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2005 Annual Radiological Environmental Operating Report

Please find enclosed a copy of the 2005 Annual Radiological Environmental Operating Report for the Duane Arnold Energy Center (DAEC). This report is transmitted in accordance with the DAEC Offsite Dose Assessment Manual (ODAM) Section 8.2.2 and Technical Specifications Section 5.6.2.

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ENCLOSURE

**DUANE ARNOLD ENERGY CENTER
2005 Annual Radiological Environmental Operating Report**



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DUANE ARNOLD ENERGY CENTER
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ANNUAL REPORT
TO THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

Radiation Environmental Monitoring Program

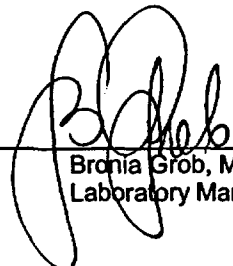
January 1 to December 31, 2005

Prepared and submitted by

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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, 2005. 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 2005 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 due to the operation of the Duane Arnold Energy Center is indicated.

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 should not be considered radiological impact indicators.

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 the eight air sampling locations. In addition, gamma radiation is monitored at thirty-four special locations: eighteen in a circle within a 0.5 mi. radius of the DAEC stack; six in 22.5° sectors within 1 mi. of the DAEC stack; ten in 22.5° sectors between 1 and 3 miles of the DAEC stack and four locations greater than 3 miles of the DAEC stack. TLDs are placed at each location and are exchanged and analyzed quarterly.

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 three locations during the non-grazing season, October through April, and biweekly during the grazing season, May 1 through September 30. One location (D-108) is a control, the rest are indicators. All 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-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. Also, potable ground water is collected quarterly from a treated municipal water system (D-53), the inlet to the municipal water treatment system (D-54) and four additional ground water locations (D-55, D-57, D-58, and D-72). 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.

Program Description (continued)

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

Surface water is collected monthly from two river locations, D-50 (Inlet, control) and D-51 (Discharge). The sewage effluent location (D-107) is also monitored. All 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-107). 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) Air Particulates / Air Iodine:

No air particulate sample was available from location D-01 for the week ending 01-06-05. The substation gate was frozen.

Air particulate / Air Iodine samples were not available from location D-05 for the week ending 03-17-05. Electricity was shut off to the sampler station.

Air particulate / Air Iodine samples were not collected from locations D-01, D-02, D-08 and D-10 after the week ending March 12, 2005. Air sampling at these stations was discontinued due to program realignment.

(2) Milk:

Milk was not available from location D-101 for all of 2005. The goat was sold. Sampling was continued at location D-109.

Milk was not available from location D-96, D-108 and D-109 for the August 9, 2005 collection. Samples were collected but damaged in shipping. These lost samples constitute a missed sample per the requirements specified by the ODAM.

Milk was not available from location D-96 after the September 7, 2005 collection. The herd was sold.

(3) Hay and Grain:

Forage samples were not available from the locations D-16 and D-58 for the collection of September 20, 2005.

(4) Thermoluminescent Dosimeters:

TLD for location D-2 was missing for the third quarter, 2005. The TLD was lost in the field.

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.

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

Tritium was determined 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. Dept 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

There were several modifications to the program in 2005.

Air Particulates / Air Iodine

Airborne iodine sampling increased at four sampling sites (D-03, D-06, D-13, D-16).

Four control locations outside the five mile limit (D-01, D-02, D-08, D-10) were eliminated in May, 2005.

Surface water.

Surface water collections at D-49, (upstream control), and D-99, (Pleasant Lake) were discontinued. Analysis for the concentration of naturally-occurring potassium-40 is no longer required for location D-107 (sewage effluent).

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.

The tabulated results of all measurements are not included in this section, although references to these results will be made in the discussion. A complete tabulation of results for 2003 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 2005.

4.2 Program Findings

Results obtained show background levels of radioactivity in the environmental samples collected in 2005.

Airborne Particulates

The average annual gross beta concentrations in airborne particulates were identical at both indicator and control locations (0.031 pCi/m³) and similar to levels observed from 1990 through 2004. The results are tabulated below.

<u>Year</u>	<u>Indicators</u>	<u>Controls</u>		<u>Year</u>	<u>Indicators</u>	<u>Controls</u>
Concentration (pCi/m ³)				Concentration (pCi/m ³)		
1990	0.022	0.024		1998	0.024	0.024
1991	0.023	0.022		1999	0.026	0.027
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

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. All other gamma-emitting isotopes were below their respective LLD limits. No effect from plant operation is indicated.

Airborne Iodine

Weekly levels of airborne iodine-131 were below the lower limit of detection (LLD) of 0.07 pCi/m³ in all samples.

Ambient Radiation (TLDs)

At twelve air sampling locations, the TLD readings averaged 17.3 and 15.7 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 19.4 mR/quarter, 19.9 mR/quarter and 17.4 mR/quarter, respectively. The average for all locations was 18.4 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.

Precipitation

Precipitation from an on-site location was analyzed for tritium and gamma-emitting isotopes.

Slight tritium activity was measured on site for the first quarter of 2005, at a concentration of 246 pCi/L. Concentration of tritium in precipitation was below the LLD of 184 pCi/L for the second, third and fourth quarters.

No gamma-emitting isotopes were detected.

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 2005 show no radiological effects of plant operation.

Ground Water

The annual mean for gross beta activity measured 3.0 pCi/L, similar to levels observed from 1990 through 2004.

The location with the highest mean (4.3 pCi/L) was D-58, a farm 1.0 mile distant from the plant. Tritium activity measured below the LLD of 190 pCi/L in all samples. No effect from plant operation is indicated.

Vegetation

Iodine-131 concentrations in broadleaf vegetation were below the LLD level of 0.054 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 concentrations in soil were below the LLD level of 0.021 pCi/g dry weight in all samples. Cesium-137 activity averaged 0.18 pCi/g dry weight. The cesium-137 activity is similar to or less than levels observed from 1990 through 2004, these levels are generally attributable to deposition of fallout from previous decades.

Naturally-occurring potassium-40 averaged 13.74 pCi/g dry weight. No effect from the plant operation is indicated.

Surface Water

Measurable tritium was detected on site in two of the four D-107 (sewage effluent) composites, at an average concentration of 729 pCi/L. This is 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 180 pCi/L.

All gamma-emitting isotopes were below their respective LLDs.

No plant effect on surface water is indicated.

Fish

All gamma-emitting isotopes, except naturally-occurring potassium-40, in edible portions were below detection limits. The potassium-40 level was similar at both indicator and control locations (3.24 and 2.92 pCi/g wet, respectively). No plant effect on fish is indicated.

River Sediments

No effect from the plant operation is indicated.

River sediments were collected in June and September, 2005, and analyzed for gamma-emitting isotopes. Potassium-40 activity ranged from 6.77 – 10.96 pCi/g dry weight and averaged 8.37 pCi/g dry weight.

All other gamma-emitting isotopes were below detection limits.

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 x 10 ⁹ y
II. Fission Products^b			
Nuclear 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		Sampling and Collection Frequency	Type and Frequency of Analysis ^a
	Sample Point	Description		
Airborne Particulates	3	Hiawatha	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.
	5	Palo		
	6	Center Point		
	7	Shellsburg		
	11	Toddville		
	13	Alburnett (C)		
	15	On-site North		
	16	On-site South		
Airborne Iodine	3	Hiawatha	Continuous operation of sampler with sample collection at least once per week.	Analyze each cartridge for iodine-131.
	5	Palo		
	6	Center Point		
	7	Shellsburg		
	11	Toddville		
	13	Alburnett (C)		
	15	On-site North		
	16	On-site South		
Ambient Radiation	1-2 (C), 8, 10		One dosimeter continuously at each location. Dosimeters are changed at least quarterly.	Read gamma radiation dose quarterly .
	3, 5-7, 11, 13, 15, 16	Air Particulate Locations		
	17-23, 28-32,	≤ 0.5 mi. of Stack		
	43-48 82-86, 91	≤ 1.0 mi. of Stack		
	33-42	≤ 3.0 mi. of Stack		
Surface Water	50	Plant Intake (C)	Once per month.	Gamma isotopic analyses of each sample (by location). Composite monthly samples to form quarterly composite (by location). Analyze quarterly composite for tritium.
	51	Plant Discharge		
	107	Plant Sewage Discharge		

(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		Sampling and Collection Frequency	Type and Frequency of Analysis ^a
	Sample Point	Description		
Ground Water (potable)	53	Treated Municipal Water	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, 57, 58, 72	On-site well Wells off-site and within 4 km of DAEC		
River Sediment	50	Plant Intake (C)	At least once every six months.	Gamma isotopic analysis of each sample.
	51	Plant Discharge		
	107	Sewage Effluent Canal (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. I-131 analysis on broadleaf vegetation.
	108 (C)			
Fish	49	Cedar River upstream of DAEC not influenced by effluent (C)	One sample per 6 months (once during January through July and once during August through December).	Gamma isotopic analysis on edible portions.
	61	Downstream of DAEC in influence of effluent		
Milk ^b	108 (C)	Control Farm	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.
	96, 101, 109	Dairy Farms within 10 miles of Site	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		Sampling and Collection Frequency	Type and Frequency of Analysis ^a
	Sample Point	Description		
Precipitation		On-site	Monthly	Gamma isotopic on all samples. Tritium on quarterly composites.
Meat ^c		On-site	Annually	Gamma Isotopic
Soil	15, 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 lower limit of detection (LLD) should be reported quantitatively; conversely, any radionuclide concentration less than the LLD should not be reported.

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

^c Meat was not collected in 2005; no animals slaughtered for home use.

Table 5.3 Sampling locations, Duane Arnold Energy Center.

Code	Type	Sampling Location		
		Sampling Point	Location Description	Distance and Direction from Site Stack
D-1	C	1	Cedar Rapids	11 mi @ 135° SE
D-2	C	2	Marion	11 mi @ 125° ESE
D-3		3	Hiawatha	7 mi @ 130° SE
D-5		5	Palo	3 mi @ 200° SSW
D-6		6	Center Point	7 mi @ 0° N
D-7		7	Shellsburg	6 mi @ 255° W
D-8		8	Urbana	10 mi @ 345° NW
D-10		10	Atkins	9 mi @ 210° SSW
D-11		11	Toddville	4 mi @ 90° E
D-13	C	13	Alburnett	9 mi @ 70° ENE
D-15		15	On-site, Northwest	0.5 mi @ 305° NW
D-16		16	On-site, South	0.5 mi @ 190° SSE
D-17		17	On-site, N	0.5 mi N
D-18		18	On-site, NNE	0.5 mi NNE
D-19		19	On-site, NE	0.5 mi NE
D-20		20	On-site, ENE	0.5 mi ENE
D-21		21	On-site, ENE	0.5 mi ENE
D-22		22	On-site, E	0.5 mi E
D-23		23	On-site, ESE	0.5 mi ESE
D-28		28	On-site, WSW	0.5 mi WSW
D-29		29	On-site, W	0.5 mi W
D-30		30	On-site, WNW	0.5 mi WNW
D-31		31	On-site, NW	0.5 mi NW
D-32		32	On-site, NNW	0.5 mi NNW
D-33		33	3 miles N	3.0 mi N
D-34		34	3 miles NNE	3.0 mi NNE
D-35		35	3 miles NE	3.0 mi NE
D-36		36	3 miles ENE	3.0 mi ENE
D-37		37	3 miles E	3.0 mi E
D-38		38	3 miles ESE	3.0 mi ESE
D-39		39	3 miles SE	3.0 mi SE
D-40		40	3 miles SSE	3.0 mi SSE
D-41		41	3 miles S	3.0 mi S
D-42		42	3 miles SSE	3.0 mi SSE
D-43		43	1 mile SSw	1.0 mi SSW
D-44		44	1 mile WSW	1.0 mi WSW
D-45		45	1 mile W	1.0 mi W
D-46		46	1 mile WNW	1.0 mi WNW

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

Code	Type	Sampling Location		
		Sampling Point	Location Description	Distance and Direction from Site Stack
D-47		47	1 mile WNW	1.0 mi WNW
D-48		48	1 mile NW	1.0 mi NW
D-49	C	49	Lewis Access, upstream of DAEC	4.0 mi NNW
D-50	C	50	Plant Intake	
D-51		51	Plant Discharge	
D-53		53	Treated Municipal Water	
D-54		54	Inlet, Municipal Water Treatment System	
D-55		55	On-site Well	
D-57		57	Farm (Off-site Well)	1.0 mi WSW
D-58		58	Farm (Off-site Well)	0.5 mi WSW-SW
D-61		61	0.5 mi downstream of plant discharge	
D-72		72	Farm	2.0 mi SSW
D-82		82	On-site, SE	0.5 mi SE
D-83		83	On-site, SSE	0.5 mi SSE
D-84		84	On-site, S	0.5 mi S
D-85		85	On-site, SSW	0.5 mi SSW
D-86		86	On-site, SW	0.5 mi SW
D-91		91	On-site, N	0.5 mi N
D-94		94	Farm	2.7 mi N
D-96		96	Farm	8.0 mi SSW
D-101		101	Farm	4.0 mi E
D-107		107	Sewage Effluent Canal	On-site
D-108	C	108	Farm	17.3 mi. SW
D-109		109	Farm	3.6 mi. SW

"C" denotes control location. All other locations are indicators.

Table 5.4 Type and Frequency of collection.

Location	Location Type	Weekly	Monthly	Quarterly	Semiannually	Annually
D-1	C	AP ^a		TLD		
D-2	C	AP, AI ^a		TLD		
D-3		AP, AI ^b		TLD		
D-5		AP, AI		TLD		
D-6		AP, AI ^b		TLD		
D-7		AP, AI		TLD		
D-8		AP, AI ^a		TLD		
D-10		AP ^a		TLD		
D-11		AP, AI		TLD		
D-13	C	AP, AI ^b		TLD		
D-15		AP, AI		TLD		SO
D-16		AP, AI ^b		TLD		SO, G
D-17 to D-23				TLD		
D-28 to D-42				TLD		
D-43 to D-48				TLD		
D-49	C				F	
D-50	C		SW		RS	
D-51			SW		RS	
D-53			WW			
D-54			WW			
D-55			WW			
D-57			WW			G
D-58			WW			G
D-61					F	
D-63			M			G
D-72			WW			G
D-82 to D-86				TLD		
D-91				TLD		
D-94						G
D-96			M			
D-101			M			
D-107			SW		RS	
D-108	C		M			G
D-109			M			G
On-site			P			ME

"C" denotes control location. All other locations are indicators.

^a Location dropped in May, 2005.

^b Analysis for airborne I-131 added in May, 2005.

Table 5.5. Sample codes used in 5.4.

Code	Description
AP	Airborne Particulates
AI	Airborne Iodine
TLD	Thermoluminescent Dosimeter
P	Precipitation
M	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
AP	Beta	D-01	01-06-05	No sample; substation gate frozen.
MI	I-131, Gamma	D-101	01-04-05	No sample; no milk available. Sample collected at D-109.
MI	I-131, Gamma	D-101	02-01-05	No milk available; goat sold.
AP/AI	Beta, I-131	D-05	03-17-05	Electricity off; not enough volume for viable sample.
AP/AI	I-131, Gamma	D-01, D-02, D-08, D-10	05-12-05	Locations dropped from program.
MI *	I-131, Gamma	D-96, D108, D-109	08-09-05	Samples damaged during shipment.
VE	Gamma	D-16, D-58	09-20-05	No forage samples available.
TLD	Ambient Gamma	D-2	3rd Qtr., 2005	Lost in the field.
TLD	Ambient Gamma	D-10	4th Qtr., 2005	Lost in the field.

* 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 Reporting Period January-December, 2005
 (County, State)

Sample Type (Units)	Type and Number of Analyses ^g	LLD ^h	Indicator Locations Mean (Fj) Range ^e	Location with Highest Annual Mean		Control Locations Mean (Fj) Range ^e	Number Non-Routine Results ^a
				Location ^f	Mean (Fj) Range ^e		
Airborne Particulates (pCi/m ³)	GB 485	0.002	0.031 (399/399) (0.005-0.080)	D-8, Urbana 10 mi. NW	0.033 (18/18) (0.017-0.068)	0.031 (86/86) (0.010-0.074)	0
	GS 40						
	Be-7	0.020	0.083 (32/32) (0.046-0.178)	D-2, Marion 11 mi. SE	0.123 (2/2) (0.083-0.162)	0.100 (8/8) (0.052-0.162)	0
	Nb-95	0.0049	< LLD			< LLD	0
	Zr-95	0.0047	< LLD			< LLD	0
	Ru-103	0.0034	< LLD			< LLD	0
	Ru-106	0.012	< LLD			< LLD	0
	Cs-134	0.0013	< LLD			< LLD	0
	Cs-137	0.0010	< LLD			< LLD	0
	Ce-141	0.0071	< LLD			< LLD	0
Ce-144	0.0071	< LLD			< LLD	0	
Airborne Iodine (pCi/m ³)	I-131 378	0.030	< LLD	-	-	< LLD	0
TLD, AP Locations (mR/quarter)	Gamma 46	1.0	17.3 (35/35) (14.0-24.7)	D-8, Urbana 10 mi. NW	21.0 (4/4) (19.3-24.7)	15.7 (11/11) (11.7-20.7)	0
TLD, within 0.5 mi. of Stack (mR/quarter)	Gamma 72	1.0	19.4 (72/72) (14.4-25.1)	D-29, On-site 0.5 mi. W	23.3 (4/4) (20.7-25.1)	None	0
TLD, within 1.0 mi. of Stack (mR/quarter)	Gamma 24	1.0	19.9 (24/24) (15.4-23.9)	D-46, 1 mi. WNW	21.9 (4/4) (19.7-23.2)	None	0
TLD, within 3.0 mi. of Stack (mR/quarter)	Gamma 40	1.0	17.4 (40/40) (14.2-25.9)	D-37, 3 mi. E	22.4 (4/4) (20.0-25.9)	None	0
Precipitation (pCi/L)	H-3 4	184	246 (1/4)	On-site	246 (1/4)	None	0
	GS 12						
	Mn-54	7.3	< LLD	-	-	None	0
	Fe-59	15.0	< LLD	-	-	None	0
	Co-58	8.5	< LLD	-	-	None	0
	Co-60	6.8	< LLD	-	-	None	0
	Zn-65	14.1	< LLD	-	-	None	0
	Nb-95	8.1	< 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 Reporting Period January-December, 2005
 (County, State)

Sample Type (Units)	Type and Number of Analyses ^d	LLD ^p	Indicator Locations Mean (F) ^f Range ^e	Location with Highest Annual Mean		Control Locations Mean (F) ^f Range ^e	Number Non-Routine Results ^g
				Location ^f	Mean (F) ^f Range ^e		
Precipitation (pCi/L) (continued)	Zr-95	15.2	< LLD	-	-	< LLD	0
	I-131	24.7	< LLD	-	-	< LLD	0
	Cs-134	10.1	< LLD	-	-	< LLD	0
	Cs-137	7.6	< LLD	-	-	< LLD	0
	Ba-140	46.0	< LLD	-	-	< LLD	0
	La-140	9.9	< LLD	-	-	< LLD	0
Milk (pCi/L)	I-131 49	1.0	< LLD	-	-	< LLD	0
	GS 49						
	K-40	100	1291 (31/31) (1126-1438)	D-96, Farm 8 mi. SSW	1306 (13/13) (1206-1438)	1299 (18/18) (977-1451)	0
	Cs-134	15	< LLD	-	-	< LLD	0
	Cs-137	18	< LLD	-	-	< LLD	0
	Ba-140	60	< LLD	-	-	< LLD	0
	La-140	15	< LLD	-	-	< LLD	0
Ground Water (pCi/L)	GB 24	1.4	3.0 (16/24) (1.6-5.3)	D-58, Farm 1 mi. WSW-SW	4.3 (4/4) (3.7-5.0)	None	0
	H-3 24	191	< LLD	-	-	< LLD	0
Broadleaf Vegetation (pCi/g wet)	I-131 6	0.054	< LLD	-	-	< LLD	0
	GS 6						
	K-40	0.5	5.37 (5/5) (2.79-7.11)	D-57, Farm 1 mi. WSW	7.11 (1/1)	2.9 (1/1)	0
	Mn-54	0.041	< LLD	-	-	< LLD	0
	Co-58	0.041	< LLD	-	-	< LLD	0
	Co-60	0.040	< LLD	-	-	< LLD	0
	Nb-95	0.033	< LLD	-	-	< LLD	0
	Zr-95	0.066	< LLD	-	-	< LLD	0
	Ru-103	0.037	< LLD	-	-	< LLD	0
	Ru-106	0.30	< LLD	-	-	< LLD	0
	Cs-134	0.042	< LLD	-	-	< LLD	0
	Cs-137	0.045	< LLD	-	-	< LLD	0
	Ce-141	0.056	< LLD	-	-	< LLD	0
	Ce-144	0.23	< LLD	-	-	< LLD	0

Table 5.7 Radiological Environmental Program Summary.

Name of Facility	<u>Duane Arnold Energy Center</u>	Docket No.	<u>50-331</u>
Location of Facility	<u>Linn, Iowa</u>	Reporting Period	<u>January-December, 2005</u>
	(County, State)		

Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^d	Location with Highest Annual Mean		Control Locations Mean (F) ^e Range ^f	Number Non-Routine Results ^g
				Location ^f	Mean (F) ^e Range ^f		
Vegetation (Grain) (pCi/g wet)	GS 12						
	K-40	0.5	9.03 (10/10) (1.48-21.35)	D-108, Farm 17.3 mi. SW	17.25 (2/2) (2.60-31.89)	17.25 (2/2) (2.60-31.89)	0
	Mn-54	0.054	< LLD	-	-	< LLD	0
	Co-58	0.035	< LLD	-	-	< LLD	0
	Co-60	0.036	< LLD	-	-	< LLD	0
	Nb-95	0.057	< LLD	-	-	< LLD	0
	Zr-95	0.11	< LLD	-	-	< LLD	0
	Ru-103	0.036	< LLD	-	-	< LLD	0
	Ru-106	0.35	< LLD	-	-	< LLD	0
	Cs-134	0.038	< LLD	-	-	< LLD	0
	Cs-137	0.041	< LLD	-	-	< LLD	0
	Ce-141	0.10	< LLD	-	-	< LLD	0
	Ce-144	0.45	< LLD	-	-	< LLD	0
Soil (pCi/g wet)	Sr-90 2	0.021	< LLD	-	-	None	0
	GS 2						
	K-40	0.5	13.74 (2/2) (9.80-17.68)	D-15, On-site 0.5 mi. NW	17.68 (1/1)	None	0
	Mn-54	0.050	< LLD	-	-	None	0
	Fe-59	0.066	< LLD	-	-	None	0
	Co-58	0.048	< LLD	-	-	None	0
	Co-60	0.047	< LLD	-	-	None	0
	Zn-65	0.088	< LLD	-	-	None	0
	Nb-95	0.036	< LLD	-	-	None	0
	Zr-95	0.093	< LLD	-	-	None	0
	Ru-103	0.036	< LLD	-	-	None	0
	Ru-106	0.32	< LLD	-	-	None	0
	Cs-134	0.059	< LLD	-	-	None	0
	Cs-137	0.050	0.18 (2/2) (0.17-0.18)	D-15, On-site 0.5 mi. NW	0.18 (1/1)	None	0
Ce-141	0.075	< LLD	-	-	None	0	
Ce-144	0.19	< 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 Reporting Period January-December, 2005
 (County, State)

Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^d	Location with Highest Annual Mean		Control Locations Mean (F) ^e Range ^f	Number Non-Routine Results ^g
				Location ^h	Mean (F) ^c Range ^d		
Surface Water (pCi/L)	H-3 12	180	729 (2/8)	D-107, Onsite Sewage Effluent	729 (2/4)	< LLD	0
	I-131 36	15	< LLD	-	-	< LLD	0
	GS 36						
	Mn-54 10		< LLD	-	-	< LLD	0
	Fe-59 30		< LLD	-	-	< LLD	0
	Co-58 10		< LLD	-	-	< LLD	0
	Co-60 10		< LLD	-	-	< LLD	0
	Zn-65 30		< LLD	-	-	< LLD	0
	Nb-95 15		< LLD	-	-	< LLD	0
	Zr-95 30		< LLD	-	-	< LLD	0
	Cs-134 10		< LLD	-	-	< LLD	0
	Cs-137 10		< LLD	-	-	< LLD	0
	Ba-140 60		< LLD	-	-	< LLD	0
	La-140 15		< LLD	-	-	< LLD	0
Sediments (pCi/g dry)	GS 6						
	K-40 1.0		7.70 (4/4) (6.77-8.48)	D-50, Plant Intake	9.70 (2/2) (8.44-10.96)	9.70 (2/2) (8.44-10.96)	0
	Mn-54 0.052		< LLD	-	-	< LLD	0
	Fe-59 0.12		< LLD	-	-	< LLD	0
	Co-58 0.074		< LLD	-	-	< LLD	0
	Co-60 0.055		< LLD	-	-	< LLD	0
	Zn-65 0.13		< LLD	-	-	< LLD	0
	Nb-95 0.067		< LLD	-	-	< LLD	0
	Zr-95 0.11		< LLD	-	-	< LLD	0
	Ru-103 0.096		< LLD	-	-	< LLD	0
	Ru-106 0.54		< LLD	-	-	< LLD	0
	Cs-134 0.073		< LLD	-	-	< LLD	0
	Cs-137 0.055		< LLD	-	-	< LLD	0
	Ce-141 0.16		< LLD	-	-	< LLD	0
	Ce-144 0.29		< LLD	-	-	< LLD	0

Table 5.7 Radiological Environmental Program Summary.

Name of Facility	<u>Duane Arnold Energy Center</u>	Docket No.	<u>50-331</u>
Location of Facility	<u>Linn, Iowa</u>	Reporting Period	<u>January-December, 2005</u>
	(County, State)		

Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^d	Location with Highest Annual Mean		Control Locations Mean (F) ^e Range ^e	Number Non-Routine Results ^e
				Location ^f	Mean (F) ^e Range ^e		
Fish (pCi/g wet)	GS 8						
	K-40	1.0	3.24 (4/4) (2.73-3.73)	D-61, Downstream	3.24 (4/4) (2.73-3.73)	2.92 (4/4) (2.06-3.46)	0
	Mn-54	0.024	< LLD	-	-	< LLD	0
	Fe-59	0.059	< LLD	-	-	< LLD	0
	Co-58	0.027	< LLD	-	-	< LLD	0
	Co-60	0.018	< LLD	-	-	< LLD	0
	Zn-65	0.052	< LLD	-	-	< LLD	0
	Nb-95	0.036	< LLD	-	-	< LLD	0
	Zr-95	0.067	< LLD	-	-	< LLD	0
	Ru-103	0.035	< LLD	-	-	< LLD	0
	Ru-106	0.19	< LLD	-	-	< LLD	0
	Cs-134	0.020	< LLD	-	-	< LLD	0
	Cs-137	0.018	< LLD	-	-	< LLD	0
	Ce-141	0.037	< LLD	-	-	< LLD	0
	Ce-144	0.11	< LLD	-	-	< LLD	0

^a GB = Gross beta; GS = Gamma spectroscopy

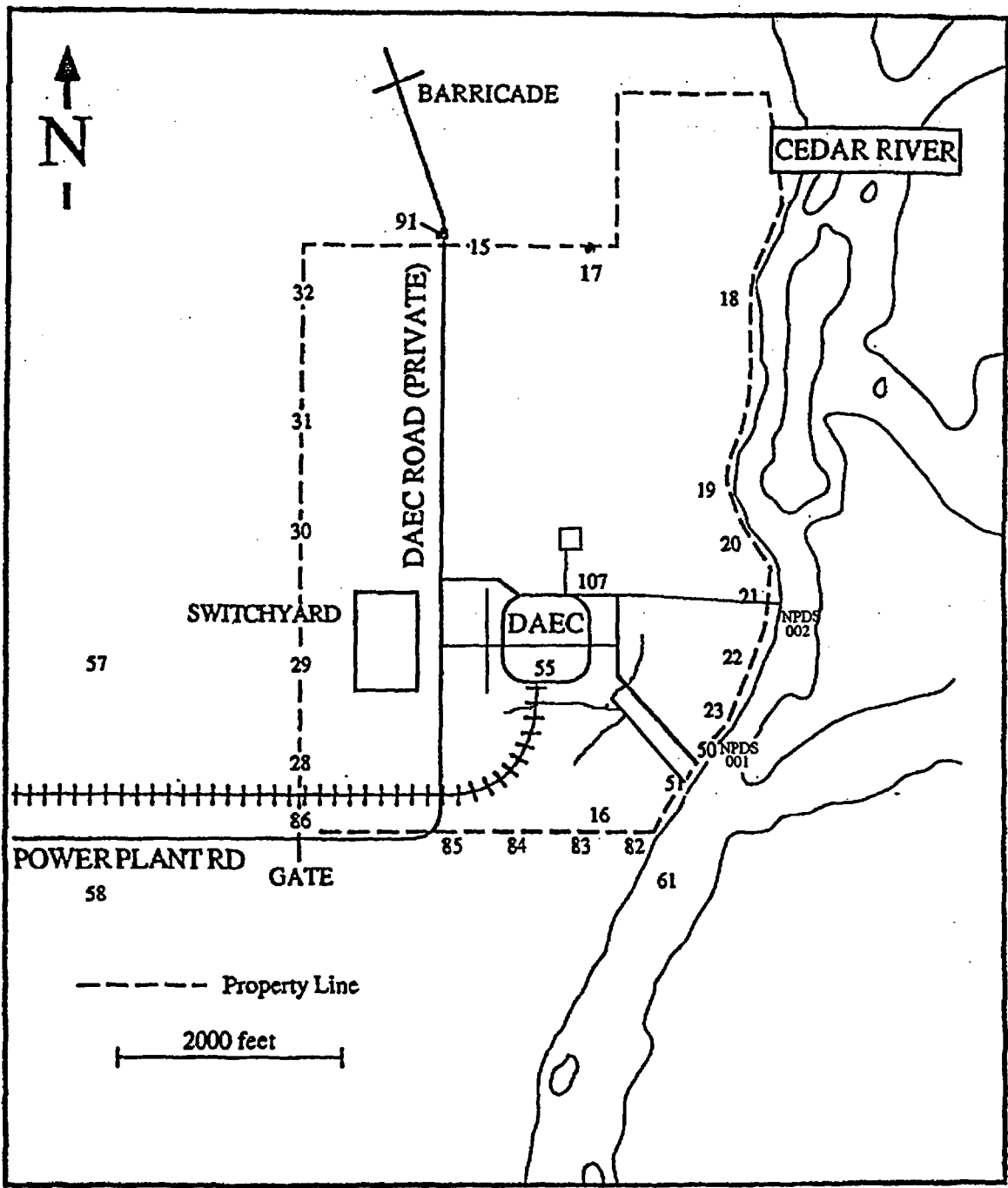
^b LLD = Nominal lower limit of detection based on 4.66 sigma counting error for the background sample.

^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.

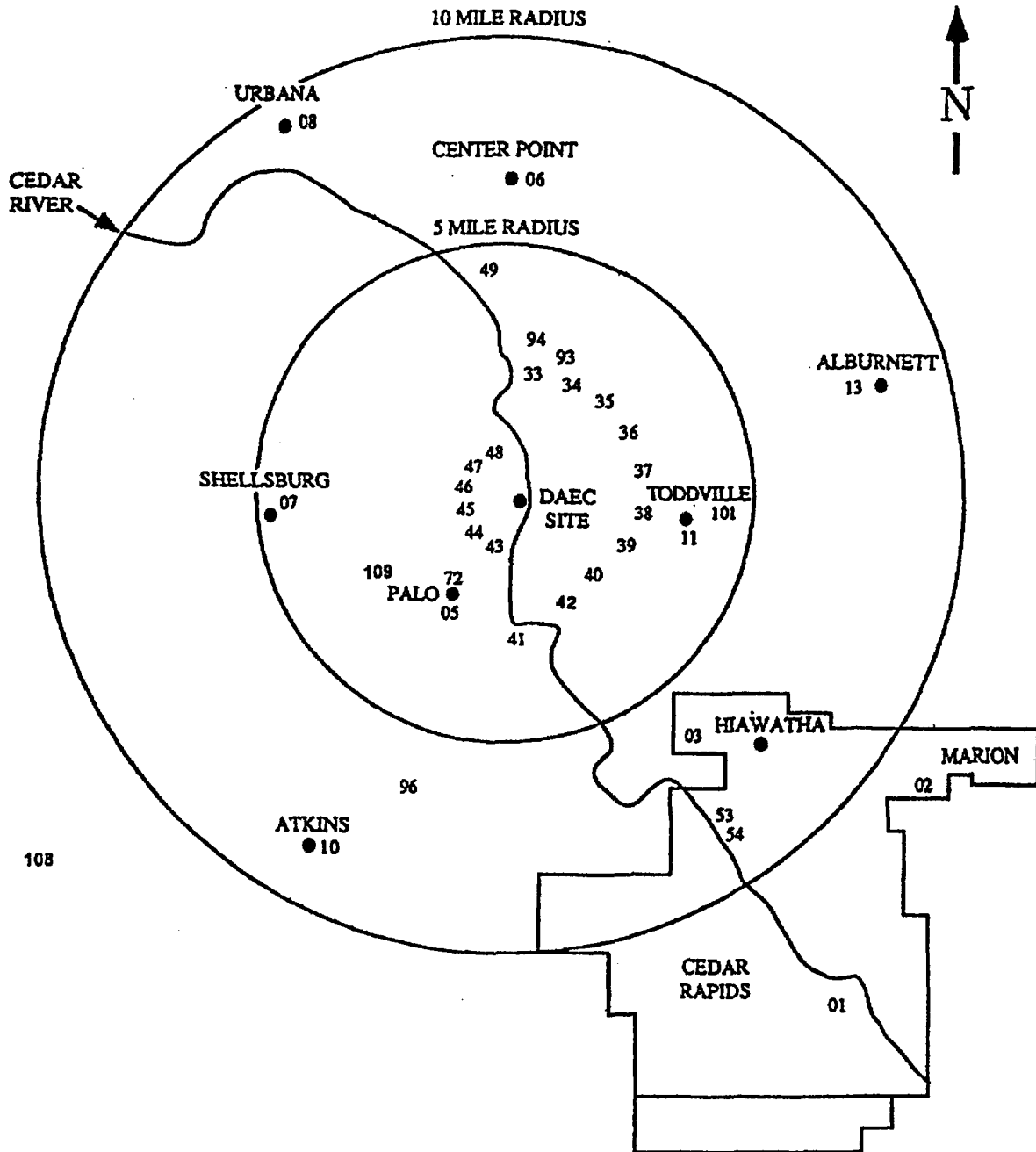
^e Non-routine results are those which exceed ten times the control station value for the location. If a control station value is not available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

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



Refer to 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 from the Duane Arnold Energy Center



Refer to 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, 2005 through December, 2005

Appendix A

Interlaboratory Comparison Program Results

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

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

Results in Table A-1 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

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 list results of 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. Data for previous years available upon request.

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

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 > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89 ^b	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90 ^b	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	≤ 100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	≤ 4,000 pCi/liter > 4,000 pCi/liter	± 1σ = (pCi/liter) = 169.85 x (known) ^{0.0933} 10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	≥ 0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129 ^b	≤ 55 pCi/liter > 55 pCi/liter	6.0 pCi/liter 10% of known value
Uranium-238, Nickel-63 ^b Technetium-99 ^b	≤ 35 pCi/liter > 35 pCi/liter	6.0 pCi/liter 15% of known value
Iron-55 ^b	50 to 100 pCi/liter > 100 pCi/liter	10 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	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory Result ^b	ERA Result ^c	Control Limits	
STW-1051	02/15/05	Sr-89	28.0 ± 1.2	29.4	20.7 - 38.1	Pass
STW-1051	02/15/05	Sr-90	25.1 ± 0.7	24.4	15.7 - 33.1	Pass
STW-1052	02/15/05	Ba-133	52.9 ± 2.8	53.4	44.2 - 62.6	Pass
STW-1052	02/15/05	Co-60	54.4 ± 0.4	56.6	47.9 - 65.3	Pass
STW-1052	02/15/05	Cs-134	67.7 ± 1.8	64.9	56.2 - 73.6	Pass
STW-1052	02/15/05	Cs-137	39.6 ± 1.8	40.2	31.5 - 48.9	Pass
STW-1052	02/15/05	Zn-65	159.7 ± 3.0	161.0	133.0 - 189.0	Pass
STW-1053	02/15/05	Gr. Alpha	55.1 ± 1.8	67.9	38.5 - 97.3	Pass
STW-1053	02/15/05	Gr. Beta	46.8 ± 1.3	51.1	38.5 - 97.3	Pass
STW-1054	02/15/05	Ra-226	13.7 ± 1.5	14.1	10.4 - 17.8	Pass
STW-1054	02/15/05	Ra-228	13.3 ± 0.6	13.7	7.8 - 19.6	Pass
STW-1054	02/15/05	Uranium	5.1 ± 0.2	5.0	0.0 - 10.2	Pass
STW-1055	05/17/05	Sr-89	45.1 ± 4.1	41.3	32.6 - 50.0	Pass
STW-1055	05/17/05	Sr-90	7.5 ± 0.9	5.9	0.0 - 14.6	Pass
STW-1056	05/17/05	Ba-133	87.1 ± 2.0	88.4	73.1 - 104.0	Pass
STW-1056	05/17/05	Co-60	38.4 ± 0.8	37.0	28.3 - 45.7	Pass
STW-1056	05/17/05	Cs-134	75.3 ± 0.7	78.6	69.9 - 87.3	Pass
STW-1056	05/17/05	Cs-137	201.0 ± 8.4	194.0	184.0 - 218.0	Pass
STW-1056	05/17/05	Zn-65	130.0 ± 6.7	118.0	97.6 - 138.0	Pass
STW-1057	05/17/05	Gr. Alpha	42.7 ± 2.9	37.0	21.0 - 53.0	Pass
STW-1057	05/17/05	Gr. Beta	34.0 ± 0.4	34.2	25.5 - 42.9	Pass
STW-1058	05/17/05	I-131	14.7 ± 0.5	15.5	10.3 - 20.7	Pass
STW-1059	05/17/05	Ra-226	6.6 ± 0.1	7.6	5.6 - 9.5	Pass
STW-1059	05/17/05	Ra-228	19.3 ± 0.7	18.9	10.7 - 27.1	Pass
STW-1059	05/17/05	Uranium	9.6 ± 0.1	10.1	4.9 - 15.3	Pass
STW-1060	05/17/05	H-3	24100.0 ± 109.0	24400.0	20200.0 - 28600.0	Pass
STW-1067	08/16/05	Sr-89	29.1 ± 3.0	28.0	19.3 - 36.7	Pass
STW-1067	08/16/05	Sr-90	36.0 ± 0.6	33.8	25.1 - 42.5	Pass
STW-1068	08/16/05	Ba-133	107.0 ± 1.7	106.0	87.7 - 124.0	Pass
STW-1068	08/16/05	Co-60	15.2 ± 0.2	13.5	4.8 - 22.2	Pass
STW-1068	08/16/05	Cs-134	89.1 ± 0.3	92.1	83.4 - 101.0	Pass
STW-1068	08/16/05	Cs-137	72.1 ± 1.0	72.7	64.0 - 81.4	Pass
STW-1068	08/16/05	Zn-65	67.4 ± 1.4	65.7	54.3 - 77.1	Pass
STW-1069	08/16/05	Gr. Alpha	44.3 ± 1.5	55.7	31.6 - 79.8	Pass
STW-1069	08/16/05	Gr. Beta	58.4 ± 2.1	61.3	44.0 - 78.6	Pass
STW-1070	08/16/05	Ra-226	16.6 ± 1.5	16.6	12.3 - 20.9	Pass
STW-1070	08/16/05	Ra-228	6.2 ± 0.3	6.2	3.5 - 8.9	Pass
STW-1070	08/16/05	Uranium	4.5 ± 0.1	4.5	0.0 - 9.7	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory Result ^b	ERA Result ^c	Control Limits	
STW-1072	11/15/05	Sr-89	20.6 ± 0.4	19.0	10.3 - 27.7	Pass
STW-1072	11/15/05	Sr-90	15.0 ± 0.3	16.0	7.3 - 24.7	Pass
STW-1073	11/15/05	Ba-133	31.8 ± 1.8	31.2	22.5 - 39.9	Pass
STW-1073	11/15/05	Co-60	85.0 ± 1.4	84.1	75.4 - 92.8	Pass
STW-1073	11/15/05	Cs-134	37.2 ± 2.1	33.9	25.2 - 42.6	Pass
STW-1073	11/15/05	Cs-137	27.8 ± 0.7	28.3	19.6 - 37.0	Pass
STW-1073	11/15/05	Zn-65	109.0 ± 1.0	105.0	86.8 - 123.0	Pass
STW-1074 ^d	11/15/05	Gr. Alpha	41.1 ± 1.2	23.3	13.2 - 33.4	Fail
STW-1074	11/15/05	Gr. Beta	42.7 ± 0.5	39.1	30.4 - 47.8	Pass
STW-1075	11/15/05	I-131	20.5 ± 0.6	17.4	12.2 - 22.6	Pass
STW-1076	11/15/05	Ra-226	7.8 ± 0.6	8.3	6.2 - 10.5	Pass
STW-1076 ^e	11/15/05	Ra-228	5.5 ± 0.6	3.5	2.0 - 5.0	Fail
STW-1076	11/15/05	Uranium	15.5 ± 0.3	16.1	10.9 - 21.3	Pass
STW-1077	11/15/05	H-3	12500.0 ± 238.0	12200.0	10100.0 - 14300.0	Pass

^a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental 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.

^d The original samples were calculated using an Am-241 efficiency. The samples were spiked with Th-232. Samples were recounted and calculated using the Th-232 efficiency. Results of the recount: 27.01 ± 2.35 pCi/L.

^e Decay of short-lived radium daughters contributed to a higher counting rate. Delay of counting for 100 minutes provided better results. The reported result was the average of the first cycle of 100 minutes, the average of the second cycle counts was 4.01 pCi/L.

TABLE A-2. Crosscheck program results; Thermoluminescent Dosimetry, (TLD, CaSO₄: Dy Cards).

Lab Code	Date	Description	Known Value	mR		Control Limits	Acceptance
				Lab Result	± 2 sigma		
<u>Environmental, Inc.</u>							
2005-1	4/4/2005	30 cm	55.01	64.02 ± 2.86		38.51 - 71.51	Pass
2005-1	4/4/2005	60 cm	13.75	15.43 ± 1.02		9.63 - 17.88	Pass
2005-1	4/4/2005	60 cm	13.75	14.98 ± 0.80		9.63 - 17.88	Pass
2005-1	4/4/2005	90 cm	6.11	6.24 ± 0.16		4.28 - 7.94	Pass
2005-1	4/4/2005	90 cm	6.11	5.45 ± 0.48		4.28 - 7.94	Pass
2005-1	4/4/2005	120 cm	3.44	3.50 ± 0.35		2.41 - 4.47	Pass
2005-1	4/4/2005	120 cm	3.44	3.15 ± 0.18		2.41 - 4.47	Pass
2005-1	4/4/2005	150 cm	2.2	2.31 ± 0.25		1.54 - 2.86	Pass
2005-1	4/4/2005	180 cm	1.53	1.65 ± 0.41		1.07 - 1.99	Pass
<u>Environmental, Inc.</u>							
2005-2	9/12/2005	30 cm	54.84	59.30 ± 2.66		38.39 - 71.29	Pass
2005-2	9/12/2005	60 cm	13.71	17.55 ± 1.30		9.60 - 17.82	Pass
2005-2	9/12/2005	75 cm	8.77	8.24 ± 0.38		6.14 - 11.40	Pass
2005-2	9/12/2005	90 cm	6.09	5.94 ± 0.49		4.26 - 7.92	Pass
2005-2	9/12/2005	90 cm	6.09	5.93 ± 0.37		4.26 - 7.92	Pass
2005-2	9/12/2005	120 cm	3.43	3.42 ± 0.18		2.40 - 4.46	Pass
2005-2	9/12/2005	150 cm	2.19	1.71 ± 0.14		1.53 - 2.85	Pass
2005-2	9/12/2005	150 cm	2.19	1.87 ± 0.27		1.53 - 2.85	Pass
2005-2	9/12/2005	180 cm	1.52	1.58 ± 0.99		1.06 - 1.98	Pass

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

Lab Code ^b	Date	Analysis	Concentration (pCi/L) ^a			Acceptance
			Laboratory results 2s, n=1 ^c	Known Activity	Control Limits ^d	
W-11105	1/11/2005	Gr. Alpha	24.05 ± 1.01	20.08	10.04 - 30.12	Pass
W-11105	1/11/2005	Gr. Beta	61.59 ± 1.11	65.70	55.70 - 75.70	Pass
SPW-764	2/18/2005	H-3	77595.00 ± 764.00	80543.00	64434.40 - 96651.60	Pass
SPAP-766	2/18/2005	Gr. Beta	416.08 ± 5.52	463.00	370.40 - 509.30	Pass
STW-2887	2/28/2005	Tc-99	32.91 ± 1.23	32.98	20.98 - 44.98	Pass
W-30105	3/1/2005	Gr. Alpha	25.22 ± 0.45	20.08	10.04 - 30.12	Pass
W-30105	3/1/2005	Gr. Beta	62.27 ± 0.48	65.73	55.73 - 75.73	Pass
SPW-1836	4/15/2005	I-131	109.79 ± 0.94	106.30	85.04 - 127.56	Pass
SPW-1836	4/15/2005	I-131(G)	110.25 ± 9.68	106.30	95.67 - 116.93	Pass
SPMI-1838	4/15/2005	Cs-134	25.94 ± 1.28	26.60	16.60 - 36.60	Pass
SPMI-1838	4/15/2005	Cs-137	59.31 ± 3.66	60.90	50.90 - 70.90	Pass
SPMI-1838	4/15/2005	I-131	97.71 ± 0.81	106.30	85.04 - 127.56	Pass
SPMI-1838	4/15/2005	I-131(G)	109.45 ± 3.06	106.30	95.67 - 116.93	Pass
SPMI-1838	4/15/2005	Sr-89	104.44 ± 2.89	108.20	86.56 - 129.84	Pass
SPMI-1838	4/15/2005	Sr-90	8.97 ± 0.79	7.53	0.00 - 17.53	Pass
SPVE-1932	4/18/2005	I-131(G)	1.00 ± 0.04	0.73	0.44 - 1.02	Pass
SPCH-1935	4/18/2005	I-131	382.40 ± 14.95	328.64	262.91 - 394.37	Pass
SPAP-1966	4/18/2005	Cs-134	52.10 ± 7.27	53.35	43.35 - 63.35	Pass
SPAP-1966	4/18/2005	Cs-134	57.28 ± 13.47	53.35	43.35 - 63.35	Pass
SPAP-1966	4/18/2005	Cs-137	124.68 ± 18.41	121.77	109.59 - 133.95	Pass
SPAP-1968	4/18/2005	Cs-134	52.10 ± 7.27	53.35	43.35 - 63.35	Pass
SPAP-1968	4/18/2005	Cs-137	116.79 ± 14.00	121.77	109.59 - 133.95	Pass
SPW-2098	4/26/2005	Fe-55	2565.20 ± 63.66	3017.60	2414.08 - 3621.12	Pass
SPW-2922	5/31/2005	Cs-134	27.01 ± 1.09	25.54	15.54 - 35.54	Pass
SPW-2922	5/31/2005	Cs-134	65.38 ± 2.92	60.71	50.71 - 70.71	Pass
SPW-2922	5/31/2005	Sr-89	107.90 ± 3.60	113.90	91.12 - 136.68	Pass
SPW-2922	5/31/2005	Sr-90	11.11 ± 1.13	6.90	0.00 - 16.90	Pass
SPAP-2892	6/1/2005	Gr. Beta	420.32 ± 5.55	448.00	358.40 - 492.80	Pass
SPW-2895	6/1/2005	H-3	75271.00 ± 724.00	78676.00	62940.80 - 94411.20	Pass
w-60105	6/1/2005	Gr. Alpha	23.69 ± 0.52	20.08	10.04 - 30.12	Pass
w-60105	6/1/2005	Gr. Beta	60.08 ± 0.57	65.73	55.73 - 75.73	Pass
SPF-3089	6/7/2005	Cs-134	1.08 ± 0.05	1.02	0.61 - 1.43	Pass
SPF-3089	6/7/2005	Cs-137	2.54 ± 0.10	2.43	1.46 - 3.40	Pass
SPW-	7/1/2005	Ni-63	20.57 ± 1.10	16.75	10.05 - 23.45	Pass
SPW-47731	8/24/2005	C-14	2112.30 ± 9.13	2370.80	1422.48 - 3319.12	Pass
SPW-47732	8/24/2005	C-14	2294.10 ± 10.37	2370.80	1422.48 - 3319.12	Pass
SPW-4775	8/24/2005	Fe-55	2633.50 ± 62.40	2777.50	2222.00 - 3333.00	Pass
SPMI-4834	8/30/2005	Cs-134	49.27 ± 4.68	47.02	37.02 - 57.02	Pass
SPMI-4834	8/30/2005	Cs-137	58.17 ± 8.18	60.37	50.37 - 70.37	Pass
SPMI-4834	8/30/2005	Sr-89	66.39 ± 3.13	65.90	52.72 - 79.08	Pass
SPMI-4834	8/30/2005	Sr-90	11.15 ± 1.13	9.60	0.00 - 19.60	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory results 2s, n=1 ^b	Known Activity	Control Limits ^c	
SPW-4836	8/30/2005	Cs-134	47.35 ± 5.19	47.02	37.02 - 57.02	Pass
SPW-4836	8/30/2005	Cs-137	62.91 ± 9.08	60.37	50.37 - 70.37	Pass
SPW-4836	8/30/2005	Sr-89	11.04 ± 0.98	9.60	0.00 - 19.60	Pass
SPW-4836	8/30/2005	Sr-90	65.89 ± 2.79	65.90	52.72 - 79.08	Pass
SPW-5014	8/30/2005	H-3	77518.20 ± 753.80	77602.52	62082.02 - 93123.02	Pass
W-90705	9/7/2005	Gr. Alpha	24.61 ± 0.48	20.08	10.04 - 30.12	Pass
W-90705	9/7/2005	Gr. Beta	58.35 ± 0.49	65.73	55.73 - 75.73	Pass
SPW-5237	9/22/2005	C-14	2387.40 ± 11.00	2370.80	1422.48 - 3319.12	Pass
SPW-5508	9/26/2005	Ni-63	20.64 ± 1.23	16.70	10.02 - 23.38	Pass
SPW-6019	10/24/2005	Tc-99	547.99 ± 6.69	539.22	377.45 - 700.99	Pass
SPF-6293	11/4/2005	Cs-134	941.30 ± 44.10	886.00	797.40 - 974.60	Pass
SPF-6293	11/4/2005	Cs-137	2570.40 ± 105.30	2400.00	2160.00 - 2640.00	Pass
SPAP-6309	11/7/2005	Cs-134	41.24 ± 1.91	44.03	34.03 - 54.03	Pass
SPAP-6309	11/7/2005	Cs-137	114.03 ± 5.01	120.24	108.22 - 132.26	Pass
SPAP-6311	11/7/2005	Gr. Beta	1.58 ± 0.02	1.42	1.14 - 11.42	Pass
SPW-6451	11/10/2005	H-3	77126.00 ± 747.00	76749.00	61399.20 - 92098.80	Pass
W-120105	12/1/2005	Gr. Alpha	25.16 ± 0.45	20.08	10.04 - 30.12	Pass
W-120105	12/1/2005	Gr. Beta	74.58 ± 0.81	65.73	55.73 - 75.73	Pass
SPW-7440	12/30/2005	Cs-134	42.67 ± 4.22	42.03	32.03 - 52.03	Pass
SPW-7440	12/30/2005	Cs-137	61.19 ± 7.20	59.91	49.91 - 69.91	Pass
SPMI-7442	12/31/2005	Cs-134	40.41 ± 5.66	42.03	32.03 - 52.03	Pass
SPMI-7442	12/31/2005	Cs-137	60.05 ± 7.80	59.91	49.91 - 69.91	Pass

^a Liquid sample results are reported in pCi/Liter, air filters(pCi/filter), charcoal (pCi/m³), 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.

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	Concentration (pCi/L) ^a		
				Laboratory results (4.66σ)		Acceptance Criteria (4.66 σ)
				LLD	Activity ^b	
W-11105	water	1/11/2005	Gr. Alpha	0.055	0.00 ± 0.038	1
W-11105	water	1/11/2005	Gr. Beta	0.15	-0.016 ± 0.10	3.2
SPW-765	water	2/18/2005	H-3	165.8	7.4 ± 82.5	200
SPAP-766	Air Filter	2/18/2005	Gr. Beta	0.72	0.29 ± 0.48	3.2
STW-2888	water	2/28/2005	Tc-99	1.32	0.45 ± 0.81	10
W-30105	water	3/1/2005	Gr. Alpha	0.067	-0.007 ± 0.043	1
W-30105	water	3/1/2005	Gr. Beta	0.18	-0.04 ± 0.11	3.2
SPW-1837	water	4/15/2005	Cs-134	4.66		10
SPW-1837	water	4/15/2005	Cs-137	5.38		10
SPW-1837	water	4/15/2005	I-131	0.30	-0.13 ± 0.16	0.5
SPW-1837	water	4/15/2005	I-131(G)	6.56		20
SPMI-1839	Milk	4/15/2005	I-131	0.26	-0.083 ± 0.14	0.5
SPMI-1839	Milk	4/15/2005	Sr-89	0.54	-0.069 ± 0.56	5
SPMI-1839	Milk	4/15/2005	Sr-90	0.53	0.88 ± 0.34	1
SPCH-1934	Charcoal	4/18/2005	I-131(G)	2.34		9.6
SPW-2097	water	4/26/2005	Fe-55	859.0	96.1 ± 528.4	1000
SPW-2923	water	5/31/2005	Cs-134	3.29		10
SPW-2923	water	5/31/2005	Cs-137	3.87		10
SPW-2896	water	6/1/2005	H-3	138.30	48.1 ± 85.9	200
w-60105	water	6/1/2005	Gr. Alpha	0.061	0.002 ± 0.043	1
w-60105	water	6/1/2005	Gr. Beta	0.16	0.056 ± 0.11	3.2
SPF-3090	Fish	6/7/2005	Cs-134	15.69		100
SPF-3090	Fish	6/7/2005	Cs-137	11.71		100
SPW-	water	7/1/2005	Ni-63	1.60	0.79 ± 0.99	20
SPW-4774	water	8/24/2005	C-14	12.18	2.84 ± 6.45	200
SPW-4776	water	8/24/2005	Fe-55	833	275 ± 525	1000
SPMI-4835	Milk	8/30/2005	Co-60	4.42		10
SPMI-4835	Milk	8/30/2005	Cs-134	4.18		10
SPMI-4835	Milk	8/30/2005	Cs-137	6.25		10
SPMI-4835	Milk	8/30/2005	I-131(G)	5.37		20
SPMI-4835	Milk	8/30/2005	Sr-89	0.66	-0.23 ± 0.65	5
SPMI-4835 ^d	Milk	8/30/2005	Sr-90	0.66	1.02 ± 0.41	1
SPW-4837	water	8/30/2005	Co-60	2.48		10
SPW-4837	water	8/30/2005	Cs-134	3.85		10
SPW-4837	water	8/30/2005	Cs-137	3.00		10
SPW-4837	water	8/30/2005	Sr-89	0.63	0.25 ± 0.53	5
SPW-4837	water	8/30/2005	Sr-90	0.63	-0.035 ± 0.29	1
SPW-5015	water	8/30/2005	H-3	142.8	168 ± 93	200
SPW-5238	water	9/22/2005	C-14	17.10	3.02 ± 9.04	200

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L) ^a		
				Laboratory results (4.66σ)		Acceptance Criteria (4.66 σ)
				LLD	Activity ^b	
W-90705	water	9/7/2005	Gr. Alpha	0.056	0.034 ± 0.04	1
W-90705	water	9/7/2005	Gr. Beta	0.16	0.082 ± 0.11	3.2
SPW-5238	water	9/22/2005	C-14	17.10	3.02 ± 9.04	200
SPW-5509	water	9/26/2005	Ni-63	1.25	1.23 ± 0.79	20
SPW-6020	water	10/24/2005	Tc-99	4.81	-1.75 ± 2.90	10
SPF-6294	Fish	11/4/2005	Cs-134	18.60		100
SPF-6294	Fish	11/4/2005	Cs-137	12.99		100
SPAP-6310	Air Filter	11/7/2005	Cs-134	3.23		100
SPAP-6310	Air Filter	11/7/2005	Cs-137	3.86		100
SPAP-6312	Air Filter	11/7/2005	Gr. Beta	1.22	-0.64 ± 0.64	3.2
W-120105	water	12/1/2005	Gr. Alpha	0.05	0.033 ± 0.04	1
W-120105	water	12/1/2005	Gr. Beta	0.15	-0.043 ± 0.11	3.2
SPMI-7419	Milk	12/22/2005	Co-60	7.24		10
SPMI-7419	Milk	12/22/2005	Cs-137	5.61		10
SPMI-7419	Milk	12/22/2005	I-131(G)	10.96		20
SPW-7421	water	12/22/2005	Co-60	2.43		10
SPW-7421	water	12/22/2005	Cs-137	3.12		10
SPW-7441	water	12/30/2005	Cs-134	4.25		10
SPW-7441	water	12/30/2005	Cs-137	1.63		10
SPMI-7443	Milk	12/30/2005	Cs-134	4.74		10
SPMI-7443	Milk	12/30/2005	Cs-137	8.53		10

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

^b Activity reported is a net activity result. For gamma spectroscopic analysis, activity detected below the LLD value is not reported

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

^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)*			Acceptance
			First Result	Second Result	Averaged Result	
SW-62, 63	1/3/2005	Gr. Beta	3.01 ± 0.57	2.39 ± 0.58	2.70 ± 0.41	Pass
SW-62, 63	1/3/2005	K-40	2.00 ± 0.20	2.10 ± 0.20	2.05 ± 0.14	Pass
CF-95, 96	1/3/2005	Gr. Beta	6.26 ± 0.23	6.28 ± 0.23	6.27 ± 0.16	Pass
CF-95, 96	1/3/2005	K-40	5.68 ± 0.59	5.37 ± 0.48	5.53 ± 0.38	Pass
AP-791, 792	1/14/2005	Be-7	0.057 ± 0.017	0.07 ± 0.04	0.06 ± 0.02	Pass
WW-353, 354	1/19/2005	Gr. Beta	8.37 ± 1.21	10.28 ± 1.34	9.32 ± 0.90	Pass
SO-383, 384	1/19/2005	H-3	453.50 ± 107.20	417.90 ± 106.00	435.70 ± 75.38	Pass
LW-431, 432	1/27/2005	Gr. Beta	2.45 ± 0.54	2.20 ± 0.54	2.33 ± 0.38	Pass
MI-486, 487	2/1/2005	K-40	1319.40 ± 163.60	1177.20 ± 179.70	1248.30 ± 121.51	Pass
SW-511, 512	2/1/2005	I-131	0.37 ± 0.22	0.44 ± 0.23	0.40 ± 0.16	Pass
TD-628, 629	2/1/2005	H-3	489663 ± 1918	491225 ± 1915	490444 ± 1355	Pass
DW-538, 539	2/3/2005	Gr. Beta	3.93 ± 1.18	3.62 ± 1.10	3.78 ± 0.81	Pass
MI-564, 565	2/8/2005	K-40	1316.20 ± 171.10	1292.60 ± 154.40	1304.40 ± 115.23	Pass
DW-50134, 5	2/11/2005	Gr. Beta	18.41 ± 0.98	16.76 ± 0.98	17.59 ± 0.69	Pass
SWU-893, 894	2/22/2005	Gr. Beta	4.00 ± 0.96	4.20 ± 0.72	4.10 ± 0.60	Pass
SW-925, 926	2/25/2005	Gr. Beta	5.97 ± 1.51	6.14 ± 1.55	6.06 ± 1.08	Pass
SW-950, 951	3/1/2005	Gr. Beta	0.92 ± 0.27	1.21 ± 0.27	1.07 ± 0.19	Pass
SW-950, 951	3/1/2005	Gr. Beta	2.06 ± 0.40	2.29 ± 0.44	2.18 ± 0.30	Pass
SW-973, 974	3/1/2005	I-131	1.08 ± 0.19	0.92 ± 0.18	1.00 ± 0.13	Pass
DW-50248, 9	3/16/2005	Gr. Alpha	5.27 ± 1.06	4.17 ± 0.90	4.72 ± 0.70	Pass
DW-1264, 1265	3/19/2005	I-131	0.54 ± 0.21	0.73 ± 0.20	0.63 ± 0.15	Pass
AP-1955, 1956	3/28/2005	Be-7	0.071 ± 0.009	0.071 ± 0.009	0.071 ± 0.006	Pass
AP-1890, 1891	3/29/2005	Be-7	0.060 ± 0.013	0.069 ± 0.013	0.065 ± 0.009	Pass
AP-2025, 2026	3/29/2005	Be-7	0.063 ± 0.012	0.071 ± 0.011	0.067 ± 0.008	Pass
MI-1346, 1347	3/30/2005	K-40	1252.80 ± 120.50	1334.10 ± 106.60	1293.45 ± 80.44	Pass
AP-2048, 2049	3/30/2005	Be-7	0.075 ± 0.018	0.071 ± 0.015	0.073 ± 0.012	Pass
AP-2081, 2082	3/30/2005	Be-7	0.073 ± 0.016	0.061 ± 0.018	0.067 ± 0.012	Pass
SWU-1521, 1522	3/31/2005	Gr. Beta	2.83 ± 1.16	3.46 ± 1.23	3.14 ± 0.85	Pass
WW-1738, 1739	4/5/2005	Gr. Beta	11.44 ± 1.17	11.14 ± 1.62	11.29 ± 1.00	Pass
SW-1857, 1858	4/13/2005	Gr. Beta	7.04 ± 1.71	9.96 ± 1.65	8.50 ± 1.19	Pass
LW-1911, 1912	4/14/2005	Gr. Beta	2.50 ± 0.63	3.23 ± 0.67	2.86 ± 0.46	Pass
F-1976, 1977	4/18/2005	K-40	3.09 ± 0.60	3.33 ± 0.40	3.21 ± 0.36	Pass
MI-2111, 2112	4/26/2005	K-40	1291.50 ± 177.90	1323.70 ± 108.80	1307.60 ± 104.27	Pass
SWU-2158, 2159	4/26/2005	Gr. Beta	3.69 ± 0.74	3.54 ± 0.66	3.62 ± 0.50	Pass
DW-2349, 2350	4/29/2005	I-131	0.58 ± 0.27	0.49 ± 0.27	0.53 ± 0.19	Pass
SO-2305, 2306	5/2/2005	Cs-137	0.11 ± 0.05	0.11 ± 0.04	0.11 ± 0.03	Pass
SO-2305, 2306	5/2/2005	Gr. Alpha	7.55 ± 2.88	12.41 ± 3.38	9.98 ± 2.22	Pass
SO-2305, 2306	5/2/2005	Gr. Beta	28.74 ± 2.57	28.17 ± 2.52	28.46 ± 1.80	Pass
SO-2305, 2306	5/2/2005	K-40	21.51 ± 1.22	21.42 ± 1.24	21.47 ± 0.87	Pass
SO-2305, 2306	5/2/2005	Sr-90	32.90 ± 9.90	29.60 ± 13.90	31.25 ± 8.53	Pass
MI-2260, 2261	5/3/2005	K-40	1028.10 ± 99.36	1206.70 ± 118.50	1117.40 ± 77.32	Pass
F-2630, 2631	5/5/2005	K-40	3.08 ± 0.46	3.04 ± 0.51	3.06 ± 0.34	Pass
VE-2502, 2503	5/10/2005	Gr. Alpha	0.06 ± 0.03	0.07 ± 0.04	0.07 ± 0.03	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) ^a			Acceptance
			First Result	Second Result	Averaged Result	
VE-2502, 2503	5/10/2005	Gr. Beta	3.81 ± 0.10	3.86 ± 0.10	3.83 ± 0.07	Pass
VE-2502, 2503	5/10/2005	K-40	3.79 ± 0.40	4.30 ± 0.59	4.04 ± 0.36	Pass
G-2546, 2547	5/11/2005	Be-7	0.81 ± 0.39	1.25 ± 0.38	1.03 ± 0.27	Pass
G-2546, 2547	5/11/2005	K-40	9.43 ± 1.00	7.96 ± 0.85	8.70 ± 0.66	Pass
SS-2787, 2788	5/18/2005	Cs-137	0.13 ± 0.04	0.14 ± 0.05	0.13 ± 0.03	Pass
SS-2787, 2788	5/18/2005	K-40	12.44 ± 0.76	13.33 ± 0.83	12.88 ± 0.56	Pass
SO-3056, 3057	5/19/2005	Cs-137	0.18 ± 0.04	0.17 ± 0.01	0.18 ± 0.02	Pass
SO-3056, 3057 ^b	5/19/2005	K-40	20.06 ± 1.10	21.73 ± 0.36	20.90 ± 0.58	Fail
SS-3175, 3176	5/23/2005	K-40	6.06 ± 0.44	5.96 ± 0.61	6.01 ± 0.38	Pass
SO-2865, 2866	5/25/2005	Cs-137	0.18 ± 0.04	0.18 ± 0.03	0.18 ± 0.02	Pass
SO-2865, 2866	5/25/2005	Gr. Beta	32.95 ± 2.48	33.88 ± 2.36	33.41 ± 1.71	Pass
SO-2865, 2866	5/25/2005	K-40	21.93 ± 0.97	22.32 ± 0.98	22.13 ± 0.69	Pass
DW-2935, 2936	5/27/2005	I-131	0.51 ± 0.34	0.56 ± 0.30	0.53 ± 0.23	Pass
SWU-3103, 3104	6/1/2005	Gr. Beta	3.29 ± 0.49	3.75 ± 0.66	3.52 ± 0.41	Pass
G-2958, 2959	6/1/2005	Be-7	1.06 ± 0.40	1.21 ± 0.28	1.14 ± 0.24	Pass
G-2958, 2959 ^b	6/1/2005	Gr. Beta	8.06 ± 0.07	7.79 ± 0.07	7.93 ± 0.05	Fail
G-2958, 2959	6/1/2005	K-40	5.93 ± 0.73	6.05 ± 0.28	5.99 ± 0.39	Pass
BS-4089, 4090	6/3/2005	Co-60	0.11 ± 0.02	0.10 ± 0.02	0.11 ± 0.02	Pass
BS-4089, 4090	6/3/2005	Cs-137	0.60 ± 0.05	0.62 ± 0.05	0.61 ± 0.04	Pass
DW-50527, 8	6/8/2005	Gr. Alpha	11.58 ± 1.31	13.52 ± 1.43	12.55 ± 0.97	Pass
VE-3278, 3279	6/13/2005	K-40	6.34 ± 0.59	7.29 ± 0.68	6.81 ± 0.45	Pass
MI-3299, 3300	6/15/2005	K-40	1215.40 ± 110.20	1250.70 ± 106.70	1233.05 ± 76.70	Pass
BS-3348, 3349	6/17/2005	Co-60	0.20 ± 0.04	0.22 ± 0.04	0.21 ± 0.03	Pass
BS-3348, 3349	6/17/2005	Cs-137	2.59 ± 0.10	2.51 ± 0.07	2.55 ± 0.06	Pass
BS-3348, 3349	6/17/2005	K-40	11.57 ± 0.81	11.82 ± 0.76	11.69 ± 0.56	Pass
DW-3486, 3487	6/28/2005	Gr. Beta	0.97 ± 0.54	1.67 ± 0.58	1.32 ± 0.40	Pass
SWT-3631, 3632	6/28/2005	Gr. Beta	2.12 ± 0.53	1.62 ± 0.56	1.87 ± 0.39	Pass
W-3507, 3508	6/29/2005	H-3	38717 ± 382	38017 ± 535	38367 ± 329	Pass
VE-3555, 3556	6/29/2005	Gr. Beta	7.53 ± 0.18	7.56 ± 0.18	7.55 ± 0.13	Pass
VE-3555, 3556	6/29/2005	K-40	5.70 ± 0.52	5.64 ± 0.53	5.67 ± 0.37	Pass
AP-3781, 3782	6/29/2005	Be-7	0.09 ± 0.02	0.08 ± 0.02	0.09 ± 0.01	Pass
LW-3610, 3611	6/30/2005	Gr. Beta	1.37 ± 0.35	1.40 ± 0.36	1.39 ± 0.25	Pass
SW-3760, 3761	6/30/2005	Gr. Beta	9.70 ± 1.63	9.77 ± 1.61	9.73 ± 1.15	Pass
E-3654, 3655	7/5/2005	Gr. Beta	1.76 ± 0.07	1.69 ± 0.07	1.72 ± 0.05	Pass
E-3654, 3655	7/5/2005	K-40	1.49 ± 0.25	1.05 ± 0.21	1.27 ± 0.16	Pass
MI-3676, 3677	7/5/2005	K-40	1383.90 ± 116.20	1428.20 ± 125.40	1406.05 ± 85.48	Pass
DW-3739, 3740	7/5/2005	I-131	1.93 ± 0.24	2.18 ± 0.23	2.05 ± 0.17	Pass
W-3808, 3809	7/6/2005	H-3	4189.61 ± 196.68	4438.33 ± 201.39	4313.97 ± 140.75	Pass
DW-3938, 3939	7/8/2005	I-131	1.11 ± 0.30	1.26 ± 0.31	1.18 ± 0.22	Pass
VE-3896, 3897	7/12/2005	K-40	3.44 ± 0.62	3.60 ± 0.36	3.52 ± 0.36	Pass
MI-3963, 3964	7/13/2005	K-40	1438.70 ± 102.80	1351.80 ± 100.80	1395.25 ± 71.99	Pass
DW-4068, 4069	7/15/2005	I-131	0.64 ± 0.27	0.91 ± 0.28	0.78 ± 0.20	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) ^a			Acceptance
			First Result	Second Result	Averaged Result	
VE-4290, 4291	7/26/2005	Gr. Alpha	0.11 ± 0.04	0.05 ± 0.03	0.08 ± 0.03	Pass
VE-4290, 4291	7/26/2005	Gr. Beta	4.55 ± 0.13	4.69 ± 0.14	4.62 ± 0.09	Pass
SWU-4311, 4312	7/26/2005	Gr. Beta	2.62 ± 0.64	1.67 ± 0.37	2.15 ± 0.37	Pass
SWU-4311, 4312	7/26/2005	H-3	192.30 ± 92.90	304.60 ± 97.40	248.45 ± 67.30	Pass
G-4383, 4384	8/1/2005	Be-7	2.06 ± 0.49	1.76 ± 0.29	1.91 ± 0.28	Pass
G-4383, 4384	8/1/2005	Gr. Beta	8.76 ± 0.22	8.40 ± 0.20	8.58 ± 0.15	Pass
G-4383, 4384	8/1/2005	K-40	6.74 ± 0.64	6.88 ± 0.92	6.81 ± 0.56	Pass
MI-4425, 4426	8/1/2005	K-40	1358.10 ± 169.20	1267.90 ± 164.40	1313.00 ± 117.96	Pass
TD-4446, 4447	8/1/2005	H-3	563.00 ± 252.00	529.00 ± 251.00	546.00 ± 177.84	Pass
SL-4473, 4474	8/4/2005	Gr. Beta	5.44 ± 0.48	4.57 ± 0.42	5.00 ± 0.32	Pass
SL-4473, 4474	8/4/2005	K-40	2.91 ± 0.83	2.74 ± 0.54	2.82 ± 0.49	Pass
VE-4532, 4533	8/5/2005	Gr. Beta	31.20 ± 1.20	31.70 ± 1.20	31.45 ± 0.85	Pass
VE-4618, 4619	8/9/2005	Gr. Alpha	0.09 ± 0.05	0.09 ± 0.04	0.09 ± 0.03	Pass
VE-4618, 4619	8/9/2005	Gr. Beta	4.60 ± 0.13	4.54 ± 0.12	4.57 ± 0.09	Pass
VE-4618, 4619	8/9/2005	K-40	4.19 ± 0.46	4.34 ± 0.47	4.27 ± 0.33	Pass
F-4639, 4640	8/11/2005	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.02	Pass
F-4639, 4640	8/11/2005	Gr. Beta	3.33 ± 0.11	3.37 ± 0.10	3.35 ± 0.07	Pass
F-4639, 4640	8/11/2005	K-40	2.62 ± 0.57	2.58 ± 0.59	2.60 ± 0.41	Pass
DW-4730, 4731	8/12/2005	I-131	0.82 ± 0.23	0.83 ± 0.25	0.83 ± 0.17	Pass
MI-4855, 4856	8/28/2005	K-40	1341.50 ± 107.70	1340.00 ± 114.70	1340.75 ± 78.67	Pass
MI-4855, 4856	8/28/2005	Sr-90	0.77 ± 0.37	0.87 ± 0.37	0.82 ± 0.26	Pass
MI-4945, 4946	8/31/2005	K-40	1388.90 ± 158.90	1307.50 ± 165.20	1348.20 ± 114.61	Pass
MI-4945, 4946	8/31/2005	Sr-90	0.67 ± 0.34	0.82 ± 0.36	0.75 ± 0.25	Pass
TD-4921, 4922	9/1/2005	H-3	5737.00 ± 266.00	5860.00 ± 269.00	5798.50 ± 189.15	Pass
VE-4900, 4901	9/2/2005	Gr. Beta	3.40 ± 0.06	3.51 ± 0.06	3.45 ± 0.04	Pass
VE-4900, 4901	9/2/2005	K-40	2.15 ± 0.27	2.27 ± 0.24	2.21 ± 0.18	Pass
DW-50769, 50770	9/2/2005	Gr. Alpha	6.17 ± 1.42	6.08 ± 1.46	6.13 ± 1.02	Pass
VE-4990, 4991	9/6/2005	K-40	18.81 ± 1.12	19.52 ± 0.86	19.17 ± 0.71	Pass
MI-5011, 5012	9/8/2005	K-40	1584.00 ± 194.00	1707.60 ± 173.00	1645.80 ± 129.97	Pass
VE-5119, 5120	9/12/2005	Gr. Alpha	0.10 ± 0.06	0.09 ± 0.05	0.10 ± 0.04	Pass
VE-5119, 5120	9/12/2005	Gr. Beta	6.05 ± 0.18	5.92 ± 0.17	5.98 ± 0.12	Pass
VE-5119, 5120	9/12/2005	K-40	4.61 ± 0.46	4.74 ± 0.69	4.68 ± 0.41	Pass
LW-5361, 5362	9/12/2005	Gr. Beta	1.09 ± 0.33	1.18 ± 0.34	1.13 ± 0.24	Pass
SW-5098, 5099	9/13/2005	I-131	0.44 ± 0.22	0.31 ± 0.20	0.38 ± 0.15	Pass
LW-5178, 5179	9/14/2005	Gr. Beta	2.92 ± 0.56	2.95 ± 0.59	2.93 ± 0.41	Pass
DW-5239, 5240	9/16/2005	I-131	0.45 ± 0.27	0.55 ± 0.29	0.50 ± 0.20	Pass
CF-5432, 5433	9/19/2005	Be-7	0.91 ± 0.40	0.64 ± 0.30	0.78 ± 0.25	Pass
CF-5432, 5433	9/19/2005	K-40	1.43 ± 0.34	1.38 ± 0.43	1.41 ± 0.27	Pass
MI-5292, 5293	9/21/2005	K-40	1228.80 ± 78.13	1297.00 ± 81.03	1262.90 ± 56.28	Pass
BS-5340, 5341	9/23/2005	Be-7	1286.10 ± 550.80	1222.90 ± 394.40	1254.50 ± 338.72	Pass
BS-5340, 5341	9/23/2005	Cs-137	726.97 ± 76.24	677.49 ± 70.03	702.23 ± 51.76	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) ^a			Acceptance
			First Result	Second Result	Averaged Result	
BS-5340, 5341	9/23/2005	K-40	12404 ± 1154	13033 ± 983	12719 ± 758	Pass
DW-5382, 5383	9/23/2005	I-131	0.79 ± 0.31	0.53 ± 0.31	0.66 ± 0.22	Pass
MI-5405, 5406	9/27/2005	K-40	1324.80 ± 112.20	1366.80 ± 99.44	1345.80 ± 74.96	Pass
AP-5769, 5770	9/27/2005	Be-7	0.08 ± 0.01	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-5983, 5984	9/27/2005	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01	Pass
AP-5878, 5879	9/29/2005	Be-7	0.06 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
G-5526, 5527	10/3/2005	Be-7	4.03 ± 0.62	4.07 ± 0.80	4.05 ± 0.51	Pass
G-5526, 5527	10/3/2005	Gr. Beta	8.10 ± 0.30	8.80 ± 0.40	8.41 ± 0.24	Pass
G-5526, 5527	10/3/2005	K-40	4.93 ± 0.67	6.00 ± 0.72	5.47 ± 0.49	Pass
VE-5721, 5722	10/10/2005	Gr. Alpha	0.07 ± 0.05	0.08 ± 0.06	0.08 ± 0.04	Pass
VE-5721, 5722	10/10/2005	Gr. Beta	5.09 ± 0.15	5.00 ± 0.16	5.05 ± 0.11	Pass
VE-5721, 5722	10/10/2005	K-40	4.27 ± 0.43	4.20 ± 0.34	4.23 ± 0.27	Pass
CF-5695, 5696	10/11/2005	Be-7	2.70 ± 0.37	2.80 ± 0.34	2.75 ± 0.25	Pass
CF-5695, 5696	10/11/2005	K-40	11.79 ± 0.86	13.11 ± 0.68	12.45 ± 0.55	Pass
LW-6129, 6130	10/11/2005	Gr. Beta	1.34 ± 0.25	1.85 ± 0.29	1.59 ± 0.19	Pass
LW-6129, 6130	10/11/2005	H-3	304.35 ± 95.31	369.23 ± 97.88	336.79 ± 68.31	Pass
DW-50844, 5	10/11/2005	Gr. Beta	5.30 ± 1.50	4.20 ± 1.40	4.75 ± 1.03	Pass
LW-5748, 5749 ^c	10/12/2005	Gr. Beta	1.09 ± 0.25	1.89 ± 0.28	1.49 ± 0.19	Fail
AP-6485, 6486	10/20/2005	Be-7	0.10 ± 0.03	0.09 ± 0.03	0.09 ± 0.02	Pass
SWU-6156, 6157	10/25/2005	Gr. Beta	4.69 ± 1.34	4.18 ± 1.34	4.44 ± 0.95	Pass
VE-6186, 6187	10/26/2005	K-40	2.90 ± 0.49	2.83 ± 0.51	2.87 ± 0.35	Pass
LW-6203, 6204	10/27/2005	Gr. Beta	2.92 ± 0.62	3.09 ± 0.66	3.01 ± 0.45	Pass
SO-6270, 6271	10/28/2005	Cs-137	0.33 ± 0.03	0.34 ± 0.04	0.33 ± 0.03	Pass
SO-6270, 6271	10/28/2005	Gr. Beta	26.85 ± 2.78	22.25 ± 2.41	24.55 ± 1.84	Pass
SO-6270, 6271	10/28/2005	K-40	13.67 ± 0.74	14.02 ± 0.76	13.85 ± 0.53	Pass
TD-6320, 6321	11/1/2005	H-3	444202 ± 1770	446633 ± 1775	445418 ± 1253	Pass
SO-6605, 6606	11/11/2005	Gr. Beta	18.22 ± 2.23	18.47 ± 2.22	18.35 ± 1.57	Pass
CF-6509, 6510	11/14/2005	K-40	0.85 ± 0.14	0.99 ± 0.22	0.92 ± 0.13	Pass
SW-6638, 6639	11/22/2005	I-131	0.95 ± 0.35	0.67 ± 0.31	0.81 ± 0.23	Pass
SO-6887, 6888	11/22/2005	Gr. Alpha	6.80 ± 2.92	10.27 ± 3.26	8.53 ± 2.19	Pass
SO-6887, 6888	11/22/2005	Gr. Beta	19.27 ± 2.16	18.43 ± 2.21	18.85 ± 1.54	Pass
SO-6887, 6888	11/22/2005	K-40	14.29 ± 1.11	13.78 ± 0.78	14.03 ± 0.68	Pass
SWT-6721, 6722	11/29/2005	Gr. Beta	0.98 ± 0.31	0.87 ± 0.31	0.93 ± 0.22	Pass
VE-6775, 6776	11/29/2005	Gr. Beta	12.75 ± 0.28	13.16 ± 0.21	12.96 ± 0.18	Pass
LW-6743, 6744	11/30/2005	Gr. Beta	3.19 ± 0.47	2.50 ± 0.44	2.85 ± 0.32	Pass
DW-51023, 4	12/2/2005	Gr. Alpha	0.55 ± 1.40	2.21 ± 1.31	1.38 ± 0.96	Pass
SWT-7282, 7283	12/27/2005	Gr. Beta	1.62 ± 0.37	1.85 ± 0.38	1.74 ± 0.27	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).

^b 600 minute count time or longer, resulting in lower error.

^c Recount of W-5748, 2.38 ± 0.85 pCi/L Averaged result; 2.14 ± 0.45 pCi/L

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

Lab Code ^c	Date	Analysis	Concentration ^b		Control Limits ^d	Acceptance
			Laboratory result	Known Activity		
STW-1045	01/01/05	Gr. Alpha	0.45 ± 0.10	0.53	0.00 - 1.05	Pass
STW-1045	01/01/05	Gr. Beta	1.99 ± 0.10	1.67	0.84 - 2.51	Pass
STW-1046	01/01/05	Am-241	1.62 ± 0.12	1.72	1.20 - 2.24	Pass
STW-1046	01/01/05	Co-57	239.40 ± 1.20	227.00	158.90 - 295.10	Pass
STW-1046	01/01/05	Co-60	248.70 ± 1.00	251.00	175.70 - 326.30	Pass
STW-1046	01/01/05	Cs-134	115.50 ± 1.80	127.00	88.90 - 165.10	Pass
STW-1046	01/01/05	Cs-137	328.50 ± 1.70	332.00	232.40 - 431.60	Pass
STW-1046	01/01/05	Fe-55	64.90 ± 7.00	75.90	53.13 - 98.67	Pass
STW-1046	01/01/05	H-3	304.00 ± 9.70	280.00	196.00 - 364.00	Pass
STW-1046	01/01/05	Mn-54	334.80 ± 1.90	331.00	231.70 - 430.30	Pass
STW-1046	01/01/05	Ni-63	7.10 ± 1.60	9.00	0.00 - 20.00	Pass
STW-1046	01/01/05	Pu-238	0.01 ± 0.02	0.02	0.00 - 1.00	Pass
STW-1046	01/01/05	Pu-239/40	2.50 ± 0.14	2.40	1.68 - 3.12	Pass
STW-1046	01/01/05	Sr-90	0.70 ± 0.80	0.00	0.00 - 5.00	Pass
STW-1046	01/01/05	Tc-99	43.20 ± 1.40	42.90	30.03 - 55.77	Pass
STW-1046	01/01/05	U-233/4	3.31 ± 0.20	3.24	2.27 - 4.21	Pass
STW-1046	01/01/05	U-238	3.38 ± 0.20	3.33	2.33 - 4.33	Pass
STW-1046	01/01/05	Zn-65	538.40 ± 3.80	496.00	347.20 - 644.80	Pass
STVE-1047	01/01/05	Co-57	10.60 ± 0.20	9.88	6.92 - 12.84	Pass
STVE-1047	01/01/05	Co-60	3.00 ± 0.20	3.15	2.21 - 4.10	Pass
STVE-1047	01/01/05	Cs-134	4.80 ± 0.40	5.00	3.50 - 6.50	Pass
STVE-1047	01/01/05	Cs-137	4.10 ± 0.30	4.11	2.88 - 5.34	Pass
STVE-1047	01/01/05	Mn-54	5.10 ± 0.30	5.18	3.63 - 6.73	Pass
STVE-1047	01/01/05	Zn-65	6.20 ± 0.50	6.29	4.40 - 8.18	Pass
STSO-1048	01/01/05	Am-241	96.60 ± 10.00	109.00	76.30 - 141.70	Pass
STSO-1048	01/01/05	Co-57	264.00 ± 2.00	242.00	169.40 - 314.60	Pass
STSO-1048	01/01/05	Co-60	226.50 ± 2.20	212.00	148.40 - 275.60	Pass
STSO-1048	01/01/05	Cs-134	760.60 ± 3.70	759.00	531.30 - 986.70	Pass
STSO-1048	01/01/05	Cs-137	336.20 ± 3.60	315.00	220.50 - 409.50	Pass
STSO-1048	01/01/05	K-40	663.70 ± 18.00	604.00	422.80 - 785.20	Pass
STSO-1048	01/01/05	Mn-54	541.30 ± 3.90	485.00	339.50 - 630.50	Pass
STSO-1048	01/01/05	Ni-63	924.30 ± 17.20	1220.00	854.00 - 1586.00	Pass
STSO-1048	01/01/05	Pu-238	0.60 ± 0.80	0.48	0.00 - 1.00	Pass
STSO-1048	01/01/05	Pu-239/40	78.00 ± 4.80	89.50	62.65 - 116.35	Pass
STSO-1048	01/01/05	Sr-90	514.60 ± 18.70	640.00	448.00 - 832.00	Pass
STSO-1048	01/01/05	U-233/4	47.90 ± 4.00	62.50	43.75 - 81.25	Pass
STSO-1048	01/01/05	U-238	226.30 ± 8.60	249.00	174.30 - 323.70	Pass
STSO-1048	01/01/05	Zn-65	851.30 ± 7.30	810.00	567.00 - 1053.00	Pass
STAP-1050	01/01/05	Gr. Alpha	0.11 ± 0.03	0.23	0.00 - 0.46	Pass
STAP-1050	01/01/05	Gr. Beta	0.38 ± 0.05	0.30	0.15 - 0.45	Pass

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

Lab Code ^c	Date	Analysis	Concentration ^b		Control Limits ^d	Acceptance
			Laboratory result	Known Activity		
STAP-1049	01/01/05	Am-241	0.10 ± 0.04	0.10	0.07 - 0.13	Pass
STAP-1049	01/01/05	Co-57	4.76 ± 0.64	4.92	3.44 - 6.40	Pass
STAP-1049	01/01/05	Co-60	2.84 ± 0.22	3.03	2.12 - 3.94	Pass
STAP-1049	01/01/05	Cs-134	3.54 ± 0.37	3.51	2.46 - 4.56	Pass
STAP-1049	01/01/05	Cs-137	2.20 ± 0.27	2.26	1.58 - 2.94	Pass
STAP-1049	01/01/05	Mn-54	3.15 ± 0.21	3.33	2.33 - 4.33	Pass
STAP-1049	01/01/05	Pu-238	0.16 ± 0.04	0.20	0.14 - 0.25	Pass
STAP-1049	01/01/05	Pu-239/40	0.17 ± 0.02	0.17	0.14 - 0.25	Pass
STAP-1049 ^e	01/01/05	Sr-90	2.24 ± 0.34	1.35	0.95 - 1.76	Fail
STAP-1049	01/01/05	U-233/4	0.34 ± 0.02	0.34	0.24 - 0.44	Pass
STAP-1049	01/01/05	U-238	0.35 ± 0.02	0.35	0.25 - 0.46	Pass
STAP-1049	01/01/05	Zn-65	3.12 ± 0.15	3.14	2.20 - 4.08	Pass
STW-1061	07/01/05	Am-241	2.21 ± 0.13	2.23	1.56 - 2.90	Pass
STW-1061	07/01/05	Co-57	293.20 ± 7.30	272.00	190.40 - 353.60	Pass
STW-1061	07/01/05	Co-60	275.70 ± 1.30	261.00	182.70 - 339.30	Pass
STW-1061	07/01/05	Cs-134	171.80 ± 4.00	167.00	116.90 - 217.10	Pass
STW-1061	07/01/05	Cs-137	342.10 ± 2.20	333.00	233.10 - 432.90	Pass
STW-1061	07/01/05	Fe-55	167.80 ± 9.30	196.00	137.20 - 254.80	Pass
STW-1061	07/01/05	H-3	514.20 ± 12.60	527.00	368.90 - 685.10	Pass
STW-1061	07/01/05	Mn-54	437.00 ± 2.50	418.00	292.60 - 543.40	Pass
STW-1061	07/01/05	Ni-63	105.10 ± 3.60	100.00	70.00 - 130.00	Pass
STW-1061	07/01/05	Pu-238	1.64 ± 0.12	1.91	1.34 - 2.48	Pass
STW-1061	07/01/05	Pu-239/40	2.32 ± 0.13	2.75	1.93 - 3.58	Pass
STW-1061	07/01/05	Sr-90	9.20 ± 1.30	8.98	6.29 - 11.67	Pass
STW-1061	07/01/05	Tc-99	72.30 ± 2.30	66.50	46.55 - 86.45	Pass
STW-1061	07/01/05	U-233/4	4.11 ± 0.18	4.10	2.87 - 5.33	Pass
STW-1061	07/01/05	U-238	4.14 ± 0.18	4.26	2.98 - 5.54	Pass
STW-1061	07/01/05	Zn-65	364.60 ± 4.90	330.00	231.00 - 429.00	Pass
STW-1062	07/01/05	Gr. Alpha	0.57 ± 0.05	0.79	0.21 - 1.38	Pass
STW-1062	07/01/05	Gr. Beta	1.36 ± 0.05	1.35	0.85 - 1.92	Pass
STSO-1063 ¹	07/01/05	Am-241	48.40 ± 3.90	81.10	56.77 - 105.43	Fail
STSO-1063	07/01/05	Co-57	608.30 ± 2.80	524.00	366.80 - 681.20	Pass
STSO-1063	07/01/05	Co-60	322.70 ± 2.40	287.00	200.90 - 373.10	Pass
STSO-1063	07/01/05	Cs-134	632.10 ± 5.20	568.00	397.60 - 738.40	Pass
STSO-1063	07/01/05	Cs-137	512.40 ± 4.20	439.00	307.30 - 570.70	Pass
STSO-1063	07/01/05	K-40	720.50 ± 19.00	604.00	422.80 - 785.20	Pass
STSO-1063	07/01/05	Mn-54	516.80 ± 5.10	439.00	307.30 - 570.70	Pass
STSO-1063	07/01/05	Ni-63	366.50 ± 13.30	445.00	311.50 - 578.50	Pass
STSO-1063	07/01/05	Pu-238	68.80 ± 15.00	60.80	42.56 - 79.04	Pass
STSO-1063	07/01/05	Pu-239/40	0.00 ± 0.00	0.00	0.00 - 0.00	
STSO-1063	07/01/05	Sr-90	602.90 ± 17.20	757.00	529.90 - 984.10	Pass
STSO-1063	07/01/05	U-233/4	61.50 ± 1.00	52.50	36.75 - 68.25	Pass
STSO-1063	07/01/05	U-238	164.50 ± 16.70	168.00	117.60 - 218.40	Pass
STSO-1063	07/01/05	Zn-65	874.70 ± 8.40	823.00	576.10 - 1070.00	Pass

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

Lab Code ^c	Date	Analysis	Concentration ^b			Acceptance
			Laboratory result	Known Activity	Control Limits ^d	
STVE-1064	07/01/05	Am-241	0.18 ± 0.03	0.23	0.16 - 0.30	Pass
STVE-1064	07/01/05	Co-57	15.90 ± 0.20	13.30	9.31 - 17.29	Pass
STVE-1064	07/01/05	Co-60	4.80 ± 0.10	4.43	3.10 - 5.76	Pass
STVE-1064	07/01/05	Cs-134	4.60 ± 0.20	4.09	2.86 - 5.32	Pass
STVE-1064	07/01/05	Cs-137	5.90 ± 0.30	5.43	3.80 - 7.06	Pass
STVE-1064	07/01/05	Mn-54	7.20 ± 0.20	6.57	4.60 - 8.54	Pass
STVE-1064	07/01/05	Pu-238	0.04 ± 0.02	0.00	0.00 - 1.00	Pass
STVE-1064	07/01/05	Pu-239/40	0.13 ± 0.02	0.16	0.11 - 0.21	Pass
STVE-1064	07/01/05	Sr-90	2.80 ± 0.30	2.42	1.69 - 3.15	Pass
STVE-1064	07/01/05	U-233/4	0.28 ± 0.03	0.33	0.23 - 0.43	Pass
STVE-1064	07/01/05	U-238	0.33 ± 0.04	0.35	0.24 - 0.45	Pass
STVE-1064	07/01/05	Zn-65	11.00 ± 0.50	10.20	7.14 - 13.26	Pass
STAP-1065	07/01/05	Gr. Alpha	0.30 ± 0.04	0.48	0.00 - 0.80	Pass
STAP-1065	07/01/05	Gr. Beta	0.97 ± 0.06	0.83	0.55 - 1.22	Pass
STAP-1066	07/01/05	Am-241	0.14 ± 0.03	0.16	0.11 - 0.21	Pass
STAP-1066	07/01/05	Co-57	5.81 ± 0.17	6.20	4.34 - 8.06	Pass
STAP-1066	07/01/05	Co-60	2.79 ± 0.14	2.85	2.00 - 3.71	Pass
STAP-1066	07/01/05	Cs-134	3.67 ± 0.12	3.85	2.70 - 5.01	Pass
STAP-1066	07/01/05	Cs-137	2.93 ± 0.23	3.23	2.26 - 4.20	Pass
STAP-1066	07/01/05	Mn-54	4.11 ± 0.26	4.37	3.06 - 5.68	Pass
STAP-1066	07/01/05	Pu-238	0.11 ± 0.02	0.10	0.07 - 0.13	Pass
STAP-1066	07/01/05	Pu-239/40	0.10 ± 0.01	0.09	0.06 - 0.12	Pass
STAP-1066	07/01/05	Sr-90	2.25 ± 0.29	2.25	1.58 - 2.93	Pass
STAP-1066	07/01/05	U-233/4	0.28 ± 0.02	0.27	0.19 - 0.35	Pass
STAP-1066	07/01/05	U-238	0.28 ± 0.02	0.28	0.20 - 0.37	Pass
STAP-1066	07/01/05	Zn-65	4.11 ± 0.26	4.33	3.06 - 5.68	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) as requested by the Department of Energy.

^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 The strontium carbonate precipitates were redissolved and processed. The average of the three analyses was 1.34 pCi/L, although the recovery was only 30%. The result of a new analysis was 1.56 pCi/L.

^f Incorrect sample weight used in calculation. Result of recalculation: 97.0 ± 7.8 Bq/kg.

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, \dots, x_n are defined as follows:

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

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

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

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

4.5 In rounding off, the following rules are followed:

4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained 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 x 10 ⁻³	Strontium-89	8,000
Gross beta	1	Strontium-90	500
Iodine-131 ^b	2.8 x 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 x 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 Land Use Census for 2005 was completed during late September and early October of 2005. All milk animals, residences and gardens greater than 500 square feet were identified within three miles for each of the 16 meteorological sectors. If none were identified within the three mile range, additional surveys were performed out to a distance of five miles. The Cedar River was surveyed by boat in July of 2005 for water use downstream of the DAEC to Cedar Rapids.

There were 178 vegetable gardens identified during the performance of the 2005 Census. This number is greater than the number of gardens found in the 2004 survey by 3. There were changes to the nearest vegetable receptor in three of the sixteen direction sectors. This is a result of new gardens planted in those sectors.

There was one change in the milk animal locations within the 3 mile radius of the plant in the past year. A new goat milk receptor was identified at 3984 Minnie Lane. No changes were identified between 3 and 5 miles

The locations of the nearest resident for each sector remained the same with the exception of the ENE sector. A replacement house in that sector was built slightly closer to the plant.

45 new homes were built or were under construction within three miles of the DAEC, compared to the 31 new homes identified in 2004. Most of the new houses built are located in Palo (SSW).

The Cedar River survey revealed no new withdrawals of river water compared to previous surveys. Irrigation of the strawberry farm in Palo and fishing remain the only food pathway uses of river water between the DAEC and Cedar Rapids.

As a result of this census, adjustments were made to the MIDAS dose projection software model for the new receptor distances.

Pursuant to ESP4.4, no changes were observed offsite that could adversely affect the safe operation of the DAEC or that would warrant a UFSAR update such as new gas pipelines, toxic gas installations or airfield strips.

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 dosimeter 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 2005 TLD results were compared using a paired difference test. No significant differences in the TLD populations were observed for the 0.5 mile and one mile TLD populations using a confidence level of 99%.
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 gaseous effluent releases was calculated by the Meteorological Information and Dose Assessment System (MIDAS) computer program in accordance with ODAM. The calculation methods follow those prescribed by Reg. Guide 1.109.
 - Because there were no nuclides detected in the environment at or beyond the site boundary that were due to the operation of the DAEC, no comparison of calculated dose from gaseous or liquid releases and dose calculated from environmental contamination was performed.
 - 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.
 - There were no planned releases of liquid radwaste and no nuclides attributable to the operation of the DAEC were identified by the Effluent Controls Program. However, in the course of the performance of the Radiological Environmental Monitoring Program, trace amounts of tritium were identified in outfall from the site sewage treatment plant and from the site transformer pit.
- 1.) The maximally exposed organ due to liquid effluents was the liver of a child, with an estimated dose equivalent of $3.9E-03$ mrem.
 - 2.) The whole body dose equivalent to the maximally exposed individual due to liquid effluents was $3.9E-03$ mrem.
 - 3.) The maximum dose to air at the site boundary from noble gases released was $3.8E-04$ mrad from gamma radiation at 936 meters NW.

- 4.) The maximum dose to air at the site boundary from noble gases released was 1.2E-01 mrad beta radiation at 535 meters SSW.
- 5.) The whole body dose equivalent to the maximally exposed individual from noble gases was 4.4E-04 mrem, at 805 meters West.
- 6.) The skin dose equivalent to the maximally exposed individual from noble gases was 7.3E-04 mrem, at 805 meters West.
- 7.) The 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 1.1E-02 mrem.

Conclusion:

No measurable dose due to the operation of the DAEC was detected by environmental TLDs in 2005. 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 2005

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	3.9E-03 mrem	3 mrem
Organ Dose	Liver – Child		S	3.9E-03 mrem	10 mrem
Noble Gas					
Gamma Air Dose		936	NW	3.8E-04 mrad	10 mrad
Beta Air Dose		535	SSW	1.2E-01 mrad	20 mrad
Whole Body	All	805	W	4.4E-04 mrem	5 mrem
Skin	All	805	W	7.2E-04 mrad	15 mrem
Particulates & Iodines					
Organ Dose	Child - Skin	805	W	1.1E-02 mrem	15 mrem

* No Appendix I limit but is used to determine 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
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RADIOLOGICAL ENVIRONMENTAL
MONITORING PROGRAM (REMP)

ANNUAL REPORT - PART II
DATA TABULATIONS AND ANALYSES

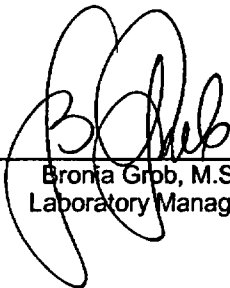
January 1 to December 31, 2005

Prepared and submitted by

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Reviewed and
Approved



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1.0 INTRODUCTION

The following constitutes a supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the Duane Arnold Energy Center, Palo, Iowa in 2005. 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.

2.0 LISTING OF MISSED SAMPLES

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
AP	Beta	D-01	01-06-05	No sample; substation gate frozen.
MI	I-131, Gamma	D-101	01-04-05	No sample; no milk available. Sample collected at D-109.
MI	I-131, Gamma	D-101	02-01-05	No milk available; goat sold.
AP/AI	Beta, I-131	D-05	03-17-05	Electricity off; not enough volume for viable sample.
AP/AI	I-131, Gamma	D-01, D-02, D-08, D-10	05-12-05	Locations dropped from program.
MI *	I-131, Gamma	D-96, D108, D-109	08-09-05	Samples damaged during shipment.
VE	Gamma	D-16, D-58	09-20-05	No forage samples available.
TLD	Ambient Gamma	D-02	3rd Qtr, 2005	Lost in the field.
TLD	Ambient Gamma	D-10	4th Qtr, 2005	Lost in the field.

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

3.0 DATA TABLES

DUANE ARNOLD

Table 1. Airborne particulates, analysis for gross beta.
 Location: D-1 (Cedar Rapids)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta	
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>	
01-06-05	323	0.054 ± 0.004				
01-13-05	283	0.074 ± 0.005				
01-20-05	281	0.044 ± 0.005				
01-27-05		^a NS				
02-03-05	568	^b 0.032 ± 0.003				
02-10-05	279	0.026 ± 0.004				
02-17-05	285	0.031 ± 0.004				
02-25-05	318	0.030 ± 0.004				
03-03-05	247	0.026 ± 0.004				
03-10-05	284	0.027 ± 0.004				
03-17-05	284	0.020 ± 0.003				
03-24-05	287	0.016 ± 0.003				
03-31-05	284	0.023 ± 0.003				
1st Quarter Mean ± s.d.		0.034 ± 0.016				
04-07-05	286	0.025 ± 0.003				
04-14-05	284	0.016 ± 0.003				
04-21-05	285	0.024 ± 0.004				
04-28-05	286	0.019 ± 0.003				
05-05-05	286	0.022 ± 0.004				
05-12-05		^a NS				
2nd Quarter Mean ± s.d.		0.021 ± 0.004				
					Cumulative Average	0.030
					Previous Annual Average	0.027

^a "NS" = No sample; see Table 2.0, Listing of Missed Samples.

^b 14-day runtime.

DUANE ARNOLD

Table 2. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
 Location: D-2 (Marion)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	326	0.052 ± 0.004			
01-13-05	286	0.073 ± 0.005			
01-20-05	284	0.051 ± 0.005			
01-27-05	287	0.035 ± 0.004			
02-03-05	285	0.034 ± 0.004			
02-10-05	283	0.026 ± 0.004			
02-17-05	288	0.036 ± 0.004			
02-25-05	321	0.034 ± 0.004			
03-03-05	249	0.030 ± 0.004			
03-10-05	291	0.032 ± 0.004			
03-17-05	305	0.023 ± 0.003			
03-24-05	306	0.020 ± 0.003			
03-31-05	291	0.030 ± 0.004			
1st Quarter Mean ± s.d.		0.037 ± 0.014			
04-07-05	304	0.025 ± 0.003			
04-14-05	305	0.022 ± 0.004			
04-21-05	305	0.024 ± 0.004			
04-28-05	286	0.019 ± 0.003			
05-05-05	307	0.023 ± 0.004			
05-12-05	^b	NS			
2nd Quarter Mean ± s.d.		0.023 ± 0.002			
				Cumulative Average	0.033
				Previous Annual Average	0.029

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

^b "NS" = No sample; see Table 2.0, Listing of Missed Samples.

DUANE ARNOLD

Table 3. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131
 Location: D-3 (Hiawatha)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	320	0.044 ± 0.004	07-07-05	293	0.017 ± 0.003
01-13-05	281	0.062 ± 0.005	07-14-05	293	0.041 ± 0.004
01-20-05	278	0.042 ± 0.005	07-21-05	298	0.037 ± 0.004
01-27-05	282	0.028 ± 0.004	07-28-05	300	0.021 ± 0.003
02-03-05	278	0.027 ± 0.004			
			08-04-05	300	0.038 ± 0.004
02-10-05	279	0.023 ± 0.004	08-11-05	301	0.028 ± 0.004
02-17-05	281	0.028 ± 0.004	08-18-05	301	0.024 ± 0.004
02-25-05	317	0.029 ± 0.004	08-25-05	298	0.021 ± 0.003
03-03-05	244	0.024 ± 0.004	09-01-05	299	0.034 ± 0.004
03-10-05	297	0.026 ± 0.004	09-08-05	300	0.041 ± 0.004
03-17-05	292	0.014 ± 0.003	09-15-05	300	0.048 ± 0.005
03-24-05	295 ^b	0.007 ± 0.002	09-22-05	299	0.037 ± 0.004
03-31-05	293	0.011 ± 0.003	09-29-05	302	0.029 ± 0.004
1st Quarter Mean ± s.d.		0.028 ± 0.015	3rd Quarter Mean ± s.d.		0.032 ± 0.009
04-07-05	295	0.011 ± 0.002	10-06-05	298	0.022 ± 0.004
04-14-05	293	0.007 ± 0.003	10-13-05	291	0.017 ± 0.003
04-21-05	294	0.013 ± 0.003	10-20-05	291	0.027 ± 0.004
04-28-05	294	0.010 ± 0.003	10-27-05	291	0.015 ± 0.004
			11-03-05	293	0.044 ± 0.005
05-05-05	294	0.016 ± 0.003			
05-12-05	294	0.014 ± 0.003	11-10-05	293	0.040 ± 0.004
05-18-05	251	0.016 ± 0.003	11-17-05	290	0.020 ± 0.004
05-25-05	214 ^c	0.019 ± 0.004	11-23-05	250	0.022 ± 0.004
06-02-05	335	0.020 ± 0.003	12-01-05	326	0.020 ± 0.003
06-09-05	297	0.021 ± 0.004	12-08-05	293	0.032 ± 0.004
06-15-05	250	0.018 ± 0.003	12-14-05	249	0.033 ± 0.005
06-23-05	335	0.021 ± 0.003	12-21-05	284	0.042 ± 0.005
06-30-05	296	0.037 ± 0.004	12-28-05	294	0.057 ± 0.005
2nd Quarter Mean ± s.d.		0.017 ± 0.007	4th Quarter Mean ± s.d.		0.030 ± 0.013
Cumulative Average					0.027
Previous Annual Average					0.028

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

^b Recounted; result = 0.009±0.002 pCi/m³.

^c Volume low; electric off.

DUANE ARNOLD

Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131^a

Location: D-5 (Palo)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	337	0.046 ± 0.004	07-07-05	282	0.019 ± 0.003
01-13-05	295	0.073 ± 0.005	07-14-05	282	0.042 ± 0.004
01-20-05	293	0.050 ± 0.005	07-21-05	283	0.040 ± 0.004
01-27-05	295	0.033 ± 0.004	07-28-05	282	0.021 ± 0.003
02-03-05	293	0.031 ± 0.004			
			08-04-05	283	0.044 ± 0.005
02-10-05	293	0.026 ± 0.004	08-11-05	282	0.036 ± 0.004
02-17-05	295	0.029 ± 0.003	08-18-05	282	0.029 ± 0.004
02-24-05	294	0.033 ± 0.004	08-25-05	284	0.021 ± 0.004
03-03-05	295	0.031 ± 0.004	09-01-05	282	0.037 ± 0.004
03-10-05	288	0.034 ± 0.004	09-08-05	283	0.042 ± 0.005
03-17-05	^b	ND ^a	09-15-05	284	0.050 ± 0.005
03-24-05	289	0.018 ± 0.003	09-22-05	282	0.042 ± 0.005
03-31-05	289	0.025 ± 0.003	09-29-05	283	0.031 ± 0.004
<u>1st Quarter Mean ± s.d.</u>		<u>0.036 ± 0.015</u>	<u>3rd Quarter Mean ± s.d.</u>		<u>0.035 ± 0.010</u>
04-07-05	286	0.023 ± 0.003	10-06-05	282	0.026 ± 0.004
04-14-05	288	0.024 ± 0.004	10-13-05	282	0.016 ± 0.004
04-21-05	289	0.026 ± 0.004	10-20-05	281	0.034 ± 0.004
04-28-05	287	0.017 ± 0.003	10-27-05	283	0.019 ± 0.004
			11-03-05	285	0.047 ± 0.005
05-05-05	289	0.024 ± 0.004			
05-12-05	288	0.026 ± 0.004	11-10-05	284	0.045 ± 0.005
05-18-05	247	0.016 ± 0.003	11-17-05	282	0.023 ± 0.004
05-25-05	289	0.020 ± 0.003	11-23-05	242	0.028 ± 0.004
06-02-05	329	0.019 ± 0.003	12-01-05	326	0.020 ± 0.003
06-09-05	289	0.023 ± 0.004	12-08-05	283	0.044 ± 0.005
06-15-05	246	0.017 ± 0.003	12-14-05	243	0.046 ± 0.005
06-23-05	324	0.021 ± 0.003	12-21-05	284	0.045 ± 0.005
06-30-05	283	0.033 ± 0.004	12-28-05	287	0.075 ± 0.006
<u>2nd Quarter Mean ± s.d.</u>		<u>0.022 ± 0.005</u>	<u>4th Quarter Mean ± s.d.</u>		<u>0.036 ± 0.016</u>
<u>Cumulative Average</u>					<u>0.032</u>
<u>Previous Annual Average</u>					<u>0.028</u>

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

^b "ND = No data; see Table 2.0, Listing of Missed Samples.

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Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131^a
 Location: D-6 (Center Point)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	329	0.053 ± 0.004	07-07-05	285	0.013 ± 0.003
01-13-05	289	0.077 ± 0.005	07-14-05	288	0.042 ± 0.004
01-20-05	287	0.056 ± 0.005	07-21-05	286	0.040 ± 0.004
01-27-05	289	0.034 ± 0.004	07-28-05	288	0.023 ± 0.003
02-03-05	287	0.033 ± 0.004			
			08-04-05	289	0.042 ± 0.005
02-10-05	288	0.032 ± 0.004	08-11-05	288	0.035 ± 0.004
02-17-05	289	0.038 ± 0.004	08-18-05	289	0.028 ± 0.004
02-24-05	289	0.029 ± 0.004	08-25-05	288	0.022 ± 0.004
03-03-05	290	0.026 ± 0.003	09-01-05	288	0.039 ± 0.004
03-10-05	288	0.029 ± 0.004	09-08-05	287	0.036 ± 0.004
03-17-05	283	0.019 ± 0.003	09-15-05	290	0.051 ± 0.005
03-24-05	286	0.020 ± 0.003	09-22-05	282	0.041 ± 0.005
03-31-05	285	0.024 ± 0.003	09-29-05	275	0.027 ± 0.004
<u>1st Quarter Mean ± s.d.</u>		<u>0.036 ± 0.017</u>	<u>3rd Quarter Mean ± s.d.</u>		<u>0.034 ± 0.010</u>
04-07-05	283	0.026 ± 0.003	10-06-05	285	0.026 ± 0.004
04-14-05	286	0.021 ± 0.004	10-13-05	285	0.021 ± 0.004
04-21-05	286	0.024 ± 0.004	10-20-05	278	0.029 ± 0.004
04-28-05	90 ^b	0.016 ± 0.007	10-27-05	281	0.013 ± 0.004
			11-03-05	283	0.050 ± 0.005
05-05-05	248	0.023 ± 0.004			
05-12-05	294	0.025 ± 0.004	11-10-05	281	0.044 ± 0.005
05-18-05	247	0.016 ± 0.003	11-17-05	279	0.025 ± 0.004
05-25-05	295	0.016 ± 0.003	11-23-05	240	0.024 ± 0.004
06-02-05	336	0.015 ± 0.003	12-01-05	326	0.017 ± 0.003
06-09-05	295	0.016 ± 0.003	12-08-05	280	0.039 ± 0.005
06-15-05	251	0.016 ± 0.003	12-14-05	241	0.043 ± 0.005
06-23-05	337	0.018 ± 0.003	12-21-05	284	0.040 ± 0.005
06-30-05	287	0.036 ± 0.004	12-28-05	282	0.067 ± 0.006
<u>2nd Quarter Mean ± s.d.</u>		<u>0.021 ± 0.006</u>	<u>4th Quarter Mean ± s.d.</u>		<u>0.034 ± 0.015</u>
			Cumulative Average		0.031
			Previous Annual Average		0.028

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

^b Volume low; power off due to broken line.

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Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131^a

Location: D-7 (Shellsburg)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	319	0.051 ± 0.004	07-07-05	276	0.017 ± 0.003
01-13-05	280	0.071 ± 0.005	07-14-05	277	0.031 ± 0.004
01-20-05	279	0.047 ± 0.005	07-21-05	277	0.042 ± 0.004
01-27-05	281	0.025 ± 0.004	07-28-05	276	0.021 ± 0.003
02-03-05	279	0.032 ± 0.004			
			08-04-05	278	0.040 ± 0.005
02-10-05	271	0.027 ± 0.004	08-11-05	277	0.036 ± 0.004
02-17-05	281	0.023 ± 0.003	08-18-05	276	0.022 ± 0.004
02-24-05	280	0.027 ± 0.004	08-25-05	278	0.019 ± 0.004
03-03-05	281	0.023 ± 0.003	09-01-05	276	0.036 ± 0.004
03-10-05	285	0.023 ± 0.004	09-08-05	278	0.038 ± 0.005
03-17-05	284	0.019 ± 0.003	09-15-05	277	0.046 ± 0.005
03-24-05	286	0.016 ± 0.003	09-22-05	276	0.030 ± 0.004
03-31-05	286	0.025 ± 0.003	09-29-05	286	0.026 ± 0.004
<u>1st Quarter Mean ± s.d.</u>		<u>0.031 ± 0.016</u>	<u>3rd Quarter Mean ± s.d.</u>		<u>0.031 ± 0.009</u>
04-07-05	283	0.025 ± 0.003	10-06-05	285	0.023 ± 0.004
04-14-05	285	0.019 ± 0.004	10-13-05	268	0.018 ± 0.004
04-21-05	286	0.021 ± 0.004	10-20-05	284	0.029 ± 0.004
04-28-05	284	0.017 ± 0.003	10-27-05	286	0.015 ± 0.004
			11-03-05	288	0.041 ± 0.004
05-05-05	286	0.021 ± 0.004			
05-12-05	285	0.023 ± 0.004	11-10-05	287	0.042 ± 0.005
05-18-05	244	0.012 ± 0.003	11-17-05	285	0.023 ± 0.004
05-25-05	286	0.009 ± 0.003	11-23-05	245	0.028 ± 0.004
06-02-05	326	0.006 ± 0.002	12-01-05	326	0.019 ± 0.003
06-09-05	286	0.019 ± 0.004	12-08-05	286	0.043 ± 0.005
06-15-05	243	0.016 ± 0.003	12-14-05	246	0.031 ± 0.005
06-23-05	317	0.020 ± 0.003	12-21-05	284	0.031 ± 0.004
06-30-05	276	0.034 ± 0.004	12-28-05	288	0.080 ± 0.006
<u>2nd Quarter Mean ± s.d.</u>		<u>0.019 ± 0.007</u>	<u>4th Quarter Mean ± s.d.</u>		<u>0.033 ± 0.017</u>
			Cumulative Average		0.028
			Previous Annual Average		0.028

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

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Table 7. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131^a.
 Location: D-8 (Urbana)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	329	0.053 ± 0.004			
01-13-05	289	0.068 ± 0.005			
01-20-05	288	0.056 ± 0.005			
01-27-05	289	0.035 ± 0.004			
02-03-05	288	0.038 ± 0.004			
02-10-05	288	0.026 ± 0.004			
02-17-05	289	0.035 ± 0.004			
02-24-05	289	0.030 ± 0.004			
03-03-05	290	0.030 ± 0.004			
03-10-05	288	0.033 ± 0.004			
03-17-05	286	0.019 ± 0.003			
03-24-05	289	0.021 ± 0.003			
03-31-05	288	0.029 ± 0.004			
1st Quarter Mean ± s.d.		0.036 ± 0.014			
04-07-05	278	0.028 ± 0.004			
04-14-05	289	0.023 ± 0.004			
04-21-05	269	0.031 ± 0.004			
04-28-05	287	0.017 ± 0.003			
05-05-05	289	0.022 ± 0.004			
05-12-05	^b	NS			
2nd Quarter Mean ± s.d.		0.024 ± 0.005			
Cumulative Average					0.033
Previous Annual Average					0.028

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

^b "NS" = No sample; see Table 2.0, Listing of Missed Samples.

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Table 8. Airborne particulates, analysis for gross beta.

Location: D-10 (Atkins)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	327	0.056 ± 0.004			
01-13-05	285	0.074 ± 0.005			
01-20-05	285	0.048 ± 0.005			
01-27-05	286	0.035 ± 0.004			
02-03-05	286	0.036 ± 0.004			
02-10-05	283	0.028 ± 0.004			
02-17-05	287	0.034 ± 0.004			
02-25-05	318	0.031 ± 0.004			
03-03-05	250	0.031 ± 0.004			
03-10-05	287	0.030 ± 0.004			
03-17-05	281 ^a	0.005 ± 0.003			
03-24-05	284	0.020 ± 0.003			
03-31-05	281	0.024 ± 0.003			
1st Quarter Mean ± s.d.		0.035 ± 0.017			
04-07-05	284	0.025 ± 0.003			
04-14-05	282	0.022 ± 0.004			
04-21-05	281	0.025 ± 0.004			
04-28-05	283	0.016 ± 0.003			
05-05-05	283	0.021 ± 0.004			
05-12-05	^b	NS			
2nd Quarter Mean ± s.d.		0.022 ± 0.004			
			Cumulative Average		0.031
			Previous Annual Average		0.028

^a Filter light.

^b "NS" = No sample; see Table 2.0, Listing of Missed Samples.

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Table 9. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131 ^a.

Location: D-11 (Toddville)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	326	0.052 ± 0.004	07-07-05	290	0.020 ± 0.003
01-13-05	287	0.056 ± 0.005	07-14-05	291	0.038 ± 0.004
01-20-05	275	0.054 ± 0.005	07-21-05	291	0.035 ± 0.004
01-27-05	287	0.031 ± 0.004	07-28-05	291	0.018 ± 0.003
02-03-05	285	0.037 ± 0.004			
			08-04-05	292	0.041 ± 0.005
02-10-05	284	0.026 ± 0.004	08-11-05	291	0.030 ± 0.004
02-17-05	286	0.031 ± 0.004	08-18-05	292	0.026 ± 0.004
02-24-05	278	0.033 ± 0.004	08-25-05	291	0.022 ± 0.004
03-03-05	278	0.030 ± 0.004	09-01-05	291	0.032 ± 0.004
03-10-05	286	0.031 ± 0.004	09-08-05	291	0.036 ± 0.004
03-17-05	284	0.020 ± 0.003	09-15-05	291	0.045 ± 0.005
03-24-05	285	0.016 ± 0.003	09-22-05	290	0.035 ± 0.004
03-31-05	286	0.028 ± 0.004	09-29-05	292	0.029 ± 0.004
1st Quarter Mean ± s.d.		0.034 ± 0.013	3rd Quarter Mean ± s.d.		0.031 ± 0.008
04-07-05	283	0.023 ± 0.003	10-06-05	302	0.028 ± 0.004
04-14-05	286	0.025 ± 0.004	10-13-05	303	0.016 ± 0.003
04-21-05	285	0.024 ± 0.004	10-20-05	300	0.032 ± 0.004
04-28-05	286	0.016 ± 0.003	10-27-05	305	0.018 ± 0.004
			11-03-05	304	0.052 ± 0.005
05-05-05	285	0.021 ± 0.004			
05-12-05	285	0.027 ± 0.004	11-10-05	304	0.044 ± 0.004
05-18-05	243	0.014 ± 0.003	11-17-05	302	0.025 ± 0.004
05-25-05	287	0.019 ± 0.003	11-23-05	260	0.026 ± 0.004
06-02-05	326	0.019 ± 0.003	12-01-05	326	0.020 ± 0.003
06-09-05	288	0.021 ± 0.004	12-08-05	305 ^b	0.043 ± 0.005
06-15-05	241	0.013 ± 0.003	12-14-05	259	0.048 ± 0.005
06-23-05	327	0.021 ± 0.003	12-21-05	284	0.048 ± 0.005
06-30-05	286	0.028 ± 0.004	12-28-05	304	0.071 ± 0.005
2nd Quarter Mean ± s.d.		0.021 ± 0.005	4th Quarter Mean ± s.d.		0.036 ± 0.016
			Cumulative Average		0.031
			Previous Annual Average		0.028

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

^b LLD not reached for I-131 possibly due to age of sample; received 12-22-05. I-131 = 0.031 pCi/m³.

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Table 10. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131 ^a.
 Location: D-13
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	319	0.046 ± 0.004	07-07-05	299	0.018 ± 0.003
01-13-05	280	0.073 ± 0.005	07-14-05	300	0.038 ± 0.004
01-20-05	279	0.053 ± 0.005	07-21-05	300	0.035 ± 0.004
01-27-05	281	0.032 ± 0.004	07-28-05	299	0.020 ± 0.003
02-03-05	279	0.033 ± 0.004			
			08-04-05	300	0.039 ± 0.004
02-10-05	280	0.027 ± 0.004	08-11-05	300	0.028 ± 0.004
02-17-05	286	0.034 ± 0.004	08-18-05	300	0.023 ± 0.004
02-24-05	280	0.028 ± 0.004	08-25-05	300 ^c	0.010 ± 0.003
03-03-05	285 ^b	0.030 ± 0.004	09-01-05	250	0.034 ± 0.005
03-10-05	280	0.028 ± 0.004	09-08-05	289	0.041 ± 0.005
03-17-05	289	0.028 ± 0.004	09-15-05	289	0.055 ± 0.005
03-24-05	292	0.017 ± 0.003	09-22-05	287	0.045 ± 0.005
03-31-05	291	0.026 ± 0.003	09-29-05	300	0.027 ± 0.004
1st Quarter Mean ± s.d.		0.035 ± 0.015	3rd Quarter Mean ± s.d.		0.032 ± 0.012
04-07-05	289	0.025 ± 0.003	10-06-05	279	0.026 ± 0.004
04-14-05	292	0.020 ± 0.004	10-13-05	280	0.013 ± 0.003
04-21-05	291	0.027 ± 0.004	10-20-05	278	0.029 ± 0.004
04-28-05	290	0.016 ± 0.003	10-27-05	258	0.013 ± 0.004
			11-03-05	50 ^d	0.230 ± 0.026
05-05-05	292	0.021 ± 0.004			
05-12-05	291	0.028 ± 0.004	11-10-05	283	0.045 ± 0.005
05-18-05	249	0.015 ± 0.003	11-17-05	279	0.022 ± 0.004
05-25-05	292	0.017 ± 0.003	11-23-05	240	0.028 ± 0.004
06-02-05	332	0.018 ± 0.003	12-01-05	326	0.021 ± 0.003
06-09-05	292	0.017 ± 0.003	12-08-05	280 ^e	0.042 ± 0.005
06-15-05	248	0.015 ± 0.003	12-14-05	239	0.047 ± 0.006
06-23-05	334	0.018 ± 0.003	12-21-05	284	0.042 ± 0.005
06-30-05	293	0.028 ± 0.004	12-28-05	282	0.064 ± 0.005
2nd Quarter Mean ± s.d.		0.020 ± 0.005	4th Quarter Mean ± s.d.		0.033 ± 0.015
			Cumulative Average		0.034
			Previous Annual Average		0.029

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

^b Estimated volume used.

^c Low count due to pump malfunction; pump replaced.

^d Loose connection; result not included in quarterly mean.

^e LLD not reached for I-131 possibly due to age of sample; received 12-22-05. I-131 = 0.034 pCi/m

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Table 11. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131^a

Location: D-15 (On-site)

Units: pCi/m³

Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	323	0.045 ± 0.004	07-07-05	290	0.018 ± 0.003
01-13-05	283	0.069 ± 0.005	07-14-05	292	0.043 ± 0.004
01-20-05	282	0.038 ± 0.004	07-21-05	291	0.035 ± 0.004
01-27-05	284	0.029 ± 0.004	07-28-05	290	0.021 ± 0.003
02-03-05	282	0.030 ± 0.004			
			08-04-05	291	0.043 ± 0.005
02-10-05	282	0.031 ± 0.004	08-11-05	293	0.033 ± 0.004
02-17-05	284	0.034 ± 0.004	08-18-05	289	0.024 ± 0.004
02-24-05	286	0.034 ± 0.004	08-25-05	292	0.024 ± 0.004
03-03-05	282	0.033 ± 0.004	09-01-05	291	0.033 ± 0.004
03-10-05	289	0.020 ± 0.004	09-08-05	291	0.041 ± 0.004
03-17-05	288	0.012 ± 0.003	09-15-05	292	0.051 ± 0.005
03-24-05	288	0.016 ± 0.003	09-22-05	291	0.037 ± 0.004
03-31-05	289	0.020 ± 0.003	09-29-05	288	0.030 ± 0.004
1st Quarter Mean ± s.d.		0.032 ± 0.015	3rd Quarter Mean ± s.d.		0.033 ± 0.010
04-07-05	286	0.021 ± 0.003	10-06-05	288	0.032 ± 0.004
04-14-05	288	0.020 ± 0.004	10-13-05	288	0.016 ± 0.003
04-21-05	287	0.022 ± 0.004	10-20-05	275	0.031 ± 0.004
04-28-05	289	0.014 ± 0.003	10-27-05	289	0.013 ± 0.003
			11-03-05	290	0.046 ± 0.005
05-05-05	289	0.017 ± 0.003			
05-12-05	288	0.024 ± 0.004	11-10-05	291	0.049 ± 0.005
05-18-05	247	0.015 ± 0.003	11-17-05	287	0.024 ± 0.004
05-25-05	289	0.019 ± 0.003	11-23-05	247	0.029 ± 0.004
06-02-05	330	0.015 ± 0.003	12-01-05	326	0.020 ± 0.003
06-09-05	289	0.017 ± 0.003	12-08-05	289 ^b	0.043 ± 0.005
06-15-05	248	0.014 ± 0.003	12-14-05	247	0.050 ± 0.006
06-23-05	334	0.021 ± 0.003	12-21-05	284	0.046 ± 0.005
06-30-05	287	0.035 ± 0.004	12-28-05	282	0.067 ± 0.006
2nd Quarter Mean ± s.d.		0.020 ± 0.006	4th Quarter Mean ± s.d.		0.036 ± 0.016
			Cumulative Average		0.030
			Previous Annual Average		0.027

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

^b LLD not reached for I-131 possibly due to age of sample; received 12-22-05. I-131 = 0.033 pCi/m³.

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Table 12. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131
 Location: D-16 (On-site)
 Units: pCi/m³
 Collection: Continuous, weekly exchange.

Date Collected	Volume (m ³)	Gross Beta	Date Collected	Volume (m ³)	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-06-05	327	0.052 ± 0.004	07-07-05	298	0.016 ± 0.003
01-13-05	289	0.069 ± 0.005	07-14-05	301	0.044 ± 0.004
01-20-05	288	0.055 ± 0.005	07-21-05	300	0.040 ± 0.004
01-27-05	287	0.037 ± 0.004	07-28-05	299	0.021 ± 0.003
02-03-05	288	0.036 ± 0.004			
			08-04-05	300	0.048 ± 0.005
02-10-05	285	0.031 ± 0.004	08-11-05	300	0.034 ± 0.004
02-17-05	286	0.036 ± 0.004	08-18-05	299	0.031 ± 0.004
02-24-05	289	0.033 ± 0.004	08-25-05	301	0.021 ± 0.003
03-03-05	289	0.037 ± 0.004	09-01-05	299	0.036 ± 0.004
03-10-05	289	0.028 ± 0.004	09-08-05	300	0.040 ± 0.004
03-17-05	287	0.021 ± 0.004	09-15-05	300	0.057 ± 0.005
03-24-05	288	0.016 ± 0.003	09-22-05	299	0.042 ± 0.005
03-31-05	289	0.030 ± 0.004	09-29-05	288	0.028 ± 0.004
1st Quarter Mean ± s.d.		0.037 ± 0.014	3rd Quarter Mean ± s.d.		0.035 ± 0.012
04-07-05	286	0.023 ± 0.003	10-06-05	288	0.024 ± 0.004
04-14-05	288	0.021 ± 0.004	10-13-05	288	0.015 ± 0.003
04-21-05	288	0.024 ± 0.004	10-20-05	287	0.032 ± 0.004
04-28-05	289	0.016 ± 0.003	10-27-05	290	0.017 ± 0.004
			11-03-05	291	0.048 ± 0.005
05-05-05	289	0.021 ± 0.004			
05-12-05	288	0.028 ± 0.004	11-10-05	290	0.046 ± 0.005
05-18-05	247	0.015 ± 0.003	11-17-05	287	0.028 ± 0.004
05-25-05	289	0.019 ± 0.003	11-23-05	247	0.027 ± 0.004
06-02-05	330	0.018 ± 0.003	12-01-05	326	0.019 ± 0.003
06-09-05	289	0.020 ± 0.004	12-08-05	288 ^b	0.050 ± 0.005
06-15-05	245	0.017 ± 0.003	12-14-05	249	0.047 ± 0.005
06-23-05	344	0.022 ± 0.003	12-21-05	283	0.048 ± 0.005
06-30-05	301	0.034 ± 0.004	12-28-05	285	0.078 ± 0.006
2nd Quarter Mean ± s.d.		0.021 ± 0.005	4th Quarter Mean ± s.d.		0.037 ± 0.018
			Cumulative Average		0.033
			Previous Annual Average		0.028

^a Iodine-131 concentrations are <0.03 pCi/m³ unless noted otherwise.

^b LLD not reached for I-131 possibly due to age of sample; received 12-22-05. I-131 = 0.033 pCi/m³.

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Table 13. Airborne particulates, analyses for gamma-emitting isotopes.
 Collection: Quarterly Composite
 Units: pCi/m³

Location		D-1		
Quarter	1st Quarter	2nd Quarter		
Lab Code	DAP-1942	DAP-4140 ^a		
Volume (m ³)	3723	1427		
Be-7	0.065 ± 0.015	0.141 ± 0.031		
Nb-95	< 0.0007	< 0.0042		
Zr-95	< 0.0011	< 0.0047		
Ru-103	< 0.0012	< 0.0033		
Ru-106	< 0.0042	< 0.0095		
Cs-134	< 0.0008	< 0.0009		
Cs-137	< 0.0005	< 0.0010		
Ce-141	< 0.0009	< 0.0052		
Ce-144	< 0.0056	< 0.0071		

Location		D-2	
Quarter	1st Quarter	2nd Quarter	
Lab Code	DAP-1943	DAP-4141 ^a	
Volume (m ³)	3802	1507	
Be-7	0.083 ± 0.015	0.162 ± 0.027	
Nb-95	< 0.0008	< 0.0026	
Zr-95	< 0.0011	< 0.0037	
Ru-103	< 0.0008	< 0.0037	
Ru-106	< 0.0050	< 0.0095	
Cs-134	< 0.0010	< 0.0012	
Cs-137	< 0.0006	< 0.0008	
Ce-141	< 0.0017	< 0.0064	
Ce-144	< 0.0061	< 0.0056	

Location		D-3			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Lab Code	DAP-1944	DAP-4142	DAP-5818	DAP-7539	
Volume (m ³)	3737	3742	3884	3743	
Be-7	0.057 ± 0.015	0.082 ± 0.015	0.071 ± 0.014	0.044 ± 0.016	
Nb-95	< 0.0007	< 0.0009	< 0.0007	< 0.0014	
Zr-95	< 0.0012	< 0.0012	< 0.0011	< 0.0012	
Ru-103	< 0.0007	< 0.0010	< 0.0009	< 0.0010	
Ru-106	< 0.0055	< 0.0056	< 0.0035	< 0.0054	
Cs-134	< 0.0010	< 0.0006	< 0.0007	< 0.0007	
Cs-137	< 0.0008	< 0.0004	< 0.0009	< 0.0006	
Ce-141	< 0.0017	< 0.0016	< 0.0009	< 0.0019	
Ce-144	< 0.0047	< 0.0047	< 0.0047	< 0.0031	

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Table 13. Airborne particulates, analyses for gamma-emitting isotopes.
Collection: Quarterly Composite
Units: pCi/m³

Location		D-5			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Lab Code	DAP-1945	DAP-4143	DAP-5819	DAP-7540	
Volume (m ³)	3556	3734	3674	3644	
Be-7	0.062 ± 0.018	0.090 ± 0.018	0.083 ± 0.019	0.061 ± 0.015	
Nb-95	< 0.0013	< 0.0004	< 0.0006	< 0.0014	
Zr-95	< 0.0013	< 0.0018	< 0.0009	< 0.0012	
Ru-103	< 0.0006	< 0.0007	< 0.0005	< 0.0008	
Ru-106	< 0.0059	< 0.0058	< 0.0032	< 0.0056	
Cs-134	< 0.0011	< 0.0007	< 0.0011	< 0.0009	
Cs-137	< 0.0007	< 0.0010	< 0.0005	< 0.0006	
Ce-141	< 0.0017	< 0.0009	< 0.0014	< 0.0010	
Ce-144	< 0.0053	< 0.0036	< 0.0063	< 0.0030	

Location		D-6			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Lab Code	DAP-1946	DAP-4144	DAP-5820	DAP-7541	
Volume (m ³)	3779	3535	3723	3625	
Be-7	0.077 ± 0.017	0.095 ± 0.017	0.080 ± 0.019	0.051 ± 0.015	
Nb-95	< 0.0012	< 0.0010	< 0.0006	< 0.0007	
Zr-95	< 0.0012	< 0.0016	< 0.0015	< 0.0009	
Ru-103	< 0.0007	< 0.0009	< 0.0012	< 0.0010	
Ru-106	< 0.0058	< 0.0062	< 0.0064	< 0.0060	
Cs-134	< 0.0012	< 0.0006	< 0.0008	< 0.0009	
Cs-137	< 0.0007	< 0.0007	< 0.0006	< 0.0004	
Ce-141	< 0.0018	< 0.0010	< 0.0011	< 0.0011	
Ce-144	< 0.0026	< 0.0033	< 0.0050	< 0.0065	

Location		D-7			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Lab Code	DAP-1947	DAP-4145	DAP-5821	DAP-7542	
Volume (m ³)	3692	3687	3608	3658	
Be-7	0.064 ± 0.015	0.081 ± 0.016	0.075 ± 0.020	0.046 ± 0.014	
Nb-95	< 0.0008	< 0.0006	< 0.0007	< 0.0014	
Zr-95	< 0.0016	< 0.0011	< 0.0013	< 0.0010	
Ru-103	< 0.0007	< 0.0005	< 0.0007	< 0.0011	
Ru-106	< 0.0054	< 0.0051	< 0.0033	< 0.0062	
Cs-134	< 0.0008	< 0.0006	< 0.0008	< 0.0008	
Cs-137	< 0.0008	< 0.0006	< 0.0006	< 0.0004	
Ce-141	< 0.0016	< 0.0019	< 0.0017	< 0.0012	
Ce-144	< 0.0032	< 0.0051	< 0.0045	< 0.0027	

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Table 13. Airborne particulates, analyses for gamma-emitting isotopes.
Collection: Quarterly Composite
Units: pCi/m³

Location		D-8		
Quarter	1st Quarter	2nd Quarter		
Lab Code	DAP-1948	DAP-4146 ^a		
Volume (m ³)	3790	1412		
Be-7	0.061 ± 0.013	0.178 ± 0.027		
Nb-95	< 0.0008	< 0.0049		
Zr-95	< 0.0020	< 0.0032		
Ru-103	< 0.0010	< 0.0032		
Ru-106	< 0.0063	< 0.0121		
Cs-134	< 0.0009	< 0.0010		
Cs-137	< 0.0005	< 0.0010		
Ce-141	< 0.0018	< 0.0054		
Ce-144	< 0.0041	< 0.0068		

Location		D-10		
Quarter	1st Quarter	2nd Quarter		
Lab Code	DAP-1949	DAP-4147 ^a		
Volume (m ³)	3740	1413		
Be-7	0.059 ± 0.014	0.145 ± 0.029		
Nb-95	< 0.0007	< 0.0039		
Zr-95	< 0.0012	< 0.0026		
Ru-103	< 0.0011	< 0.0034		
Ru-106	< 0.0055	< 0.0061		
Cs-134	< 0.0009	< 0.0013		
Cs-137	< 0.0007	< 0.0010		
Ce-141	< 0.0020	< 0.0071		
Ce-144	< 0.0025	< 0.0056		

Location		D-11			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Lab Code	DAP-1950	DAP-4148	DAP-5822	DAP-7543	
Volume (m ³)	3727	3708	3784	3858	
Be-7	0.074 ± 0.017	0.096 ± 0.019	0.104 ± 0.017	0.046 ± 0.013	
Nb-95	< 0.0007	< 0.0006	< 0.0006	< 0.0008	
Zr-95	< 0.0010	< 0.0008	< 0.0015	< 0.0010	
Ru-103	< 0.0010	< 0.0007	< 0.0007	< 0.0008	
Ru-106	< 0.0055	< 0.0055	< 0.0040	< 0.0068	
Cs-134	< 0.0001	< 0.0005	< 0.0007	< 0.0008	
Cs-137	< 0.0007	< 0.0005	< 0.0005	< 0.0008	
Ce-141	< 0.0021	< 0.0018	< 0.0014	< 0.0014	
Ce-144	< 0.0049	< 0.0057	< 0.0027	< 0.0045	

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Table 13. Airborne particulates, analyses for gamma-emitting isotopes.
Collection: Quarterly Composite
Units: pCi/m³

Location				
D-13				
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP-1951	DAP-4149	DAP-5823	DAP-7544
Volume (m ³)	3721	3785	3813	3308
Be-7	0.069 ± 0.013	0.087 ± 0.018	0.094 ± 0.020	0.052 ± 0.017
Nb-95	< 0.0007	< 0.0006	< 0.0011	< 0.0011
Zr-95	< 0.0014	< 0.0014	< 0.0014	< 0.0010
Ru-103	< 0.0009	< 0.0007	< 0.0009	< 0.0012
Ru-106	< 0.0056	< 0.0052	< 0.0073	< 0.0082
Cs-134	< 0.0008	< 0.0004	< 0.0008	< 0.0010
Cs-137	< 0.0004	< 0.0003	< 0.0005	< 0.0005
Ce-141	< 0.0013	< 0.0015	< 0.0020	< 0.0026
Ce-144	< 0.0042	< 0.0040	< 0.0048	< 0.0044

Location				
D-15				
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP-1952	DAP-4150	DAP-5824	DAP-7545
Volume (m ³)	3742	3751	3781	3683
Be-7	0.063 ± 0.013	0.064 ± 0.017	0.087 ± 0.015	0.054 ± 0.013
Nb-95	< 0.0008	< 0.0006	< 0.0009	< 0.0012
Zr-95	< 0.0010	< 0.0007	< 0.0011	< 0.0016
Ru-103	< 0.0009	< 0.0010	< 0.0009	< 0.0007
Ru-106	< 0.0055	< 0.0050	< 0.0047	< 0.0055
Cs-134	< 0.0010	< 0.0005	< 0.0008	< 0.0009
Cs-137	< 0.0007	< 0.0005	< 0.0006	< 0.0006
Ce-141	< 0.0016	< 0.0019	< 0.0016	< 0.0021
Ce-144	< 0.0027	< 0.0055	< 0.0046	< 0.0038

Location				
D-16				
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP-1953	DAP-4151	DAP-5825	DAP-7546
Volume (m ³)	3781	3773	3884	3699
Be-7	0.081 ± 0.015	0.102 ± 0.020	0.078 ± 0.012	0.060 ± 0.014
Nb-95	< 0.0010	< 0.0006	< 0.0006	< 0.0006
Zr-95	< 0.0013	< 0.0015	< 0.0009	< 0.0016
Ru-103	< 0.0009	< 0.0008	< 0.0008	< 0.0010
Ru-106	< 0.0060	< 0.0073	< 0.0040	< 0.0053
Cs-134	< 0.0012	< 0.0004	< 0.0008	< 0.0010
Cs-137	< 0.0005	< 0.0007	< 0.0009	< 0.0004
Ce-141	< 0.0017	< 0.0021	< 0.0014	< 0.0012
Ce-144	< 0.0055	< 0.0047	< 0.0047	< 0.0028

^a Partial composite; location discontinued as of May, 2005.

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Table 14. Area monitors (TLD), Quarterly
Units: mR/91 days

<u>Air Stations</u>	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
D-1 (C)	13.5 ± 1.1	16.1 ± 1.0	12.4 ± 1.7	11.7 ± 1.1
D-2 (C)	15.5 ± 0.7	17.8 ± 1.1	ND ^a	14.1 ± 0.8
D-3	16.2 ± 1.3	17.0 ± 0.8	14.1 ± 1.7	14.2 ± 0.7
D-5	14.8 ± 0.9	19.4 ± 0.9	14.0 ± 1.8	15.5 ± 1.0
D-6	15.7 ± 0.7	20.7 ± 0.7	15.0 ± 1.4	16.0 ± 0.7
D-7	15.2 ± 1.2	20.6 ± 1.1	15.4 ± 1.5	16.6 ± 0.9
D-8	19.5 ± 0.8	24.7 ± 1.6	19.3 ± 1.4	20.5 ± 1.1
D-10	18.2 ± 0.8	21.5 ± 0.7	18.9 ± 1.7	ND ^a
D-11	15.2 ± 0.7	18.9 ± 1.8	14.1 ± 1.4	15.4 ± 1.7
D-13 (C)	16.8 ± 0.9	20.7 ± 0.9	16.5 ± 1.3	17.8 ± 1.8
D-15	15.6 ± 1.1	18.1 ± 0.8	14.9 ± 2.2	15.2 ± 0.7
D-16	16.8 ± 0.9	20.4 ± 2.0	17.7 ± 1.8	17.3 ± 1.8
Mean ± s.d.	16.1 ± 1.6	19.7 ± 2.3	15.7 ± 2.2	15.8 ± 2.3
<u>Within 0.5 mi. of Stack</u>				
D-17	18.9 ± 1.1	18.7 ± 1.4	21.2 ± 1.5	17.8 ± 2.0
D-18	16.5 ± 1.4	16.8 ± 1.3	18.6 ± 1.7	20.1 ± 2.4
D-19	16.2 ± 0.9	16.1 ± 1.1	18.8 ± 1.6	18.3 ± 1.4
D-20	17.2 ± 0.7	19.2 ± 1.1	21.3 ± 1.8	21.8 ± 1.1
D-21	18.4 ± 0.9	19.1 ± 1.3	21.9 ± 1.5	22.2 ± 2.4
D-22	16.6 ± 1.1	17.8 ± 0.9	20.2 ± 1.5	18.8 ± 1.4
D-23	18.8 ± 0.9	16.4 ± 1.2	18.0 ± 1.5	17.9 ± 1.5
D-28	15.3 ± 0.8	22.8 ± 1.2	22.8 ± 1.7	24.2 ± 1.2
D-29	20.7 ± 0.8	23.5 ± 1.6	25.1 ± 1.3	24.0 ± 1.4
D-30	21.2 ± 1.4	21.0 ± 1.7	24.7 ± 1.8	20.5 ± 1.4
D-31	20.2 ± 1.3	23.4 ± 1.7	24.8 ± 2.0	24.9 ± 1.7
D-32	21.1 ± 0.6	20.2 ± 1.9	25.0 ± 1.3	21.6 ± 1.9
D-82	15.0 ± 0.9	14.4 ± 0.8	18.3 ± 1.5	14.6 ± 0.7
D-83	16.7 ± 0.9	16.7 ± 0.9	19.4 ± 1.3	18.0 ± 0.8
D-84	16.9 ± 0.8	17.6 ± 1.5	20.0 ± 1.6	18.0 ± 0.9
D-85	17.0 ± 0.6	17.2 ± 1.2	18.5 ± 1.5	17.8 ± 1.4
D-86	19.3 ± 1.1	18.0 ± 1.0	22.2 ± 2.0	19.4 ± 1.3
D-91	15.7 ± 0.8	18.4 ± 1.0	15.2 ± 1.6	17.7 ± 1.2
Mean ± s.d.	17.9 ± 2.0	18.7 ± 2.6	20.9 ± 2.8	19.9 ± 2.8

^aND" = No data; TLD missing.

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Table 14. Area monitors (TLD), Quarterly
Units: mR/91 days

<u>Within 1.0 mi. of Stack</u>	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>
D-43	16.1 ± 0.8	17.4 ± 1.1	17.2 ± 1.6	18.7 ± 1.4
D-44	19.2 ± 0.8	21.1 ± 0.8	22.0 ± 1.7	22.9 ± 1.0
D-45	15.9 ± 0.8	15.4 ± 1.2	18.3 ± 1.3	16.4 ± 1.5
D-46	19.7 ± 1.2	22.2 ± 1.2	22.4 ± 1.7	23.2 ± 1.4
D-47	18.3 ± 0.8	20.9 ± 1.1	21.3 ± 1.5	22.0 ± 1.5
D-48	<u>19.8 ± 0.9</u>	<u>22.6 ± 1.1</u>	<u>21.1 ± 1.4</u>	<u>23.9 ± 1.3</u>
Mean ± s.d.	18.2 ± 1.8	19.9 ± 2.9	20.4 ± 2.1	21.2 ± 3.0
<u>Within 3.0 mi. of Stack</u>				
D-33	14.2 ± 0.7	15.4 ± 0.7	16.8 ± 1.5	16.9 ± 1.0
D-34	15.0 ± 0.6	15.1 ± 1.0	17.4 ± 1.4	15.7 ± 1.3
D-35	14.6 ± 0.8	15.0 ± 0.9	16.7 ± 1.7	16.4 ± 1.0
D-36	15.8 ± 1.0	17.5 ± 1.1	17.2 ± 1.6	19.5 ± 1.1
D-37	20.0 ± 1.6	21.5 ± 2.1	22.1 ± 2.2	25.9 ± 1.7
D-38	17.2 ± 1.1	19.7 ± 1.4	19.9 ± 2.1	20.8 ± 1.1
D-39	17.7 ± 1.0	19.0 ± 0.7	19.8 ± 1.7	19.8 ± 1.0
D-40	14.2 ± 0.8	15.9 ± 1.0	15.3 ± 1.4	16.7 ± 1.0
D-41	16.1 ± 0.7	16.8 ± 0.7	16.9 ± 1.5	18.2 ± 1.0
D-42	<u>15.1 ± 0.7</u>	<u>15.9 ± 1.4</u>	<u>15.9 ± 1.4</u>	<u>17.1 ± 1.8</u>
Mean ± s.d.	16.0 ± 1.8	17.2 ± 2.2	17.8 ± 2.1	18.7 ± 3.0

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Table 15. 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-96					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
01-04-05	DMI -70	< 0.5	1300 ± 118	< 5	< 5	< 60	< 5
02-01-05	DMI -484	< 0.5	1206 ± 156	< 5	< 5	< 60	< 5
03-15-05	DMI -1186	< 0.5	1260 ± 101	< 5	< 5	< 60	< 5
04-05-05	DMI -1591	< 0.5	1209 ± 170	< 5	< 5	< 60	< 5
05-03-05	DMI -2265	< 0.5	1343 ± 107	< 5	< 5	< 60	< 5
05-17-05	DMI -2609	< 0.5	1438 ± 177	< 5	< 5	< 60	< 5
06-01-05	DMI -2931	< 0.5	1329 ± 177	< 5	< 5	< 60	< 5
06-14-05	DMI -3239	< 0.5	1361 ± 120	< 5	< 5	< 60	< 5
06-28-05	DMI -3475	< 0.5	1291 ± 98	< 5	< 5	< 60	< 5
07-12-05	DMI -3880	< 0.5	1316 ± 180	< 5	< 5	< 60	< 5
07-26-05	DMI -4254	< 0.5	1342 ± 93	< 5	< 5	< 60	< 5
08-09-05	NS ^a	-	-	-	-	-	-
08-23-05	DMI -4787	< 0.5	1317 ± 114	< 5	< 5	< 60	< 5
09-07-05	DMI -4983	< 0.5	1263 ± 173	< 5	< 5	< 60	< 5
09-20-05	NS ^a	-	-	-	-	-	-
10-04-05	NS ^a	-	-	-	-	-	-
10-18-05	NS ^a	-	-	-	-	-	-
11-01-05	NS ^a	-	-	-	-	-	-
12-06-05	NS ^a	-	-	-	-	-	-

Location		D-101					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
01-06-04	NS ^a	-	-	-	-	-	-
02-01-05	NS ^a	-	-	-	-	-	-
03-15-05	NS ^a	-	-	-	-	-	-
04-05-05	NS ^a	-	-	-	-	-	-
05-03-05	NS ^a	-	-	-	-	-	-
05-17-05	NS ^a	-	-	-	-	-	-
06-01-05	NS ^a	-	-	-	-	-	-
06-14-05	NS ^a	-	-	-	-	-	-
06-28-05	NS ^a	-	-	-	-	-	-
07-12-05	NS ^a	-	-	-	-	-	-
07-26-05	NS ^a	-	-	-	-	-	-
08-09-05	NS ^a	-	-	-	-	-	-
08-23-05	NS ^a	-	-	-	-	-	-
09-07-05	NS ^a	-	-	-	-	-	-
09-20-05	NS ^a	-	-	-	-	-	-
10-04-05	NS ^a	-	-	-	-	-	-
10-18-05	NS ^a	-	-	-	-	-	-
11-01-05	NS ^a	-	-	-	-	-	-
12-06-05	NS ^a	-	-	-	-	-	-

^a NS= No sample; sample not available. See Table 2.0, "Listing of Missed Samples."

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Table 15. 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
01-04-05	DMI -71	< 0.5	977 ± 147	< 5	< 5	< 60	< 5
02-01-05	DMI -485	< 0.5	1293 ± 164	< 5	< 5	< 60	< 5
03-15-05	DMI -1187	< 0.5	1243 ± 97	< 5	< 5	< 60	< 5
04-05-05	DMI -1592	< 0.5	1341 ± 163	< 5	< 5	< 60	< 5
05-03-05	DMI -2266	< 0.5	1333 ± 77	< 5	< 5	< 60	< 5
05-17-05	DMI -2610	< 0.5	1221 ± 163	< 5	< 5	< 60	< 5
06-01-05	DMI -2932	< 0.5	1299 ± 171	< 5	< 5	< 60	< 5
06-14-05	DMI -3240	< 0.5	1361 ± 173	< 5	< 5	< 60	< 5
06-28-05	DMI -3476	< 0.5	1351 ± 111	< 5	< 5	< 60	< 5
07-12-05	DMI -3881	< 0.5	1295 ± 180	< 5	< 5	< 60	< 5
07-26-05	DMI -4255	< 0.5	1265 ± 79	< 5	< 5	< 60	< 5
08-09-05	NS ^a	-	-	-	-	-	-
08-23-05	DMI -4788	< 0.5	1394 ± 115	< 5	< 5	< 60	< 5
09-07-05	DMI -4984	< 0.5	1447 ± 115	< 5	< 5	< 60	< 5
09-20-05	DMI -5225	< 0.5	1451 ± 93	< 5	< 5	< 60	< 5
10-04-05	DMI -5520	< 0.5	1212 ± 107	< 5	< 5	< 60	< 5
10-18-05	DMI -5912	< 0.5	1282 ± 115	< 5	< 5	< 60	< 5
11-01-05	DMI -6208	< 0.5	1326 ± 115	< 5	< 5	< 60	< 5
12-06-05	DMI -6979	< 0.5	1284 ± 116	< 5	< 5	< 60	< 5

Location		D-109					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
01-04-05	DMI -72	< 0.5	1244 ± 159	< 5	< 5	< 60	< 5
02-01-05	DMI 486,7	< 0.5	1248 ± 122	< 5	< 5	< 60	< 5
03-15-05	DMI -1188	< 0.5	1197 ± 114	< 5	< 5	< 60	< 5
04-05-05	DMI -1593	< 0.5	1315 ± 171	< 5	< 5	< 60	< 5
05-03-05	DMI -2267	< 0.5	1248 ± 120	< 5	< 5	< 60	< 5
05-17-05	DMI -2611	< 0.5	1126 ± 170	< 5	< 5	< 60	< 5
06-01-05	DMI -2933	< 0.5	1335 ± 175	< 5	< 5	< 60	< 5
06-14-05	DMI -3241	< 0.5	1283 ± 120	< 5	< 5	< 60	< 5
06-28-05	DMI -3477	< 0.5	1291 ± 117	< 5	< 5	< 60	< 5
07-12-05	DMI -3882	< 0.5	1281 ± 120	< 5	< 5	< 60	< 5
07-26-05	DMI -4256	< 0.5	1275 ± 94	< 5	< 5	< 60	< 5
08-09-05	NS ^a	-	-	-	-	-	-
08-23-05	DMI -4789	< 0.5	1306 ± 115	< 5	< 5	< 60	< 5
09-07-05	DMI -4985	< 0.5	1289 ± 113	< 5	< 5	< 60	< 5
09-20-05	DMI -5226	< 0.5	1299 ± 88	< 5	< 5	< 60	< 5
10-04-05	DMI -5521	< 0.5	1292 ± 110	< 5	< 5	< 60	< 5
10-18-05	DMI -5913	< 0.5	1288 ± 124	< 5	< 5	< 60	< 5
11-01-05	DMI -6209	< 0.5	1387 ± 114	< 5	< 5	< 60	< 5
12-06-05	DMI -6980	< 0.5	1265 ± 129	< 5	< 5	< 60	< 5

^a NS= No sample; sample not available. See Table 2.0, "Listing of Missed Samples."

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Table 16. Well water samples, analyses for gross beta and tritium.
 Collection: Quarterly
 Units: pCi/L

Location				
D-53 Treated Municipal Water				
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DWW-1332	DWW-3135	DWW-5327	DWW-7184
Gross Beta	1.9 ± 0.6	3.0 ± 0.7	2.3 ± 0.4	2.8 ± 0.6
H-3	< 166	< 157	< 149	< 191
Location				
D-54 Inlet to Municipal Water				
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DWW-1333	DWW-3136	DWW-5328	DWW-7185
Gross Beta	3.3 ± 0.6	3.4 ± 0.7	5.3 ± 0.6	2.7 ± 0.6
H-3	< 166	< 157	< 164	< 191
Location				
D-55 On-site Well				
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DWW-1334	DWW-3137	DWW-5329	DWW-7186
Gross Beta	< 1.4	< 1.1	< 0.5	< 1.2
H-3	< 166	< 157	< 164	< 191
Location				
D-57 Bull Farm				
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DWW-1335	DWW-3138	DWW-5330	DWW-7187,8
Gross Beta	1.8 ± 0.6	1.9 ± 0.6	1.2 ± 0.4	1.6 ± 0.5
H-3	< 166	< 157	< 149	< 191
Location				
D-58 Franz Farm				
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DWW-1336	DWW-3139	DWW-5331	DWW-7189
Gross Beta	4.3 ± 0.8	4.0 ± 0.7	3.7 ± 0.5	5.0 ± 0.8
H-3	< 166	< 157	< 149	< 191
Location				
D-72 Van Note Farm				
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DWW-1337	DWW-3140	DWW-5332	DWW-7190
Gross Beta	< 1.2	< 1.2	< 0.5	< 1.2
H-3	< 166	< 157	< 149	< 191

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Table 17. Vegetation (broadleaf), analyses for iodine-131 and other gamma-emitting isotopes.

Collection: Annually

Units: pCi/g wet

Location	D-57	D-58	D-72	D-96
Lab Code	DVE-4977	DVE-4978	DVE-4979	DVE-4980
Date Collected	9/6/2005	9/6/2005	9/6/2005	9/6/2005
Sample Type	Broad Leaf	Broad Leaf	Broad Leaf	Broad Leaf
K-40	7.11 ± 0.51	2.79 ± 0.73	4.00 ± 0.41	6.47 ± 0.44
Mn-54	< 0.018	< 0.041	< 0.020	< 0.023
Co-58	< 0.024	< 0.041	< 0.019	< 0.020
Co-60	< 0.024	< 0.040	< 0.018	< 0.028
Nb-95	< 0.031	< 0.033	< 0.013	< 0.028
Zr-95	< 0.036	< 0.066	< 0.032	< 0.044
Ru-103	< 0.028	< 0.037	< 0.015	< 0.014
Ru-106	< 0.22	< 0.30	< 0.19	< 0.22
I-131	< 0.036	< 0.054	< 0.016	< 0.023
Cs-134	< 0.022	< 0.042	< 0.015	< 0.019
Cs-137	< 0.026	< 0.045	< 0.026	< 0.017
Ce-141	< 0.056	< 0.054	< 0.025	< 0.031
Ce-144	< 0.144	< 0.228	< 0.087	< 0.122

Location	D-109	D-108 (C)
Lab Code	DVE-4982	DVE-4981
Date Collected	9/6/2005	9/6/2005
Sample Type	Broad Leaf	Broad Leaf
K-40	6.50 ± 0.44	2.90 ± 0.56
Mn-54	< 0.019	< 0.029
Co-58	< 0.013	< 0.022
Co-60	< 0.024	< 0.029
Nb-95	< 0.028	< 0.032
Zr-95	< 0.044	< 0.040
Ru-103	< 0.026	< 0.029
Ru-106	< 0.25	< 0.29
I-131	< 0.020	< 0.050
Cs-134	< 0.030	< 0.030
Cs-137	< 0.023	< 0.024
Ce-141	< 0.017	< 0.044
Ce-144	< 0.128	< 0.151

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Table 18. 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	NS ^a	DVE-6185	DVE-4986	DVE-6186,7	NS ^a
Date Collected	10/6/2004	10/26/2005	9/6/2005	10/26/2005	10/6/2004
Sample Type	Forage	Beans	Forage	Corn	Forage
K-40	-	6.23 ± 0.53	12.03 ± 0.74	2.87 ± 0.35	-
Mn-54	-	< 0.027	< 0.026	< 0.016	-
Co-58	-	< 0.021	< 0.018	< 0.016	-
Co-60	-	< 0.023	< 0.018	< 0.016	-
Nb-95	-	< 0.027	< 0.027	< 0.014	-
Zr-95	-	< 0.071	< 0.057	< 0.026	-
Ru-103	-	< 0.018	< 0.028	< 0.012	-
Ru-106	-	< 0.19	< 0.24	< 0.14	-
Cs-134	-	< 0.024	< 0.027	< 0.012	-
Cs-137	-	< 0.017	< 0.035	< 0.016	-
Ce-141	-	< 0.050	< 0.043	< 0.029	-
Ce-144	-	< 0.170	< 0.164	< 0.098	-

Location	D-58	D-72	D-72	D-96	D-96
Lab Code	DVE-6188	DVE-4987	DVE-6189	DVE-4988	DVE-6190
Date Collected	10/26/2005	9/6/2005	10/26/2005	9/6/2005	10/26/2005
Sample Type	Corn	Forage	Beans	Forage	Corn
K-40	2.40 ± 0.41	19.72 ± 0.87	1.48 ± 0.75	21.35 ± 0.89	2.85 ± 0.44
Mn-54	< 0.014	< 0.030	< 0.019	< 0.030	< 0.012
Co-58	< 0.016	< 0.029	< 0.020	< 0.029	< 0.010
Co-60	< 0.015	< 0.034	< 0.019	< 0.036	< 0.020
Nb-95	< 0.013	< 0.035	< 0.032	< 0.038	< 0.015
Zr-95	< 0.031	< 0.061	< 0.032	< 0.057	< 0.036
Ru-103	< 0.011	< 0.019	< 0.028	< 0.036	< 0.008
Ru-106	< 0.13	< 0.26	< 0.23	< 0.35	< 0.11
Cs-134	< 0.017	< 0.026	< 0.033	< 0.027	< 0.019
Cs-137	< 0.020	< 0.026	< 0.023	< 0.031	< 0.012
Ce-141	< 0.020	< 0.031	< 0.041	< 0.063	< 0.032
Ce-144	< 0.087	< 0.196	< 0.103	< 0.184	< 0.088

^a "NS" = No sample; see Table 2.0, "Listing of Missed Samples."

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Table 18. Vegetation (hay and grain), analyses for gamma-emitting isotopes.

Collection: Annually

Units: pCi/g wet

Location	Control			
	D-109	D-109	D-108	D-108
Lab Code	DVE-4990,1	DVE-6192	DVE-4989	DVE-6191
Date Collected	9/6/2005	10/26/2005	9/6/2005	10/26/2005
Sample Type	Forage	Corn	Forage	Corn
K-40	19.17 ± 0.71	2.18 ± 0.46	31.89 ± 1.68	2.60 ± 0.27
Mn-54	< 0.031	< 0.017	< 0.054	< 0.007
Co-58	< 0.018	< 0.018	< 0.035	< 0.008
Co-60	< 0.023	< 0.014	< 0.033	< 0.010
Nb-95	< 0.033	< 0.023	< 0.057	< 0.007
Zr-95	< 0.050	< 0.038	< 0.110	< 0.009
Ru-103	< 0.030	< 0.017	< 0.034	< 0.010
Ru-106	< 0.23	< 0.09	< 0.27	< 0.07
Cs-134	< 0.026	< 0.014	< 0.038	< 0.009
Cs-137	< 0.029	< 0.018	< 0.041	< 0.007
Ce-141	< 0.041	< 0.019	< 0.100	< 0.015
Ce-144	< 0.248	< 0.085	< 0.445	< 0.059

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Table 19. Surface water samples, analyses for iodine-131 and gamma-emitting isotopes.

Collector Monthly

Units: pCi/L

Location: D-50

Date Collected	01-19-05	02-21-05	03-16-05	04-20-05	05-27-05	06-27-05
Lab Code	DSW-401	DSW-793	DSW-1201	DSW-2033	DSW-2883	DSW-3875,6
Mn-54	< 10	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Zr-95	< 30	< 30	< 30	< 30	< 30	< 30
I-131	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba-140	< 60	< 60	< 60	< 60	< 60	< 60
La-140	< 15	< 15	< 15	< 15	< 15	< 15

Date Collected	07-27-05	08-19-05	09-26-05	10-26-05	11-15-05	12-13-05
Lab Code	DSW-4403	DSW-4822	DSW-5435	DSW-6251	DSW-6586	DSW-7181
Mn-54	< 10	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Zr-95	< 30	< 30	< 30	< 30	< 30	< 30
I-131	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba-140	< 60	< 60	< 60	< 60	< 60	< 60
La-140	< 15	< 15	< 15	< 15	< 15	< 15

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Table 19. Surface water samples, analyses for iodine-131 and gamma-emitting isotopes.

Collector Monthly

Units: pCi/L

Location: D-51

Date Collected	01-19-05	02-21-05	03-16-05	04-20-05	05-27-05	06-27-05
Lab Code	DSW-402	DSW-794	DSW-1202	DSW-2034	DSW-2884	DSW-3877
Mn-54	< 10	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Zr-95	< 30	< 30	< 30	< 30	< 30	< 30
I-131	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba-140	< 60	< 60	< 60	< 60	< 60	< 60
La-140	< 15	< 15	< 15	< 15	< 15	< 15

Date Collected	07-27-05	08-19-05	09-26-05	10-26-05	11-15-05	12-13-05
Lab Code	DSW-4404,5	DSW-4823	DSW-5326	DSW-6252	DSW-6587	DSW-7182
Mn-54	< 10	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Zr-95	< 30	< 30	< 30	< 30	< 30	< 30
I-131	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba-140	< 60	< 60	< 60	< 60	< 60	< 60
La-140	< 15	< 15	< 15	< 15	< 15	< 15

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Table 19. Surface water, analyses for iodine-131 and gamma-emitting isotopes.

Collection: Monthly

Units: pCi/L

Location: D-107

Date Collected Lab Code	01-19-05 DSW-403	02-21-05 DSW-795	03-16-05 DSW-1203	04-20-05 DSW-2035	05-27-05 DSW-2885	06-27-05 DSW-3878
Mn-54	< 10	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Zr-95	< 30	< 30	< 30	< 30	< 30	< 30
I-131	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba-140	< 60	< 60	< 60	< 60	< 60	< 60
La-140	< 15	< 15	< 15	< 15	< 15	< 15

Date Collected Lab Code	07-27-05 DSW-4406	08-19-05 DSW-4824	09-26-05 DSW-5436	10-26-05 DSW-6253	11-15-05 DSW-6588	12-13-05 DSW-7183
Mn-54	< 10	< 10	< 10	< 10	< 10	< 10
Fe-59	< 30	< 30	< 30	< 30	< 30	< 30
Co-58	< 10	< 10	< 10	< 10	< 10	< 10
Co-60	< 10	< 10	< 10	< 10	< 10	< 10
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Zr-95	< 30	< 30	< 30	< 30	< 30	< 30
I-131	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba-140	< 60	< 60	< 60	< 60	< 60	< 60
La-140	< 15	< 15	< 15	< 15	< 15	< 15

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

D-50				
Location	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Period				
Lab Code	DSW-1228	DSW-3885	DSW-5473	DSW-7336
H-3	< 144	< 162	< 164	< 180

D-51				
Location	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Period				
Lab Code	DSW-1229,30	DSW-3886	DSW-5474	DSW-7337
H-3	< 144	< 162	< 177	< 180

D-107				
Location	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Period				
Lab Code	DSW-1231	DSW-3887	DSW-5475	DSW-7338
H-3	< 144	737 ± 113 ^a	720 ± 118	< 180

^a Repeat tritium result = 791±130 pCi/L.; recomposite tritium result = 865±133 pCi/L.

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Table 21. Fish, analyses of edible portion for gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/g wet

Location				
Upstream, D-49				
Lab Code	DF-3931	DF-3932	DF-5203	DF-5204
Date Collected	6/27/2005	6/27/2005	9/13/2005	9/13/2005
Sample Type	Carp	Carp sucker	Carp	Carp sucker
K-40	3.46 ± 0.61	3.29 ± 0.61	2.06 ± 0.24	2.88 ± 0.47
Mn-54	< 0.013	< 0.024	< 0.010	< 0.017
Fe-59	< 0.059	< 0.046	< 0.012	< 0.023
Co-58	< 0.022	< 0.027	< 0.006	< 0.022
Co-60	< 0.018	< 0.018	< 0.006	< 0.018
Zn-65	< 0.029	< 0.052	< 0.009	< 0.039
Nb-95	< 0.019	< 0.036	< 0.014	< 0.022
Zr-95	< 0.067	< 0.057	< 0.019	< 0.027
Ru-103	< 0.021	< 0.028	< 0.011	< 0.016
Ru-106	< 0.187	< 0.119	< 0.074	< 0.096
Cs-134	< 0.020	< 0.020	< 0.013	< 0.013
Cs-137	< 0.015	< 0.018	< 0.008	< 0.014
Ce-141	< 0.032	< 0.036	< 0.021	< 0.021
Ce-144	< 0.090	< 0.094	< 0.071	< 0.078

Location				
Downstream, D-61				
Lab Code	DF-3933	DF-3934	DF-5205	DF-5206
Date Collected	6/27/2005	6/27/2005	9/13/2005	9/13/2005
Sample Type	Carp	Carp sucker	Carp sucker	Carp
K-40	3.73 ± 0.57	3.29 ± 0.42	3.19 ± 0.38	2.73 ± 0.41
Mn-54	< 0.017	< 0.018	< 0.012	< 0.013
Fe-59	< 0.049	< 0.040	< 0.025	< 0.034
Co-58	< 0.024	< 0.011	< 0.013	< 0.012
Co-60	< 0.018	< 0.012	< 0.010	< 0.017
Zn-65	< 0.023	< 0.022	< 0.043	< 0.027
Nb-95	< 0.019	< 0.030	< 0.025	< 0.019
Zr-95	< 0.044	< 0.038	< 0.037	< 0.020
Ru-103	< 0.035	< 0.022	< 0.019	< 0.022
Ru-106	< 0.176	< 0.146	< 0.129	< 0.083
Cs-134	< 0.015	< 0.017	< 0.013	< 0.011
Cs-137	< 0.016	< 0.016	< 0.016	< 0.013
Ce-141	< 0.023	< 0.037	< 0.025	< 0.018
Ce-144	< 0.090	< 0.106	< 0.094	< 0.084

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Table 22. River sediment, analysis for gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/g dry

Location		D-50	
Lab Code	DBS-3472	DBS-5323	
Date Collected	6/27/2005	9/26/2005	
K-40	8.44 ± 0.69	10.96 ± 0.92	
Mn-54	< 0.017	< 0.032	
Fe-59	< 0.044	< 0.099	
Co-58	< 0.020	< 0.030	
Co-60	< 0.024	< 0.027	
Zn-65	< 0.053	< 0.081	
Nb-95	< 0.035	< 0.039	
Zr-95	< 0.053	< 0.039	
Ru-103	< 0.018	< 0.039	
Ru-106	< 0.120	< 0.242	
Cs-134	< 0.023	< 0.031	
Cs-137	< 0.021	< 0.027	
Ce-141	< 0.038	< 0.078	
Ce-144	< 0.093	< 0.165	

Location		D-51	
Lab Code	DBS-3473	DBS-5324	
Date Collected	6/27/2005	9/26/2005	
K-40	8.48 ± 0.65	8.41 ± 0.71	
Mn-54	< 0.016	< 0.020	
Fe-59	< 0.056	< 0.086	
Co-58	< 0.031	< 0.029	
Co-60	< 0.010	< 0.023	
Zn-65	< 0.041	< 0.060	
Nb-95	< 0.033	< 0.033	
Zr-95	< 0.047	< 0.056	
Ru-103	< 0.031	< 0.027	
Ru-106	< 0.116	< 0.135	
Cs-134	< 0.028	< 0.026	
Cs-137	< 0.014	< 0.019	
Ce-141	< 0.062	< 0.061	
Ce-144	< 0.121	< 0.069	

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Table 23. River sediment, analysis for gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/g dry

Location	D-107	
Lab Code	DBS-3474	DBS-5325
Date Collected	6/27/2005	9/26/2005
K-40	7.15 ± 1.22	6.77 ± 0.93
Mn-54	< 0.052	< 0.036
Fe-59	< 0.12	< 0.066
Co-58	< 0.074	< 0.042
Co-60	< 0.055	< 0.018
Zn-65	< 0.13	< 0.082
Nb-95	< 0.067	< 0.055
Zr-95	< 0.11	< 0.058
Ru-103	< 0.096	< 0.025
Ru-106	< 0.54	< 0.16
Cs-134	< 0.073	< 0.038
Cs-137	< 0.055	< 0.029
Ce-141	< 0.16	< 0.042
Ce-144	< 0.29	< 0.10

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Table 23. Precipitation, analyses for gamma emitting isotopes.

Collection:	Monthly					
Units:	pCi/L					
Location:	DAEC					
Date Collected	01-19-05	02-21-05	03-16-05	04-20-05	05-27-05	06-27-05
Lab Code	DP-404	DP-796	DP-1204	DP-2036	DP-2886	DP-3879
Mn-54	< 3.4	< 6.0	< 5.5	< 3.6	< 3.4	< 4.1
Fe-59	< 10.7	< 5.8	< 9.6	< 6.7	< 5.3	< 8.5
Co-58	< 5.5	< 4.5	< 5.6	< 2.5	< 3.3	< 3.3
Co-60	< 5.3	< 3.1	< 6.3	< 3.5	< 2.6	< 2.6
Zn-65	< 8.8	< 8.2	< 10.7	< 6.7	< 7.5	< 6.6
Nb-95	< 6.1	< 5.2	< 5.8	< 4.6	< 5.5	< 6.2
Zr-95	< 10.1	< 5.4	< 5.4	< 5.7	< 4.0	< 10.0
I-131	< 14.2	< 7.8	< 9.4	< 5.8	< 7.9	< 24.7
Cs-134	< 4.9	< 6.8	< 5.8	< 4.1	< 2.3	< 3.5
Cs-137	< 4.6	< 6.0	< 5.4	< 3.3	< 3.5	< 3.9
Ba-140	< 34.9	< 20.0	< 11.9	< 17.0	< 16.6	< 33.8
La-140	< 8.2	< 5.6	< 4.2	< 4.0	< 3.5	< 9.9
Date Collected	07-27-05	08-25-05	09-29-05	10-27-05	11-18-05	12-13-05
Lab Code	DP-4407	DP-4825	DP-5437	DP-6254	DP-6610	DP-7180
Mn-54	< 4.0	< 3.6	< 3.7	< 7.3	< 4.8	< 5.5
Fe-59	< 6.8	< 3.9	< 4.9	< 8.8	< 15.0	< 14.6
Co-58	< 2.7	< 5.2	< 3.3	< 5.3	< 6.3	< 8.5
Co-60	< 4.3	< 3.7	< 2.9	< 5.7	< 5.9	< 6.8
Zn-65	< 5.1	< 3.4	< 7.8	< 7.9	< 11.6	< 14.1
Nb-95	< 3.5	< 7.9	< 3.9	< 8.1	< 6.3	< 4.8
Zr-95	< 6.1	< 15.2	< 6.0	< 6.4	< 14.4	< 8.8
I-131	< 8.2	< 10.9	< 6.7	< 13.1	< 10.8	< 11.2
Cs-134	< 3.2	< 5.8	< 3.2	< 6.6	< 5.8	< 10.1
Cs-137	< 2.5	< 7.6	< 3.6	< 6.8	< 7.0	< 5.6
Ba-140	< 2.2	< 19.7	< 19.2	< 38.5	< 25.4	< 46.0
La-140	< 4.4	< 7.1	< 3.4	< 5.1	< 8.4	< 4.4

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Table 24. Precipitation, analysis for tritium.
Collection: Quarterly composites of monthly samples.
Units: pCi/L

Location	Duane Arnold			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DP-1232 ^a	DP-3888	DP-5476,7	DP-7339
H-3	246 ± 86	< 165	< 173	< 184

^a Tritium repeated with a result of 232±109 pCi/L.

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Table 25. Soil, analysis for strontium-90 and gamma-emitting isotopes.
Collection: Annually
Units: pCi/g dry

Location	D-15	D-16
Lab Code	DSO-6183	DSO-6184
Date Collected	10/26/2005	10/26/2005
Sr-90	< 0.021	< 0.021
K-40	17.68 ± 1.26	9.80 ± 0.77
Mn-54	< 0.050	< 0.020
Fe-59	< 0.051	< 0.066
Co-58	< 0.048	< 0.020
Co-60	< 0.047	< 0.017
Zn-65	< 0.088	< 0.065
Nb-95	< 0.036	< 0.034
Zr-95	< 0.093	< 0.042
Ru-103	< 0.036	< 0.029
Ru-106	< 0.32	< 0.11
Cs-134	< 0.059	< 0.033
Cs-137	0.18 ± 0.056	0.17 ± 0.039
Ce-141	< 0.075	< 0.043
Ce-144	< 0.19	< 0.078
