HAZLETON
ENVIRONMENTAL SCIENCES
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REPORT TO
IOWA ELECTRIC LIGHT AND POWER
CEDAR RAPIDS, IOWA

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM
FOR
THE DUANE ARNOLD ENERGY CENTER
CEDAR RAPIDS, IOWA

Docket No. 50-331

ANNUAL REPORT - II
DATA TABULATIONS AND ANALYSES
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PREFACE

The staff members of the Nuclear Sciences Department of Hazleton Environmental Sciences (HES), a Division of Hazleton Laboratories America, Inc. (HLA), were responsible for the acquisition of data presented in this report. All environmental samples were collected by personnel of DAEC.

The report was prepared by C. R. Marucut, Section Supervisor, Nuclear Sciences, under the direction of L. G. Huebner, Director, Nuclear Sciences. She was assisted in the report preparation by L. Nicia, Group Leader, and other staff members of the Nuclear Sciences Department.

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1.0 Introduction

The following consists of data tabulations and analyses for the Annual Reprot - Part II for the 1982 Environmental Radiological Monitoring Program conducted at the Duane Arnold Energy Center, Cedar Rapids, Iowa.

A summary with interpretation of the data presented here is contained in a separate report to the Iowa Electric Light and Power Company.

Table 1. Sampling locations, Duane Arnold Energy Center.

Code	Type[a]	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° SE
D-3		3	Hiawatha	7 mi @ 130° SE
D-4		4	Johnson	3 mi @ 140° SE
D-5		5	Palo	3 mi @ 200° SW
D-6		6	Center Point	7 mi @ 0° N
D-7		7	Shellsburg	6 mi @ 255° W
D-8		8	Urbana	9 mi @ 345° NW
D-9		9	Route W26	7 mi @ 295° NW
D-10		10	Atkins	8 mi @ 210° SW
D-11		11	Toddville	4 mi @ 90° E
D-12	C	12	Iowa City	25 mi @ 160° S
D-13	C	13	Alburnett	8 mi @ 70° NE
D-14		14	Alice Substation	7 mi @ 35° NE
D-15		15	On-site, North	0.5 mi @ 305° NW
D-16		16	On-site, South	0.5 mi @ 190° S
D-17		17		0.5 mi N
D-18		18		0.5 mi NE
D-19		19		0.5 mi NE
D-20		20		0.5 mi NE
D-21		21		0.5 mi E
D-22		22		0.5 mi SE
D-23		23		0.5 mi SE
D-24		24		0.5 mi S
D-25		25		0.5 mi SW
D-26		26		0.5 mi SW
D-27		27		0.5 mi SW
D-28		28		0.5 mi SW
D-29		29		0.5 mi SW
D-30		30		0.5 mi W
D-31		31		0.5 mi NW
D-32		32		0.5 mi NW
D-33		33		3.0 mi N
D-34		34		3.0 mi NE
D-35		35		3.0 mi NE
D-36		36		3.0 mi NE
D-37		37		3.0 mi E
D-38		38		3.0 mi SE
D-39		39		3.0 mi SE
D-40		40		3.0 mi SE
D-41		41		3.0 mi S
D-42		42		3.0 mi SW
D-43		43		1.0 mi SW

Table 1. (continued)

Code	Type[a]	Sampling Location		
		Sampling Point	Location Description	Distance and Direction from Site Stack
D-44		44		1.0 mi SW
D-45		45		1.0 mi SW
D-46		46		1.0 mi W
D-47		47		1.0 mi NW
D-48		48		1.0 mi NW
D-49	C	49	Lewis access, upstream of DAEC	
D-50		50	Plant Intake	
D-51		51	Plant Discharge	
D-52		52	Cedar Rapids City Park	7.5 mi SE
D-53		53	Treated Municipal Water	
D-54		54	Inlet to Municipal Water Treatment System	
D-55		55	On-site Well	
D-57		57	Bull (Off-site well)	
D-58		58	Frantz Farm, 0.5 mi of DAEC	
D-59		59	Frantz Farm, 0.5 mi of DAEC	
D-60		60	Wiley, Off-site within 1.0 mi of DAEC	
D-61		61	One-half mile downstream of plant discharge	
D-63		63	Andrews Farm, 1.5 mi NW	
D-72		72	Van Note Farm, within 2 miles of site, SW	
D-73	C	73	Hansen Farm, within 22 miles of site	
D-76		76		0.5 mi NE
D-77		77		0.5 mi NE
D-78		78		0.5 mi NE
D-79		79		0.5 mi E
D-80		80		0.5 mi SE
D-81		81		0.5 mi SE

Table 1. (continued)

Code	Type[a]	Sampling Location		
		Sampling Point	Location Description	Distance and Direction from Site Stack
D-82		82		0.5 mi SE
D-83		83		0.5 mi S
D-84		84		0.5 mi SW
D-85		85		0.5 mi SW
D-86		86		0.5 mi SW
D-87		87		0.5 mi SW
D-88		88		0.5 mi W
D-89		89		0.5 mi W
D-90		90		0.5 mi NW
D-91		91		0.5 mi N
D-93		93	Yarborough Farm	2.8 mi of site, NW
D-94		94	Hines Farm	2.7 mi NE
D-96		96	Keiper Farm	7.5 mi SW
D-99		99	Pleasant Creek	2.2 mi NW
D-101		101	Flecksing Farm	4.0 mi NE
D-102	C	102	McCardle Farm	20.0 mi NW
D-103		103	Park Pond	1.5 mi E
D-104[b]		104	Jim Miller Farm	1.2 mi NE
D-105	C	105	Schulte Farm	21.3 mi SW
D-106		106	David R. Stallman	4.5 mi SE

[a] "C" denotes control location. All other locations are indicators.
[b] Location D-104 was dropped from the program effective 8-24-82 and was replaced by location D-106

Table 2. Type and frequency of collection.

Location	Loc. Type[a]	Weekly	Monthly	Quarterly	Semi-Annually	Annually
D-1	C	AP	TLD			TLD
D-2	C	AP	TLD			TLD
D-3		AP	TLD			TLD
D-4		AP,AI	TLD			TLD
D-5		AP,AI				
D-6		AP	TLD			TLD
D-7		AP,AI	TLD			TLD
D-8		AP,AI	TLD			TLD
D-9		AP	TLD			TLD
D-10		AP	TLD			TLD
D-11		AP,AI	TLD			TLD
D-12	C	AP,AI	TLD			TLD
D-13	C	AP	TLD			TLD
D-14		AP,AI	TLD			TLD
D-15		AP,AI	TLD	SO[b]		TLD
D-16		AP	TLD	SO[b]		TLD
D-17-48			TLD			TLD
D-49	C		SW	SL	F,BS	
D-50			SW		BS	
D-51			SW		BS	
D-52			SW			
D-53			WW[c]			
D-54			WW[d]			
D-55			WW			
D-57			WW	SO[b]		Ge
D-58			WW	SO[b]		Ge
D-59			WW			
D-60			WW			
D-61				SL	F,BS	
D-63			M[f]	SO[b]		Ge
D-72			M[f]	SO[b]		Ge
D-73	C		SW			
D-76-91			TLD			TLD
D-93			M[f]	SO[b]		Ge
D-94			M[f]	SO[b]		Ge,ME
D-96			M[f]	SO[b]		Ge
D-99			SW			

Table 2. (continued)

Location	Loc. Type[a]	Weekly	Monthly	Quarterly	Semi-Annually	Annually
D-101			M[f]	SO[b]		G[e]
D-102	C		M[f]	SO[b]		G[e],ME
D-103			SW			
D-104[g]				SO[b]		G[e]
D-105	C		M[f]	SO[b]		G[e]
D-106			M[f]	SO[b]		G[e]
On-site			P			
Inside 10 mile radius of plant						WL

[a] Control locations are indicated by a "C" in this column. All other locations are indicators.
[b] Soil is collected three times per year.
[c] Collected hourly and composited monthly and quarterly.
[d] Collected daily and composited monthly and quarterly.
[e] Vegetation (G) includes broad leaf vegetation and grain.
[f] Monthly from October through April; weekly from May through September.
[g] D-104 was dropped from the program starting 8-31-82 and was replaced by location D-106.

Table 3 Sample codes used in Table 2

Code	Description
AP	Airborne Particulates
AI	Airborne Iodine
TLD	Thermoluminescent Dosimeter
P	Precipitation
M	Milk
WW	Well Water
G	Vegetation (broad leaf and grain)
ME	Meat and Poultry
SO	Soil
SW	Surface Water
F	Fish
SL	Periphyton (aquatic biota)
BS	River Sediment
WL	Wildlife

2.0 DATA TABLES

Table 4. Airborne particulates collected at Location D-1, (Cedar Rapids), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	287	0.061±0.005	7-08-82	242[b]	0.024±0.004
1-14-82	281	0.048±0.004	7-15-82	285	0.026±0.003
1-21-82	281	0.048±0.004	7-22-82	286	0.022±0.003
1-28-82	281	0.036±0.004	7-29-82	287	0.034±0.004
2-04-82	284	0.045±0.004	8-05-82	283	0.032±0.004
2-11-82	281	0.050±0.005	8-12-82	285	0.023±0.003
2-18-82	287	0.056±0.005	8-19-82	286	0.035±0.004
2-25-82	292	0.025±0.003	8-26-82	287	0.032±0.004
3-04-82	284	0.023±0.003	9-02-82	277	0.017±0.003
3-11-82	283	0.033±0.004	9-09-82	277	0.016±0.003
3-18-82	285	0.014±0.003	9-16-82	268	0.014±0.003
3-25-82	286	0.014±0.003	9-23-82	280	0.021±0.004
4-01-82	283	0.020±0.003	9-30-82	276	0.033±0.004
1st Qtr. mean ± s.d.		0.036±0.016	3rd Qtr. mean ± s.d.		0.025±0.007
4-08-82	286	0.029±0.003	10-07-82	276	0.023±0.004
4-15-82	289	0.031±0.004	10-14-82	278	0.015±0.003
4-22-82	284	0.019±0.003	10-21-82	274	0.028±0.004
4-29-82	284	0.029±0.004	10-28-82	279	0.023±0.004
5-06-82	284	0.034±0.004	11-04-82	287	0.023±0.003
5-13-82	284	0.033±0.004	11-11-82	286	0.029±0.004
5-20-82	287	0.023±0.003	11-18-82	285	0.034±0.004
5-27-82	300	0.012±0.003	11-24-82	242[b]	0.037±0.003
6-03-82	298	0.018±0.003	12-02-82	329[c]	0.033±0.003
6-10-82	294	0.018±0.003	12-09-82	286	0.026±0.003
6-17-82	287	0.033±0.005	12-16-82	286	0.030±0.003
6-24-82	293	0.017±0.003	12-22-82	243[b]	0.022±0.003
7-01-82	52[a]	0.038±0.014	12-30-82	326[c]	0.023±0.003
2nd Qtr. mean ± s.d.		0.026±0.008	3rd Qtr. mean ± s.d.		0.027±0.006

[a] Pump ran for only 28 hours.
[b] Pump ran for 6 days.
[c] Pump ran for 8 days.

Table 5. Airborne particulates collected at Location D-2, (Marion) analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	292	0.058±0.005	7-08-82	287	0.016±0.003
1-14-82	285	0.051±0.004	7-15-82	285	0.020±0.003
1-21-82	285	0.052±0.004	7-22-82	287	0.013±0.003
1-28-82	284	0.035±0.004	7-29-82	286	0.016±0.003
2-04-82	285	0.048±0.004	8-05-82	293	0.027±0.003
2-11-82	283	0.052±0.005	8-12-82	293	0.016±0.003
2-18-82	286	0.053±0.005	8-19-82	286	0.031±0.004
2-25-82	289	0.022±0.003	8-26-82	286	0.028±0.004
3-04-82	283	0.033±0.004	9-02-82	282	0.019±0.003
3-11-82	283	0.046±0.004	9-09-82	285	0.015±0.003
3-18-82	287	0.017±0.003	9-16-82	285	0.018±0.003
3-25-82	285	0.020±0.003	9-23-82	288	0.012±0.003
4-01-82	286	0.025±0.003	9-30-82	284	0.028±0.003
1st Qtr. mean ± s.d.		0.039±0.014	3rd Qtr. mean ± s.d.		0.020±0.006
4-08-82	286	0.029±0.003	10-07-82	285	0.026±0.004
4-15-82	289	0.037±0.004	10-14-82	284	0.012±0.003
4-22-82	284	0.023±0.003	10-21-82	286	0.019±0.003
4-29-82	283	0.036±0.004	10-28-82	285	0.026±0.004
5-06-82	284	0.028±0.004	11-04-82	287	0.019±0.003
5-13-82	285	0.023±0.003	11-11-82	287	0.011±0.003
5-20-82	287	0.021±0.003	11-18-82	284	0.032±0.004
5-27-82	284	0.010±0.003	11-25-82	243[a]	0.035±0.004
6-03-82	286	0.014±0.003	12-02-82	329[b]	0.020±0.003
6-10-82	285	0.014±0.003	12-09-82	286	0.027±0.003
6-17-82	285	0.024±0.004	12-16-82	284	0.030±0.003
6-24-82	285	0.011±0.003	12-22-82	244[a]	0.023±0.004
7-01-82	285	0.015±0.003	12-30-82	326[b]	0.022±0.003
2nd Qtr. mean ± s.d.		0.022±0.009	4th Qtr. mean ± s.d.		0.023±0.007

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 6. Airborne particulates collected at Location D-3, (Hiawatha) analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-11-82	450[a]	0.042±0.003	7-08-82	286	0.021±0.003
1-14-82	122[b]	0.039±0.007	7-15-82	285	0.023±0.003
1-21-82	285	0.049±0.004	7-22-82	286	0.020±0.003
1-28-82	284	0.038±0.004	7-29-82	287	0.032±0.004
2-04-82	285	0.047±0.004	8-05-82	284	0.032±0.004
2-11-82	285	0.057±0.005	8-12-82	286	0.020±0.003
2-18-82	286	0.076±0.005	8-19-82	285	0.034±0.004
2-25-82	290	0.029±0.003	8-26-82	287	0.025±0.004
3-04-82	285	0.029±0.004	9-02-82	284	0.022±0.003
3-11-82	283	0.045±0.004	9-09-82	285	0.019±0.003
3-18-82	286	0.018±0.003	9-16-82	285	0.019±0.003
3-25-82	286	0.023±0.003	9-23-82	287	0.021±0.003
4-01-82	286	0.024±0.003	9-30-82	284	0.041±0.004
1st Qtr. mean ± s.d.		0.040±0.016	3rd Qtr. mean ± s.d.		0.025±0.007
4-08-82	285	0.025±0.003	10-07-82	286	0.031±0.004
4-15-82	290	0.047±0.004	10-14-82	285	0.011±0.003
4-22-82	284	0.030±0.004	10-21-82	287	0.021±0.004
4-29-82	283	0.040±0.004	10-28-82	285	0.021±0.003
5-06-82	285	0.034±0.004	11-04-82	287	0.020±0.003
5-13-82	284	0.028±0.004	11-11-82	285	0.024±0.003
5-20-82	286	0.024±0.003	11-18-82	286	0.027±0.003
5-27-82	285	0.012±0.003	11-25-82	243[c]	0.031±0.004
6-03-82	286	0.014±0.003	12-02-82	328[d]	0.025±0.003
6-10-82	285	0.016±0.003	12-09-82	282	0.022±0.003
6-17-82	286	0.032±0.005	12-16-82	279	0.024±0.003
6-24-82	285	0.014±0.003	12-22-82	241[c]	0.023±0.004
7-01-82	286	0.019±0.003	12-30-82	326[d]	0.023±0.003
2nd Qtr. mean ± s.d.		0.026±0.011	4th Qtr. mean ± s.d.		0.023±0.005

[a] Pump ran for 11 days. Collection was delayed because of snow storm.
[b] Pump ran for only 3 days.
[c] Pump ran for 6 days.
[d] Pump ran for 8 days.

Table 7. Airborne particulates collected at Location D-4, (Johnson) analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	297	0.048±0.004	7-08-82	286	0.017±0.003
1-14-82	292	0.047±0.004	7-15-82	287	0.018±0.003
1-21-82	297	0.047±0.004	7-22-82	284	0.013±0.003
1-28-82	291	0.034±0.004	7-29-82	287	0.028±0.004
2-04-82	296	0.042±0.004	8-05-82	284	0.026±0.003
2-11-82	294	0.053±0.005	8-12-82	285	0.020±0.003
2-18-82	291	0.027±0.004	8-19-82	285	0.030±0.004
2-25-82	297	0.023±0.003	8-26-82	288	0.027±0.004
3-04-82	284	0.027±0.003	9-02-82	283	0.018±0.003
3-11-82	283	0.041±0.004	9-09-82	286	0.018±0.003
3-18-82	286	0.017±0.003	9-16-82	285	0.020±0.003
3-25-82	283	0.018±0.003	9-23-82	286	0.014±0.003
4-01-82	285	0.021±0.003	9-30-82	285	0.023±0.003
1st Qtr. mean ± s.d.		0.034±0.013	3rd Qtr. mean ± s.d.		0.021±0.005
4-08-82	285	0.026±0.003	10-07-82	285	0.027±0.004
4-15-82	285	0.032±0.004	10-14-82	285	0.011±0.003
4-22-82	288	0.023±0.003	10-21-82	285	0.022±0.004
4-29-82	282	0.024±0.003	10-28-82	286	0.025±0.004
5-06-82	282	0.027±0.004	11-04-82	287	0.022±0.003
5-13-82	287	0.027±0.003	11-11-82	286	0.027±0.004
5-20-82	290	0.021±0.003	11-18-82	285	0.031±0.004
5-27-82	286	0.010±0.003	11-25-82	245[a]	0.026±0.004
6-03-82	287	0.014±0.003	12-02-82	327[b]	0.029±0.003
6-10-82	299	0.016±0.003	12-09-82	286	0.020±0.003
6-17-82	285	0.026±0.004	12-16-82	285	0.020±0.003
6-24-82	292	0.015±0.003	12-22-82	245[a]	0.003±0.003[c]
7-01-82	308	0.015±0.003	12-30-82	327	0.004±0.002[c]
2nd Qtr. mean ± s.d.		0.021±0.007	4th Qtr. mean ± s.d.		0.021±0.009

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.
[c] Filter paper very light. Very little air particulate matter on the filter.

Table 8. Airborne particulates collected at Location D-5, (Palo), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	288	0.050±0.004	7-08-82	286	0.017±0.003
1-15-82	329[a]	0.050±0.004	7-15-82	289	0.018±0.003
1-21-82	240[b]	0.053±0.005	7-22-82	114[c]	0.011±0.006
1-28-82	285	0.041±0.004	7-29-82	288	0.031±0.004
2-04-82	295	0.057±0.005	8-05-82	283	0.029±0.004
2-11-82	276	0.067±0.005	8-12-82	285	0.022±0.003
2-18-82	285	0.078±0.006	8-19-82	285	0.032±0.004
2-25-82	288	0.021±0.003	8-26-82	287	0.025±0.004
3-04-82	285	0.022±0.003	9-02-82	243[d]	0.017±0.003
3-11-82	283	0.038±0.004	9-09-82	286	0.016±0.003
3-18-82	286	0.015±0.003	9-16-82	285	0.018±0.003
3-25-82	283	0.016±0.003	9-23-82	286	0.016±0.003
4-01-82	285	0.019±0.003	9-30-82	285	0.030±0.004
1st Qtr. mean ± s.d.		0.041±0.021	3rd Qtr. mean ± s.d.		0.022±0.007
4-08-82	286	0.028±0.003	10-07-82	285	0.032±0.004
4-15-82	285	0.033±0.004	10-14-82	285	0.013±0.003
4-22-82	289	0.018±0.003	10-21-82	285	0.019±0.003
4-29-82	279	0.034±0.004	10-28-82	285	0.024±0.004
5-06-82	288	0.030±0.004	11-04-82	287	0.018±0.003
5-13-82	281	0.022±0.003	11-11-82	285	0.024±0.003
5-20-82	285	0.023±0.003	11-18-82	285	0.024±0.003
5-27-82	279	0.012±0.003	11-25-82	245[b]	0.027±0.004
6-03-82	284	0.017±0.003	12-02-82	326[e]	0.025±0.003
6-10-82	282	0.015±0.003	12-09-82	286	0.022±0.003
6-17-82	287	0.022±0.004	12-16-82	285	0.021±0.003
6-24-82	282	0.017±0.003	12-22-82	245[b]	0.019±0.004
7-01-82	284	0.015±0.003	12-30-82	327[e]	0.019±0.003
2nd Qtr. mean ± s.d.		0.022±0.007	4th Qtr. mean ± s.d.		0.022±0.005

[a] Pump ran for 8 days. Collection was delayed because of snow storm.
[b] Pump ran or 6 days.
[c] Low volume due to pump malfunction.
[d] Pump ran for only 143.1 hrs. Started 8-27-82.
[e] Pump ran for 8 days.

Table 9. Airborne particulates collected at Location D-6, (Center Point), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	299	0.051±0.004	7-08-82	280	0.018±0.003
1-14-82	281	0.044±0.004	7-15-82	291	0.022±0.003
1-21-82	307	0.048±0.004	7-22-82	29[a]	0.027±0.021
1-28-82	304	0.041±0.004	7-29-82	283	0.020±0.003
2-04-82	301	0.046±0.004	8-05-82	278	0.018±0.003
2-11-82	303	0.048±0.004	8-12-82	281	0.019±0.003
2-18-82	290	0.038±0.004	8-19-82	284	0.036±0.004
2-25-82	294	0.024±0.003	8-26-82	287	0.026±0.004
3-04-82	297	0.024±0.003	9-02-82	283	0.018±0.003
3-11-82	290	0.038±0.004	9-09-82	286	0.018±0.003
3-18-82	290	0.013±0.003	9-16-82	287	0.021±0.003
3-25-82	285	0.018±0.003	9-23-82	285	0.020±0.003
4-01-82	285	0.021±0.003	9-30-82	285	0.033±0.004
1st Qtr. mean ± s.d.		0.035±0.013	3rd Qtr. mean ± s.d.		0.023±0.006
4-08-82	281	0.026±0.003	10-07-82	286	0.034±0.004
4-15-82	288	0.033±0.004	10-14-82	285	0.014±0.003
4-22-82	289	0.021±0.003	10-21-82	285	0.022±0.004
4-29-82	271	0.035±0.004	10-28-82	286	0.026±0.004
5-06-82	284	0.025±0.003	11-04-82	287	0.022±0.003
5-13-82	287	0.019±0.003	11-11-82	283	0.021±0.003
5-20-82	285	0.020±0.003	11-18-82	276	0.035±0.004
5-27-82	283	0.012±0.003	11-25-82	238[b]	0.036±0.004
6-03-82	282	0.019±0.003	12-02-82	320[c]	0.027±0.003
6-10-82	278	0.017±0.003	12-09-82	286	0.028±0.004
6-17-82	288	0.024±0.004	12-16-82	285	0.028±0.003
6-24-82	279	0.016±0.003	12-22-82	244[b]	0.022±0.004
7-01-82	281	0.016±0.003	12-30-82	344[c]	0.019±0.003
2nd Qtr. mean ± s.d.		0.022±0.007	4th Qtr. mean ± s.d.		0.026±0.007

[a] Low volume caused by blown fuse.
[b] Pump ran for 6 days.
[c] Pump ran for 8 days.

Table 10. Airborne particulates collected at Location D-7, (Shellsburg), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	295	0.047±0.004	7-08-82	282	0.017±0.003
1-14-82	284	0.041±0.004	7-15-82	285	0.023±0.003
1-21-82	284	0.045±0.004	7-22-82	280	0.018±0.003
1-28-82	293	0.034±0.004	7-29-82	287	0.032±0.004
2-04-82	284	0.047±0.004	8-05-82	286	0.030±0.004
2-11-82	284	0.046±0.005	8-12-82	285	0.019±0.003
2-18-82	282	0.050±0.005	8-19-82	285	0.036±0.004
2-25-82	274	0.021±0.003	8-26-82	286	0.028±0.004
3-04-82	265	0.024±0.004	9-02-82	285	0.021±0.003
3-11-82	303	0.030±0.003	9-09-82	286	0.018±0.003
3-18-82	286	0.012±0.003	9-16-82	285	0.018±0.003
3-25-82	283	0.015±0.003	9-23-82	286	0.018±0.003
4-01-82	286	0.018±0.003	9-30-82	285	0.033±0.004
1st Qtr. mean ± s.d.		0.033±0.014	3rd Qtr. mean ± s.d.		0.024±0.007
4-08-82	285	0.022±0.003	10-07-82	285	0.035±0.004
4-15-82	285	0.030±0.004	10-14-82	285	0.012±0.003
4-22-82	289	0.026±0.003	10-21-82	286	0.021±0.004
4-29-82	287	0.024±0.003	10-28-82	285	0.027±0.004
5-06-82	285	0.027±0.004	11-04-82	287	0.023±0.003
5-13-82	284	0.023±0.003	11-11-82	285	0.029±0.004
5-20-82	286	0.021±0.003	11-18-82	285	0.034±0.004
5-27-82	284	0.010±0.003	11-25-82	245[a]	0.036±0.004
6-03-82	286	0.018±0.003	12-02-82	327[b]	0.031±0.003
6-10-82	285	0.018±0.003	12-09-82	286	0.032±0.003
6-17-82	286	0.019±0.004	12-16-82	285	0.029±0.003
6-24-82	289	0.015±0.003	12-22-82	245[a]	0.021±0.004
7-01-82	296	0.015±0.003	12-30-82	326[b]	0.025±0.003
2nd Qtr. mean ± s.d.		0.021±0.006	4th Qtr. mean ± s.d.		0.027±0.007

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 11. Airborne particulates collected at Location D-8, (Urbana), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	288	0.048±0.004	7-08-82	286	0.016±0.003
1-14-82	284	0.042±0.004	7-15-82	285	0.019±0.003
1-21-82	284	0.043±0.004	7-22-82	286	0.011±0.003
1-28-82	285	0.038±0.004	7-29-82	287	0.020±0.003
2-04-82	285	0.039±0.004	8-05-82	284	0.021±0.003
2-11-82	285	0.042±0.004	8-12-82	285	0.013±0.003
2-18-82	285	0.043±0.004	8-19-82	292	0.039±0.004
2-25-82	286	0.022±0.003	8-26-82	304	0.023±0.003
3-04-82	286	0.022±0.003	9-02-82	283	0.013±0.003
3-11-82	283	0.027±0.003	9-09-82	286	0.017±0.003
3-18-82	286	0.004±0.002[a]	9-16-82	291	0.017±0.003
3-25-82	286	0.011±0.002	9-23-82	285	0.018±0.003
4-01-82	286	0.013±0.003	9-30-82	290	0.032±0.004
1st Qtr. mean ± s.d.		0.030±0.015	3rd Qtr. mean ± s.d.		0.020±0.008
4-08-82	285	0.012±0.003	10-07-82	290	0.024±0.004
4-15-82	285	0.016±0.003	10-14-82	281	0.012±0.003
4-22-82	288	0.019±0.003	10-21-82	285	0.021±0.004
4-29-82	296	0.034±0.004	10-28-82	285	0.028±0.004
5-06-82	267	0.019±0.003	11-04-82	287	0.020±0.003
5-13-82	284	0.023±0.003	11-11-82	285	0.019±0.003
5-20-82	286	0.017±0.003	11-18-82	285	0.007±0.002[a]
5-27-82	284	0.011±0.003	11-25-82	245[b]	0.032±0.004
6-03-82	286	0.012±0.003	12-02-82	327[c]	0.015±0.003
6-10-82	285	0.013±0.003	12-09-82	286	0.019±0.003
6-17-82	286	0.022±0.004	12-16-82	285	0.023±0.003
6-24-82	285	0.014±0.003	12-22-82	245[b]	0.011±0.003
7-01-82	286	0.012±0.003	12-30-82	327[c]	0.020±0.003
2nd Qtr. mean ± s.d.		0.017±0.006	4th Qtr. mean ± s.d.		0.019±0.007

[a] Filter paper very light. Small amount of air particulate matter on the filter.
[b] Pump ran for 6 days.
[c] Pump ran for 8 days.

Table 12. Airborne particulates collected at Location D-9, (Route W26), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	273	0.046±0.004	7-08-82	294	0.018±0.003
1-14-82	265	0.044±0.004	7-15-82	291	0.019±0.003
1-21-82	265	0.046±0.004	7-22-82	293	0.013±0.003
1-28-82	270	0.042±0.004	7-29-82	294	0.027±0.004
2-04-82	254	0.046±0.005	8-05-82	283	0.021±0.003
2-11-82	252	0.052±0.005	8-12-82	259	0.019±0.003
2-18-82	259	0.052±0.005	8-19-82	300	0.029±0.004
2-25-82	288	0.023±0.003	8-26-82	280	0.028±0.004
3-04-82	282	0.020±0.003	9-02-82	290	0.018±0.003
3-11-82	278	0.027±0.003	9-09-82	287	0.014±0.003
3-18-82	287	0.012±0.003	9-16-82	285	0.014±0.003
3-25-82	288	0.014±0.003	9-23-82	277	0.019±0.003
4-01-82	287	0.020±0.003	9-30-82	287	0.030±0.004
1st Qtr. mean ± s.d.		0.034±0.015	3rd Qtr. mean ± s.d.		0.021±0.006
4-08-82	285	0.023±0.003	10-07-82	289	0.025±0.004
4-15-82	289	0.033±0.004	10-14-82	282	0.012±0.003
4-22-82	288	0.026±0.003	10-21-82	281	0.021±0.004
4-29-82	285	0.029±0.004	10-28-82	286	0.019±0.003
5-06-82	285	0.031±0.004	11-04-82	277	0.019±0.003
5-13-82	289	0.020±0.003	11-11-82	281	0.019±0.003
5-20-82	295	0.019±0.003	11-18-82	279	0.031±0.004
5-27-82	288	0.012±0.003	11-25-82	232[a]	0.034±0.004
6-03-82	286	0.014±0.003	12-02-82	328[b]	0.021±0.003
6-10-82	290	0.017±0.003	12-09-82	277	0.023±0.003
6-17-82	290	0.017±0.003	12-16-82	288	0.027±0.003
6-24-82	291	0.015±0.003	12-22-82	251[a]	0.017±0.004
7-01-82	296	0.015±0.003	12-30-82	313[b]	0.011±0.002
2nd Qtr. mean ± s.d.		0.021±0.007	4th Qtr. mean ± s.d.		0.021±0.007

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 13. Airborne particulates collected at Location D-10, (Atkins), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	288	0.052±0.004	7-08-82	285	0.017±0.003
1-14-82	285	0.044±0.004	7-15-82	284	0.022±0.003
1-21-82	284	0.050±0.004	7-22-82	287	0.014±0.003
1-28-82	284	0.044±0.004	7-29-82	286	0.027±0.004
2-04-82	286	0.044±0.004	8-05-82	284	0.025±0.003
2-11-82	284	0.048±0.005	8-12-82	286	0.020±0.003
2-18-82	285	0.068±0.005	8-19-82	281	0.037±0.004
2-25-82	290	0.026±0.003	8-26-82	283	0.022±0.004
3-04-82	283	0.027±0.004	9-02-82	275	0.016±0.003
3-11-82	283	0.036±0.004	9-09-82	277	0.017±0.003
3-18-82	286	0.016±0.003	9-16-82	278	0.014±0.003
3-25-82	285	0.022±0.003	9-23-82	277	0.020±0.003
4-01-82	284	0.029±0.003	9-30-82	277	0.020±0.004
1st Qtr. mean ± s.d.		0.039±0.015	3rd Qtr. mean ± s.d.		0.022±0.007
4-08-82	286	0.029±0.003	10-07-82	285	0.025±0.004
4-15-82	290	0.035±0.004	10-14-82	288	0.012±0.003
4-22-82	283	0.025±0.003	10-21-82	286	0.021±0.004
4-29-82	285	0.037±0.004	10-28-82	280	0.022±0.004
5-06-82	285	0.036±0.004	11-04-82	288	0.017±0.003
5-13-82	285	0.030±0.004	11-11-82	287	0.022±0.003
5-20-82	286	0.026±0.003	11-18-82	285	0.032±0.004
5-27-82	285	0.012±0.003	11-25-82	245[a]	0.027±0.004
6-03-82	283	0.015±0.003	12-02-82	325[b]	0.019±0.003
6-10-82	286	0.017±0.003	12-09-82	284	0.024±0.003
6-17-82	286	0.018±0.003	12-16-82	289	0.027±0.003
6-24-82	286	0.013±0.003	12-22-82	249[a]	0.017±0.004
7-01-82	284	0.014±0.003	12-30-82	329[b]	0.020±0.003
2nd Qtr. mean ± s.d.		0.024±0.009	4th Qtr. mean ± s.d.		0.022±0.005

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 14. Airborne particulates collected at Location D-11, (Toddville), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	288	0.062±0.005	7-08-82	275	0.014±0.003
1-14-82	284	0.050±0.004	7-15-82	272	0.020±0.003
1-21-82	284	0.058±0.005	7-22-82	284	0.018±0.003
1-28-82	284	0.044±0.004	7-29-82	287	0.029±0.004
2-04-82	285	0.062±0.005	8-05-82	284	0.026±0.003
2-11-82	285	0.059±0.005	8-12-82	285	0.018±0.003
2-18-82	286	0.068±0.005	8-19-82	286	0.034±0.004
2-25-82	288	0.023±0.003	8-26-82	288	0.027±0.004
3-04-82	285	0.021±0.003	9-02-82	283	0.017±0.003
3-11-82	283	0.032±0.004	9-09-82	279	0.017±0.003
3-18-82	286	0.011±0.002	9-16-82	286	0.018±0.003
3-25-82	270	0.018±0.003	9-23-82	286	0.014±0.003
4-01-82	285	0.014±0.003	9-30-82	285	0.037±0.004
1st Qtr. mean ± s.d.		0.040±0.021	3rd Qtr. mean ± s.d.		0.022±0.008
4-08-82	285	0.025±0.003	10-07-82	285	0.030±0.004
4-15-82	285	0.029±0.003	10-14-82	285	0.021±0.003
4-22-82	288	0.020±0.003	10-21-82	285	0.040±0.004
4-29-82	282	0.029±0.004	10-28-82	285	0.052±0.005
5-06-82	288	0.025±0.003	11-04-82	287	0.040±0.004
5-13-82	277	0.020±0.003	11-11-82	286	0.045±0.004
5-20-82	276	0.019±0.003	11-18-82	285	0.060±0.005
5-27-82	283	0.012±0.003	11-25-82	245[a]	0.073±0.006
6-03-82	282	0.015±0.003	12-02-82	327[b]	0.053±0.004
6-10-82	286	0.014±0.003	12-09-82	286	0.046±0.004
6-17-82	280	0.018±0.003	12-16-82	285	0.028±0.003
6-24-82	291	0.015±0.003	12-22-82	245[a]	0.020±0.004
7-01-82	280	0.016±0.003	12-30-82	327[b]	0.023±0.003
2nd Qtr. mean ± s.d.		0.020±0.006	4th Qtr. mean ± s.d.		0.041±0.016

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 15. Airborne particulates collected at Location D-12, (Iowa City), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	288	0.052±0.004	7-08-82	286	0.019±0.003
1-14-82	285	0.048±0.004	7-15-82	286	0.024±0.003
1-21-82	284	0.048±0.004	7-22-82	287	0.016±0.003
1-28-82	284	0.038±0.004	7-29-82	287	0.031±0.004
2-04-82	286	0.042±0.004	8-05-82	284	0.028±0.003
2-11-82	284	0.049±0.005	8-12-82	286	0.018±0.003
2-18-82	284	0.053±0.005	8-19-82	277	0.029±0.004
2-25-82	290	0.023±0.003	8-26-82	292	0.022±0.004
3-04-82	283	0.024±0.003	9-02-82	288	0.012±0.002
3-11-82	283	0.036±0.004	9-09-82	285	0.017±0.003
3-18-82	286	0.013±0.003	9-16-82	281	0.011±0.003
3-25-82	285	0.017±0.003	9-23-82	287	0.016±0.003
4-01-82	285	0.018±0.003	9-30-82	284	0.035±0.004
1st Qtr. mean ± s.d.		0.035±0.015	3rd Qtr. mena ± s.d.		0.021±0.008
4-08-82	286	0.023±0.003	10-07-82	285	0.037±0.004
4-15-82	289	0.031±0.004	10-14-82	284	0.013±0.003
4-22-82	284	0.019±0.003	10-21-82	287	0.022±0.004
4-29-82	284	0.034±0.004	10-28-82	287	0.029±0.004
5-06-82	284	0.029±0.004	11-04-82	286	0.020±0.003
5-13-82	284	0.029±0.004	11-11-82	286	0.032±0.004
5-20-82	287	0.022±0.003	11-18-82	285	0.034±0.004
5-27-82	285	0.011±0.003	11-25-82	243[a]	0.026±0.004
6-03-82	284	0.015±0.003	12-02-82	329[b]	0.031±0.003
6-10-82	286	0.020±0.003	12-09-82	293	0.027±0.003
6-17-82	285	0.016±0.003	12-16-82	293	0.029±0.003
6-24-82	285	0.014±0.003	12-22-82	250[a]	0.024±0.004
7-01-82	286	0.020±0.003	12-30-82	317[b]	0.021±0.003
2nd Qtr. mean ± s.d.		0.022±0.007	4th Qtr. mean ± s.d.		0.027±0.007

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 16. Airborne particulates collected at Location D-13, (Alburnett), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	288	0.051±0.004	7-08-82	286	0.020±0.003
1-14-82	284	0.046±0.004	7-15-82	285	0.022±0.003
1-21-82	284	0.050±0.004	7-22-82	282	0.015±0.003
1-28-82	284	0.036±0.004	7-29-82	290	0.025±0.004
2-04-82	285	0.044±0.004	8-05-82	286	0.022±0.003
2-11-82	285	0.055±0.005	8-12-82	284	0.016±0.003
2-18-82	286	0.064±0.005	8-19-82	286	0.034±0.004
2-25-82	287	0.021±0.003	8-26-82	286	0.027±0.004
3-04-82	285	0.023±0.003	9-02-82	280	0.019±0.003
3-11-82	283	0.045±0.004	9-09-82	285	0.019±0.003
3-18-82	286	0.010±0.002	9-16-82	283	0.016±0.003
3-25-82	286	0.019±0.003	9-23-82	286	0.013±0.003
4-01-82	286	0.019±0.003	9-30-82	285	0.028±0.003
1st Qtr. mean ± s.d.		0.037±0.017	3rd Qtr. mean ± s.d.		0.021±0.006
4-08-82	285	0.028±0.003	10-07-82	286	0.028±0.004
4-15-82	285	0.041±0.004	10-14-82	285	0.010±0.003
4-22-82	288	0.020±0.003	10-21-82	285	0.018±0.003
4-29-82	282	0.039±0.004	10-28-82	286	0.025±0.004
5-06-82	285	0.033±0.004	11-04-82	287	0.017±0.003
5-13-82	284	0.030±0.004	11-11-82	286	0.020±0.003
5-20-82	286	0.026±0.003	11-18-82	285	0.024±0.003
5-27-82	284	0.010±0.003	11-25-82	245[a]	0.026±0.004
6-03-82	286	0.016±0.003	12-02-82	327[b]	0.026±0.003
6-10-82	285	0.020±0.003	12-09-82	286	0.019±0.003
6-17-82	284	0.018±0.003	12-16-82	285	0.027±0.003
6-24-82	286	0.016±0.003	12-22-82	245[a]	0.024±0.004
7-01-82	286	0.020±0.003	12-30-82	327[b]	0.021±0.003
2nd Qtr. mean ± s.d.		0.024±0.009	4th Qtr. mean ± s.d.		0.022±0.005

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 17. Airborne particulates collected at Location D-14, (Alice), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	284	0.051±0.004	7-08-82	205[a]	0.021±0.004
1-14-82	298	0.045±0.004	7-15-82	213[b]	0.025±0.004
1-21-82	277	0.052±0.004	7-22-82	281	0.018±0.003
1-28-82	273	0.037±0.004	7-29-82	287	0.026±0.004
2-04-82	276	0.048±0.004	8-05-82	278	0.020±0.003
2-11-82	295	0.045±0.004	8-12-82	278	0.014±0.003
2-18-82	272	0.032±0.004	8-19-82	276	0.032±0.004
2-25-82	273	0.022±0.003	8-26-82	284	0.027±0.004
3-04-82	285	0.025±0.003	9-02-82	271	0.018±0.003
3-11-82	283	0.029±0.003	9-09-82	299	0.015±0.003
3-18-82	286	0.012±0.002	9-16-82	290	0.014±0.003
3-25-82	286	0.019±0.003	9-23-82	288	0.015±0.003
4-01-82	285	0.024±0.003	9-30-82	286	0.033±0.004
1st Qtr. mean ± s.d.		0.034±0.013	3rd Qtr. mean ± s.d.		0.021±0.006
4-08-82	285	0.028±0.003	10-07-82	287	0.024±0.004
4-15-82	286	0.034±0.004	10-14-82	290	0.012±0.003
4-22-82	288	0.024±0.003	10-21-82	288	0.015±0.003
4-29-82	282	0.029±0.004	10-28-82	282	0.014±0.003
5-06-82	281	0.031±0.004	11-04-82	285	0.017±0.003
5-13-82	290	0.021±0.003	11-11-82	285	0.025±0.003
5-20-82	295	0.022±0.003	11-18-82	285	0.027±0.003
5-27-82	292	0.012±0.003	11-25-82	244[b]	0.027±0.004
6-03-82	294	0.018±0.003	12-02-82	327[c]	0.026±0.003
6-10-82	288	0.019±0.003	12-09-82	286	0.026±0.003
6-17-82	284	0.013±0.003	12-16-82	285	0.018±0.003
6-24-82	289	0.016±0.003	12-22-82	245[b]	0.020±0.004
7-01-82	282	0.018±0.003	12-30-82	327[c]	0.021±0.003
2nd Qtr. mean ± s.d.		0.022±0.007	4th Qtr. mean ± s.d.		0.021±0.005

[a] Electrical fuse blown.
[b] Pump ran for 6 days.
[c] Pump ran for 8 days.

Table 18. Airborne particulates collected at Location D-15, (On-site), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-08-82	328[a]	0.054±0.004	7-08-82	282	0.010±0.003
1-15-82	276	0.050±0.004	7-15-82	285	0.015±0.003
1-21-82	229[b]	0.046±0.005	7-22-82	270	<0.003[d]
1-28-82	275	0.035±0.004	7-29-82	288	0.028±0.004
2-04-82	269	0.048±0.004	8-05-82	293	0.025±0.003
2-11-82	277	0.052±0.005	8-12-82	194	0.015±0.003
2-18-82	269	0.027±0.004	8-19-82	3[e]	<0.270
2-25-82	280	0.023±0.003	8-26-82	255	0.020±0.004
3-04-82	286	0.024±0.003	9-02-82	285	0.021±0.003
3-11-82	281	0.036±0.004	9-09-82	287	0.014±0.003
3-18-82	272	0.014±0.003	9-16-82	285	0.020±0.004
3-25-82	261	0.022±0.003	9-23-82	286	0.014±0.003
4-01-82	275	0.019±0.003	9-30-82	285	0.037±0.004
1st Qtr. mean ± s.d.		0.035±0.014	3rd Qtr. mean ± s.d.		0.020±0.008
4-08-82	273	0.026±0.003	10-07-82	286	0.033±0.004
4-15-82	283	0.030±0.004	10-14-82	285	0.012±0.003
4-22-82	7	0.214±0.092[c]	10-21-82	286	0.020±0.004
4-29-82	233	0.026±0.004	10-28-82	285	0.023±0.004
5-06-82	290	0.029±0.004	11-04-82	288	0.018±0.003
5-13-82	289	0.027±0.003	11-11-82	285	0.027±0.003
5-20-82	293	0.020±0.003	11-18-82	285	0.030±0.004
5-27-82	285	0.012±0.003	11-25-82	255[b]	0.031±0.004
6-03-82	289	0.017±0.003	12-02-82	318[f]	0.017±0.003
6-10-82	291	0.016±0.003	12-09-82	244	0.029±0.004
6-17-82	285	0.012±0.003	12-16-82	258	0.032±0.004
6-24-82	292	0.014±0.003	12-22-82	225[b]	0.023±0.004
7-01-82	286	0.012±0.003	12-30-82	328[f]	0.020±0.003
2nd Qtr. mean ± s.d.		0.020±0.007	4th Qtr. mean ± s.d.		0.024±0.007

[a] Pump ran for 8 days. Collection was delayed because of snow storm.
[b] Pump ran for 6 days.
[c] Result unreliable due to a very low volume caused by electrical failure and was excluded in the 2nd Qtr. mean.
[d] Filter paper was light because filter was torn thus letting all the air pass through.
[e] Low volume due to blown fuse.
[f] Pump ran for 8 days.

Table 19. Airborne particulates collected at Location D-16, (On-site), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
1-07-82	287	0.047±0.004	7-08-82	294	0.018±0.003
1-14-82	302	0.043±0.004	7-15-82	294	0.019±0.003
1-21-82	274	0.043±0.004	7-22-82	290	0.014±0.003
1-28-82	285	0.032±0.004	7-29-82	288	0.030±0.004
2-04-82	285	0.050±0.004	8-05-82	283	0.026±0.003
2-11-82	285	0.055±0.005	8-12-82	285	0.016±0.003
2-18-82	285	0.065±0.005	8-19-82	285	0.036±0.004
2-25-82	286	0.021±0.003	8-26-82	283	0.025±0.003
3-04-82	287	0.025±0.003	9-02-82	276	0.025±0.003
3-11-82	283	0.039±0.004	9-09-82	282	0.017±0.003
3-18-82	286	0.013±0.003	9-16-82	294	0.016±0.003
3-25-82	286	0.019±0.003	9-23-82	290	0.015±0.003
4-01-82	285	0.019±0.003	9-30-82	293	0.030±0.004
1st Qtr. mean ± s.d.		0.036±0.016	3rd Qtr. mean ± s.d.		0.022±0.007
4-08-82	286	0.027±0.003	10-07-82	294	0.027±0.004
4-15-82	284	0.030±0.004	10-14-82	290	0.011±0.003
4-22-82	286	0.022±0.003	10-21-82	288	0.013±0.003
4-29-82	285	0.031±0.004	10-28-82	292	0.024±0.004
5-06-82	286	0.029±0.004	11-04-82	288	0.020±0.003
5-13-82	292	0.024±0.003	11-11-82	289	0.015±0.003
5-20-82	296	0.017±0.003	11-18-82	286	0.030±0.004
5-27-82	287	0.013±0.003	11-25-82	245[a]	0.036±0.004
6-03-82	296	0.015±0.003	12-02-82	318[b]	0.019±0.003
6-10-82	296	0.016±0.003	12-09-82	277	0.026±0.003
6-17-82	291	0.016±0.003	12-16-82	280	0.029±0.003
6-24-82	295	0.017±0.003	12-22-82	244[a]	0.022±0.003
7-01-82	295	0.020±0.003	12-30-82	326[b]	0.018±0.003
2nd Qtr. mean ± s.d.		0.021±0.006	4th Qtr. mean ± s.d.		0.022±0.007

[a] Pump ran for 6 days.
[b] Pump ran for 8 days.

Table 20. Airborne particulate samples, quarterly composites of weekly samples, analysis for strontium-89, strontium-90, and gamma emitting isotopes.

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-1	Lab Code	DAP-23	DAP-96	DAP-170	DAP-244
	Volume (m^3)	3695	3522	3619	3677
	Sr-89	<0.0024	<0.0018	<0.0015	<0.0009
	Sr-90	<0.0007	<0.0011	<0.0006	<0.0006
	Be-7	0.097±0.026	0.111±0.028	<0.056	0.103±0.024
	Nb-95	<0.0019	<0.0023	<0.0025	<0.0028
	Zr-95	<0.0053	<0.0056	<0.0047	<0.0042
	Ru-103	<0.0053	<0.0039	<0.0047	<0.0036
	Ru-106	<0.017	<0.012	<0.015	<0.016
	Cs-134	<0.0016	<0.0010	<0.0014	<0.0020
	Cs-137	<0.0017	<0.0010	<0.0014	<0.0020
	Ce-141	<0.0092	<0.0078	<0.0073	<0.0068
	Ce-144	<0.0098	0.020±0.006	<0.0071	<0.011
D-2	Lab Code	DAP-24	DAP-97	DAP-171	DAP-245
	Volume (m^3)	3714	3708	3727	3710
	Sr-89	<0.0019	<0.0017	<0.0015	<0.0008
	Sr-90	<0.0005	<0.0007	<0.0006	<0.0004
	Be-7	0.134±0.029	0.143±0.032	<0.059	0.108±0.024
	Nb-95	<0.0039	<0.0022	<0.0022	<0.0014
	Zr-95	<0.0053	<0.0028	<0.0028	<0.0042
	Ru-103	<0.0045	<0.0043	<0.0026	<0.0036
	Ru-106	<0.013	<0.019	<0.011	<0.011
	Cs-134	<0.0012	<0.0014	<0.0016	<0.0009
	Cs-137	<0.0017	<0.0020	<0.0011	<0.0019
	Ce-141	<0.0090	<0.0067	<0.0045	<0.0074
	Ce-144	<0.0095	<0.0099	<0.0081	<0.0068

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-3	Lab Code	DAP-25	DAP-98	DAP-172	DAP-246
	Volume (m^3)	3713	3710	3711	3700
	Sr-89	<0.0033	<0.0018	<0.0017	<0.0008
	Sr-90	<0.0009	<0.0008	0.0007±0.0005	<0.0005
	Be-7	0.122±0.028	0.163±0.033	0.120±0.028	0.111±0.026
	Nb-95	<0.0031	<0.0020	<0.0016	<0.0025
	Zr-95	<0.0050	<0.0050	<0.0040	<0.0053
	Ru-103	<0.0037	<0.0036	<0.0062	<0.0033
	Ru-106	<0.017	<0.019	<0.010	<0.013
	Cs-134	<0.0019	<0.0014	<0.0017	<0.0019
	Cs-137	<0.0014	<0.0023	<0.0025	<0.0014
	Ce-141	<0.0096	<0.0087	<0.0051	<0.0067
	Ce-144	<0.0096	<0.0084	<0.0093	<0.012
D-4	Lab Code	DAP-26	DAP-99	DAP-173	DAP-247
	Volume (m^3)	3776	3756	3711	3714
	Sr-89	<0.0039	<0.0018	<0.0017	<0.0008
	Sr-90	<0.0019	<0.0008	<0.0007	<0.0005
	Be-7	<0.071	0.137±0.030	0.092±0.024	<0.050
	Nb-95	<0.0037	<0.0025	<0.0022	<0.0019
	Zr-95	<0.0042	<0.0050	<0.0040	<0.0026
	Ru-103	<0.0054	<0.0039	<0.0034	<0.0028
	Ru-106	<0.015	<0.011	<0.012	<0.013
	Cs-134	<0.0017	<0.0022	<0.0016	<0.0014
	Cs-137	<0.0017	<0.0023	<0.0019	<0.0016
	Ce-141	<0.0085	<0.0068	<0.0057	<0.0047
	Ce-144	<0.0096	<0.0082	<0.0073	<0.011

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-5	Lab Code	DAP-27	DAP-100	DAP-174	DAP-248
	Volume (m^3)	3708	3691	3502	3711
	Sr-89	<0.0040	<0.0018	<0.0018	<0.0010
	Sr-90	<0.0021	<0.0008	<0.0008	<0.0006
	Be-7	0.107±0.026	0.112±0.027	<0.056	0.085±0.021
	Nb-95	<0.0025	<0.0025	<0.0023	<0.0026
	Zr-95	<0.0050	<0.0030	<0.0048	<0.0039
	Ru-103	<0.0054	<0.0048	<0.0028	<0.0031
	Ru-106	<0.016	<0.014	<0.022	<0.012
	Cs-134	<0.0016	<0.0014	<0.0015	<0.0012
	Cs-137	<0.0013	<0.0014	<0.0013	<0.0016
	Ce-141	<0.0071	<0.0081	<0.0076	<0.0059
	Ce-144	<0.0067	<0.010	<0.0079	<0.0057
D-6	Lab Code	DAP-28	DAP-101	DAP-175	DAP-249
	Volume (m^3)	3826	3676	3439	3705
	Sr-89	<0.0019	<0.0014	<0.0016	<0.0009
	Sr-90	<0.0007	<0.0006	<0.0007	<0.0005
	Be-7	0.079±0.016	0.119±0.029	0.117±0.030	<0.048
	Nb-95	<0.0015	<0.0020	<0.0036	<0.0023
	Zr-95	<0.0028	<0.0036	<0.0040	<0.0047
	Ru-103	<0.0023	<0.0026	<0.0079	<0.0036
	Ru-106	<0.011	<0.0092	<0.013	<0.0071
	Cs-134	<0.0007	<0.0014	<0.0019	<0.0012
	Cs-137	<0.0012	<0.0016	<0.0017	<0.0015
	Ce-141	<0.0037	<0.0062	<0.0070	<0.0070
	Ce-144	<0.0064	<0.011	<0.0071	<0.011

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-7	Lab Code	DAP-29	DAP-102	DAP-176	DAP-250
	Volume (m^3)	3703	3717	3703	3712
	Sr-89	<0.0018	<0.0019	<0.0017	<0.0012
	Sr-90	<0.0007	0.0011±0.0005	0.0005±0.0005	<0.0006
	Be-7	<0.073	0.135±0.030	<0.062	0.092±0.022
	Nb-95	<0.0022	<0.0017	<0.0030	<0.0019
	Zr-95	<0.010	<0.0047	<0.0028	<0.0030
	Ru-103	<0.0054	<0.0053	<0.0030	<0.0026
	Ru-106	<0.017	<0.0090	<0.0017	<0.014
	Cs-134	<0.0023	<0.0007	<0.0012	<0.0011
	Cs-137	<0.0014	<0.0014	<0.0017	<0.0014
	Ce-141	<0.011	<0.0071	<0.0090	<0.0067
	Ce-144	<0.0085	<0.0095	<0.011	<0.0092
D-8	Lab Code	DAP-30	DAP-103	DAP-177	DAP-251
	Volume (m^3)	3709	3703	3744	3713
	Sr-89	<0.0018	<0.0023	<0.0016	<0.0010
	Sr-90	<0.0006	<0.0013	<0.0007	<0.0005
	Be-7	<0.047	<0.060	<0.054	0.084±0.023
	Nb-95	<0.0028	<0.0020	<0.0038	<0.0026
	Zr-95	<0.0047	<0.0062	<0.0034	<0.0059
	Ru-103	<0.0042	<0.0048	<0.0043	<0.0053
	Ru-106	<0.015	<0.017	<0.010	<0.0015
	Cs-134	<0.0016	<0.0016	<0.0010	<0.0011
	Cs-137	<0.0016	<0.0019	<0.0012	<0.0011
	Ce-141	<0.010	<0.011	<0.0050	<0.0073
	Ce-144	<0.0078	<0.0076	<0.0082	<0.0096

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-9	Lab Code	DAP-31	DAP-104	DAP-178	DAP-252
	Volume (m^3)	3548	3757	3720	3664
	Sr-89	<0.0024	<0.0028	<0.0017	<0.0010
	Sr-90	<0.0009	<0.0008	<0.0006	<0.0006
	Be-7	0.114±0.028	0.122±0.031	0.103±0.026	0.076±0.019
	Nb-95	<0.0030	<0.0026	<0.0020	<0.0012
	Zr-95	<0.0037	<0.0047	<0.0036	<0.0034
	Ru-103	<0.0043	<0.0042	<0.0036	<0.0026
	Ru-106	<0.011	<0.014	<0.015	<0.0084
	Cs-134	<0.0015	<0.0014	<0.0019	<0.0017
	Cs-137	<0.0017	<0.0017	<0.0013	<0.0012
	Ce-141	<0.010	<0.0057	<0.0063	<0.0042
	Ce-144	<0.0079	<0.0084	<0.0071	<0.0076
D-10	Lab Code	DAP-32	DAP-105	DAP-179	DAP-253
	Volume (m^3)	3707	3710	3660	3770
	Sr-89	<0.0027	<0.0023	<0.0020	<0.0011
	Sr-90	<0.0010	0.0006±0.0004	<0.0008	<0.0005
	Be-7	0.143±0.030	0.161±0.033	0.091±0.025	<0.042
	Nb-95	<0.0025	<0.0020	<0.0028	<0.0020
	Zr-95	<0.0036	<0.0059	<0.0030	<0.0045
	Ru-103	<0.0042	<0.0051	<0.0030	<0.0034
	Ru-106	<0.019	<0.016	<0.017	<0.013
	Cs-134	<0.0019	<0.0007	<0.0014	<0.0017
	Cs-137	<0.0022	<0.0025	<0.0013	<0.0011
	Ce-141	<0.0088	<0.0081	<0.0065	<0.0076
	Ce-144	<0.012	<0.0067	<0.012	<0.0070

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-11	Lab Code	DAP-33	DAP-106	DAP-180	DAP-254
	Volume (m^3)	3693	3683	3680	3713
	Sr-89	<0.0021	<0.0023	<0.0020	<0.0013
	Sr-90	<0.0013	0.0007±0.0004	<0.0008	<0.0006
	Be-7	0.099±0.026	<0.020	<0.048	0.099±0.022
	Nb-95	<0.0031	<0.0020	<0.0028	<0.0023
	Zr-95	<0.0051	<0.0037	<0.0036	<0.0026
	Ru-103	<0.0028	<0.0036	<0.0036	<0.0048
	Ru-106	<0.012	<0.016	<0.012	<0.010
	Cs-134	<0.0016	<0.0017	<0.0014	<0.0013
	Cs-137	<0.0020	<0.0011	<0.0011	<0.0011
	Ce-141	<0.0057	<0.0059	<0.0053	<0.0048
	Ce-144	<0.0076	<0.0073	<0.011	<0.0061
D-12	Lab Code	DAP-34	DAP-107	DAP-181	DAP-255
	Volume (m^3)	3707	3709	3710	3725
	Sr-89	<0.0044	<0.0023	<0.0018	<0.0012
	Sr-90	<0.0023	<0.0008	<0.0007	<0.0006
	Be-7	0.125±0.028	0.119±0.031	0.108±0.027	0.091±0.029
	Nb-95	<0.0030	<0.0031	<0.0023	<0.0054
	Zr-95	<0.0050	<0.0051	<0.0030	<0.0060
	Ru-103	<0.0071	<0.0043	<0.0047	<0.0057
	Ru-106	<0.012	<0.0022	<0.017	<0.022
	Cs-134	<0.0015	<0.0012	<0.0010	<0.0026
	Cs-137	<0.0012	<0.0022	<0.0008	<0.0023
	Ce-141	<0.0082	<0.0087	<0.0057	<0.0028
	Ce-144	<0.0078	<0.0096	<0.0087	<0.012

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-13	Lab Code	DAP-35	DAP-108	DAP-182	DAP-256
	Volume (m^3)	3709	3707	3704	3714
	Sr-89	<0.0021	<0.0027	<0.0016	<0.0010
	Sr-90	0.0005±0.0003	<0.0009	<0.0007	<0.0005
	Be-7	0.118±0.030	0.164±0.036	<0.062	0.051±0.035
	Nb-95	<0.0031	<0.0020	<0.0025	<0.0082
	Zr-95	<0.0062	<0.0042	<0.0030	<0.0050
	Ru-103	<0.0045	<0.0071	<0.0040	<0.0067
	Ru-106	<0.014	<0.011	<0.010	<0.023
	Cs-134	<0.0014	<0.0020	<0.0012	<0.0028
	Cs-137	<0.0023	<0.0015	<0.0011	<0.0025
	Ce-141	<0.0056	<0.0061	<0.0065	<0.0028
	Ce-144	<0.0065	<0.0073	0.021±0.007	<0.012
D-14	Lab Code	DAP-36	DAP-109	DAP-183	DAP-257
	Volume (m^3)	3673	3736	3536	3716
	Sr-89	<0.0024	<0.0024	<0.0021	<0.0010
	Sr-90	<0.0006	<0.0007	<0.0013	<0.0006
	Be-7	0.117±0.026	0.151±0.032	<0.060	0.083±0.020
	Nb-95	<0.0033	<0.0017	<0.0025	<0.0028
	Zr-95	<0.0067	<0.0022	<0.0043	<0.0034
	Ru-103	<0.0040	<0.0045	<0.0062	<0.0025
	Ru-106	<0.011	<0.012	<0.015	<0.012
	Cs-134	<0.0019	<0.0019	<0.0019	<0.0015
	Cs-137	<0.0019	<0.0011	<0.0016	<0.0013
	Ce-141	<0.0071	<0.0062	<0.0093	<0.0073
	Ce-144	<0.010	<0.0074	<0.0073	<0.0067

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3) 1st Q	2nd Q	3rd Q	4th Q
D-15	Lab Code	DAP-37	DAP-110	DAP-184	DAP-258
	Volume (m^3)	3578	3396	3298	3627
	Sr-89	<0.0020	<0.0051	<0.0018	<0.0010
	Sr-90	<0.0005	<0.0015	<0.0007	<0.0005
	Be-7	<0.057	0.106±0.029	0.106±0.028	<0.051
	Nb-95	<0.0023	<0.0020	<0.0022	<0.0025
	Zr-95	<0.0053	<0.0037	<0.0047	<0.0045
	Ru-103	<0.0028	<0.0051	<0.0057	<0.0051
	Ru-106	<0.016	<0.012	<0.012	<0.016
	Cs-134	<0.0014	<0.0012	<0.0011	<0.0017
	Cs-137	<0.0023	<0.0020	<0.0011	<0.0022
	Ce-141	0.013±0.004	<0.0082	<0.0074	<0.0062
	Ce-144	<0.0099	<0.0071	<0.012	<0.011
D-16	Lab Code	DAP-38	DAP-111	DAP-185	DAP-259
	Volume (m^3)	3716	3775	3737	3713
	Sr-89	<0.0024	<0.0028	<0.0018	<0.0010
	Sr-90	<0.0006	<0.0010	<0.0008	<0.0005
	Be-7	0.109±0.027	0.107±0.027	0.098±0.026	0.089±0.023
	Nb-95	<0.0023	<0.0033	<0.0020	<0.011
	Zr-95	<0.0030	<0.0051	<0.0036	<0.019
	Ru-103	<0.0050	<0.0040	<0.0026	<0.0045
	Ru-106	<0.022	<0.010	<0.020	<0.051
	Cs-134	<0.0016	<0.0014	<0.0007	<0.0064
	Cs-137	<0.0013	<0.0015	<0.0010	0.029±0.004
	Ce-141	<0.0093	<0.0057	<0.0050	<0.0053
	Ce-144	<0.0070	<0.0076	<0.0090	<0.0062

Table 21. Charcoal samples, weekly composites from indicator locations D-4, D-5, D-7, D-11, and D-15; analysis for iodine-131. Collection: Weekly.

Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)	Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)
1-07-82[a]	1496	<0.007	9-09-82	1424	<0.006
1-14-82[b]	1465	<0.006	9-16-82	1426	<0.006
1-21-82	1334	<0.006	9-23-82	1430	<0.006
1-28-82	1428	<0.006	9-30-82	1425	<0.006
2-04-82	1429	<0.006	10-07-82	1426	<0.006
2-11-82	1416	<0.006	10-14-82	1425	<0.006
2-18-82	1413	<0.006	10-21-82	1427	<0.006
2-25-82	1447	<0.008	10-28-82	1426	<0.006
3-04-82	1405	<0.006	11-04-82	1436	<0.006
3-11-82	1433	<0.006	11-11-82	1427	<0.006
3-18-82	1416	<0.006	11-18-82	1425	<0.006
3-25-82	1380	<0.006	11-25-82	1265	<0.006
4-01-82	1416	<0.006	12-02-82	1625	<0.006
4-08-82	1414	<0.006	12-09-82	1388	<0.006
4-15-82	1423	<0.007	12-16-82	1398	<0.006
4-22-82	1210	<0.006	12-22-82	1205	<0.006
4-29-82	1363	<0.006	12-30-82	1635	<0.006
5-06-82	1433	<0.006			
5-13-82	1418	<0.006			
5-20-82	1430	<0.006			
5-27-82	1417	<0.006			
6-03-82	1428	<0.006			
6-10-82	1443	<0.006			
6-17-82	1423	<0.006			
6-24-82	1446	<0.006			
7-01-82	1444	<0.006			
7-08-82	1411	<0.006			
7-15-82	1418	<0.006			
7-22-82	1232	<0.006			
7-29-82	1437	<0.006			
8-05-82	1430	<0.006			
8-12-82	1434	<0.006			
8-19-82	1144	<0.006			
8-26-82	1404	<0.006			
9-02-82	1379	<0.006			

[a] Sample at Location D-15 was collected on 1-08-82
[b] Samples at location D-15 and D-5 were collected 1-15-82.

Table 22. Charcoal samples, weekly composites from control locations D-8, D-12, and D-14; analysis for iodine-131. Collection: Weekly.

Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)	Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)
1-07-82	861	<0.01	9-09-82	870	<0.01
1-14-82	867	<0.01	9-16-82	862	<0.01
1-21-82	845	<0.01	9-23-82	860	<0.01
1-28-82	842	<0.01	9-30-82	860	<0.01
2-04-82	845	<0.01	10-07-82	862	<0.01
2-11-82	846	<0.01	10-14-82	855	<0.01
2-18-82	841	<0.01	10-21-82	860	<0.01
2-25-82	849	<0.01	10-28-82	854	<0.01
3-04-82	845	<0.01	11-04-82	858	<0.01
3-11-82	849	<0.01	11-11-82	856	<0.01
3-18-82	858	<0.01	11-18-82	855	<0.01
3-25-82	857	<0.01	11-25-82	732	<0.01
4-01-82	856	<0.01	12-02-82	983	<0.01
4-08-82	856	<0.01	12-09-82	865	<0.01
4-15-82	860	<0.01	12-16-82	863	<0.01
4-22-82	875	<0.01	12-22-82	740	<0.01
4-29-82	862	<0.01	12-30-82	971	<0.01
5-06-82	832	<0.01			
5-13-82	858	<0.01			
5-20-82	868	<0.01			
5-27-82	861	<0.01			
6-03-82	864	<0.01			
6-10-82	859	<0.01			
6-17-82	855	<0.01			
6-24-82	859	<0.01			
7-01-82	854	<0.01			
7-08-82	777	<0.01			
7-15-82	784	<0.01			
7-22-82	854	<0.01			
7-29-82	861	<0.01			
8-05-82	846	<0.01			
8-12-82	849	<0.01			
8-19-82	845	<0.01			
8-26-82	880	<0.01			
9-02-82	842	<0.01			

Table 23. Ambient gamma radiation (TLD), monthly exposure.

Location No.	Location Descr.	mR/30 days					
		January	February	March	April	May	June
D-1	Cedar Rapids	2.9±0.6	3.2±0.5	3.7±0.6	ND[a]	3.1±0.3	3.6±0.5
D-2	Marion	2.9±0.7	3.1±0.4	3.3±0.3	3.5±0.2	3.3±0.2	3.6±0.3
D-3	Hiawatha	4.1±0.8	3.2±0.4	3.5±0.4	3.5±0.2	3.3±0.4	3.7±0.2
D-4	Johnson	3.6±0.7	2.6±0.5	3.8±0.2	3.2±0.2	3.5±0.2	3.6±0.5
D-6	Center Point	3.2±0.8	3.1±0.5	3.1±0.4	3.4±0.2	3.6±0.3	3.4±0.3
D-7	Shellsberg	2.5±0.6	3.0±0.4	3.7±0.4	3.7±9.2	3.8±0.2	4.0±0.4
D-8	Urbana	3.5±0.6	3.3±0.6	3.5±0.4	3.8±0.3	3.9±0.2	3.9±0.6
D-9	Route W26	4.9±0.6	3.4±0.4	3.9±0.4	3.9±0.5	4.8±0.5	4.4±0.5
D-10	Atkins	2.7±0.8	3.2±0.5	3.5±0.3	3.8±0.2	3.8±0.1	4.2±0.4
D-11	Toddville	2.6±0.6	3.2±0.6	4.2±0.5	4.0±0.2	4.4±0.4	4.1±0.4
D-12	Univ. of Iowa	2.7±0.5	3.4±0.6	3.4±0.4	3.3±0.3	3.9±0.6	3.8±0.6
D-13	Albrunett	3.4±0.7	2.4±0.6	2.9±0.5	ND[a]	ND[a]	4.2±0.3
D-14	Alice	6.0±0.8	3.1±0.7	3.9±0.4	4.2±0.3	4.3±0.5	4.5±0.5
D-15	On-Site	3.7±0.9	3.1±0.7	3.6±0.4	4.6±0.3	4.9±0.5	5.2±0.6
D-16	On-Site	3.0±0.5	3.4±0.5	3.7±0.4	ND[a]	3.9±0.4	3.7±0.3
Mean ± s.d.		3.5±1.0	3.1±0.3	3.6±0.3	3.7±0.4	3.9±0.5	4.0±0.5

Table 23. (continued)

Location	mR/30 days					
	July	August	September	October	November	December
D-1	3.8±0.4	3.4±0.4	3.3±0.3	4.0±0.3	3.4±0.3	3.6±0.4
D-2	3.5±0.4	3.5±0.5	3.5±0.4	4.2±0.4	3.4±0.3	3.9±0.7
D-3	3.4±0.2	3.4±0.4	3.6±0.4	3.8±0.3	3.4±0.3	3.6±0.2
D-4	3.7±0.2	3.5±0.8	3.8±0.2	3.8±0.4	3.4±0.2	3.6±0.5
D-6	3.8±0.3	5.1±0.6	3.5±0.3	3.8±0.2	3.5±0.3	3.7±0.3
D-7	4.0±0.4	3.9±0.6	3.7±0.2	4.5±0.4	ND[a]	3.8±0.5
D-8	4.0±0.3	4.5±0.5	3.8±0.4	4.4±0.4	3.7±0.3	4.2±0.6
D-9	3.9±0.2	3.6±0.3	4.2±0.3	4.7±0.6	4.2±0.5	4.5±0.7
D-10	4.1±0.3	4.1±0.6	3.9±0.4	4.0±0.4	3.8±0.5	3.8±0.3
D-11	3.8±0.3	4.5±0.7	3.6±0.3	3.9±0.2	3.8±0.5	3.7±0.3
D-12	3.7±0.4	3.6±0.4	3.6±0.5	3.6±0.2	3.0±0.3	3.4±0.2
D-13	3.9±0.3	3.4±0.4	4.0±0.5	4.4±0.4	3.8±0.2	4.2±0.4
D-14	3.9±0.2	4.5±0.8	4.2±0.3	5.1±0.4	3.8±0.4	4.0±0.4
D-15	5.4±0.7	5.3±0.6	4.9±0.5	4.8±0.2	4.4±0.2	5.0±0.4
D-16	4.0±0.4	3.3±0.3	3.7±0.3	4.6±0.5	4.0±0.5	4.5±0.4
Mean ± s.d.	3.9±0.4	4.4±0.7	3.8±0.4	4.2±0.4	3.7±0.4	4.0±0.4

Table 23. (continued)

Location No.	Location Descr.	mR/30 days January	February	March	April	May	June
D-17	.5 mi N	3.7±0.7	3.0±0.5	3.0±0.2	4.0±0.3	4.2±0.2	4.2±0.3
D-18	0.5 mi NNE	3.2±0.5	3.5±0.5	3.2±0.2	3.8±0.3	4.1±0.5	3.7±0.5
D-19	0.5 mi NE	3.0±0.5	3.1±0.7	3.8±0.6	3.8±0.4	4.3±0.4	4.2±0.3
D-20	0.5 mi ENE	3.5±0.6	3.3±0.4	4.2±0.6	3.8±0.3	3.7±0.1	3.8±0.4
D-21	0.5 mi E	3.1±017	3.5±0.6	3.6±0.3	3.7±0.3	4.0±0.6	3.8±0.3
D-22	0.5 mi ESE	3.4±0.6	2.8±0.6	4.2±0.7	ND[a]	3.6±0.4	3.8±0.5
D-23	0.5 mi SE	3.7±0.6	2.6±0.6	3.4±0.5	4.0±0.3	4.0±0.3	3.7±0.3
D-24	0.5 mi SSE	2.7±0.8	3.0±1.1	3.3±0.2	3.8±0.3	3.9±0.5	4.0±0.4
D-25	0.5 mi S	ND[a]	2.8±0.6	3.4±0.3	ND[a]	3.6±0.3	3.9±0 5
D-26	0.5 mi SSW	ND[a]	3.0±0.5	3.3±0.4	3.9±0.2	4.2±0.3	4.4±0.4
D-27	0.5 mi SW	3.1±0.6	3.1±0.6	3.9±0.4	4.0±0.2	4.4±0.5	4.0±0.5
D-28	0.5 mi WSW	2.8±0.8	2.5±0.5	3.3±0.4	4.3±0.4	4.8±0.7	4.8±0.5
D-29	0.5 mi W	2.8±0.6	2.4±0.4	3.8±0.5	4.4±0.4	4.3±0.4	5.0±0.4
D-30	0.5 mi WNW	4.1±0.5	2.8±0.7	ND[a]	4.7±0.4	4.6±0.4	4.6±0.2
D-31	0.5 mi NW	ND[a]	3.2±0.5	3.8±0.2	4.9±0.2	4.9±0.5	5.7±0.6
D-32	0.5 mi NNW	4.1±1.0	3.1±0.5	3.9±0.3	5.1±0.3	5.5±0.5	4.6±0.4
Mean ± s.d.		3.3±0.5	3.0±0.3	3.6±0.4	4.2±0.5	4.3±0.5	4.3±0.6

Table 23. (continued)

Location	mR/30 days					
	July	August	September	October	November	December
D-17	4.5±0.7	3.6±0.4	4.0±0.5	4.8±0.5	3.8±0.2	4.1±0.3
D-18	3.8±0.5	3.7±0.7	3.8±0.4	4.1±0.3	3.7±0.2	4.0±0.6
D-19	3.6±0.2	3.5±0.5	3.9±0.4	4.6±0.4	4.2±0.5	4.1±0.3
D-20	3.7±0.4	4.1±0.7	3.8±0.3	4.4±0.4	4.3±0.7	4.9±0.6
D-21	3.9±0.4	3.9±0.4	4.0±0.6	4.1±0.3	ND[a]	4.4±0.3
D-22	3.4±0.3	3.7±0.7	3.5±0.3	4.0±0.2	3.5±0.2	4.1±0.3
D-23	3.5±0.2	3.8±0.9	3.6±0.2	4.4±0.4	3.6±0.3	4.5±0.5
D-24	4.0±0.6	4.0±0.5	4.0±0.8	4.3±0.4	3.8±0.3	4.3±0.4
D-25	3.6±0.3	4.1±1.0	3.9±0.4	4.6±0.7	4.1±0.9	4.3±0.5
D-26	4.0±0.2	3.6±0.7	3.8±0.4	4.5±0.6	4.2±0.3	4.2±0.5
D-27	4.2±0.3	3.7±0.4	4.2±0.4	4.4±0.3	4.2±0.6	4.4±0.4
D-28	4.5±0.3	4.0±0.5	4.8±0.7	5.2±0.6	4.5±0.7	4.6±0.3
D-29	4.7±0.4	4.0±0.3	4.1±0.2	5.1±0.5	4.8±0.4	4.8±0.3
D-30	4.4±0.2	4.3±0.5	4.3±0.2	5.6±0.5	4.6±0.2	5.0±0.4
D-31	5.3±0.5	4.8±0.4	4.7±0.2	5.8±0.8	5.2±0.5	5.6±0.7
D-32	4.2±0.2	4.5±0.5	4.7±0.4	5.3±0.3	4.6±0.5	4.7±0.4
Mean ± s.d.	4.1±0.5	4.0±0.4	4.1±0.4	4.7±0.5	4.2±0.5	4.5±0.4

Table 23. (continued)

Location No.	Location Descr.	mR/30 days					
		January	February	March	April	May	June
D-33	3.0 mi N	2.7±0.7	2.8±0.6	3.0±0.2	3.9±0.3	4.2±0.3	4.1±0.4
D-34	3.0 mi NE	ND[a]	2.7±0.6	3.3±0.6	4.1±0.3	4.1±0.3	4.4±0.4
D-35	3.0 mi NE	3.0±0.6	2.8±0.4	3.5±0.4	3.4±0.2	4.2±0.6	3.5±0.4
D-36	3.0 mi NE	3.1±0.8	3.0±1.1	ND[a]	4.0±0.3	4.6±0.3	4.1±0.5
D-37	3.0 mi E	4.8±0.8	3.9±0.6	4.0±0.5	4.6±0.4	5.3±0.7	5.0±0.4
D-38	3.0 mi SE	3.4±0.6	3.0±0.7	2.9±0.2	4.2±0.2	4.3±0.4	4.2±0.4
D-39	3.0 mi SE	3.3±0.7	2.9±0.6	3.2±0.4	4.5±0.4	4.4±0.5	4.4±0.4
D-40	3.0 mi SE	3.4±0.5	3.3±0.6	3.4±0.4	3.9±0.5	4.1±0.3	4.2±0.5
D-41	3.0 mi S	3.9±0.7	2.8±0.6	3.8±0.6	4.0±0.3	4.0±0.3	4.5±0.5
D-42	3.0 mi SW	3.5±0.6	3.0±0.8	3.4±0.2	ND[a]	4.1±0.4	4.2±0.5
D-43	3.0 mi SW	3.8±0.6	2.8±0.6	4.3±0.5	4.0±0.3	3.7±0.4	4.1±0.5
D-44	1.0 mi SW	3.3±0.5	3.1±0.5	4.3±0.4	4.7±0.3	5.2±0.4	5.8±0.5
D-45	1.0 mi SW	4.9±1.1	3.1±0.4	3.1±0.4	4.5±0.3	5.5±0.8	4.4±0.4
D-46	1.0 mi W	3.7±0.7	3.3±0.4	4.6±0.7	4.6±0.3	5.3±0.4	4.8±0.3
D-47	1.0 mi NW	4.0±0.9	3.1±0.6	4.7±0.5	4.5±0.3	4.8±0.4	5.0±0.6
D-48	1.0 mi NW	3.1±0.7	2.8±0.5	3.9±0.4	4.5±0.4	5.1±0.2	5.0±0.4
Mean ± s.d.		3.6±0.6	3.0±0.3	3.7±0.6	4.2±0.4	4.7±0.6	4.5±0.5

Table 23. (continued)

Location	mR/30 days					
	July	August	September	October	November	December
D-33	3.9±0.4	3.7±0.3	4.1±0.4	4.5±0.3	4.7±0.6	4.4±0.7
D-34	3.7±0.3	3.4±0.4	3.9±0.3	4.5±0.6	4.3±0.3	5.0±0.5
D-35	3.6±0.3	3.1±0.2	3.5±0.2	4.2±0.2	3.6±0.3	4.3±0.6
D-36	4.5±0.5	3.5±0.6	4.3±0.4	5.1±0.7	4.4±0.4	4.6±0.3
D-37	4.5±0.3	4.1±0.3	4.9±0.4	5.0±0.4	4.6±0.6	4.8±0.3
D-38	4.0±0.3	4.0±0.4	4.1±0.4	4.6±0.6	4.0±0.3	4.7±0.4
D-39	4.2±0.2	3.8±0.6	4.3±0.3	4.7±0.5	3.8±0.3	4.8±0.4
D-40	3.9±0.1	3.6±0.7	4.4±0.6	4.5±0.3	4.3±0.6	4.2±0.3
D-41	4.2±0.3	3.8±0.6	4.3±0.3	4.7±0.9	3.9±0.3	4.3±0.3
D-42	3.5±0.2	4.7±0.7	3.7±0.5	4.1±0.5	3.7±0.2	4.0±0.6
D-43	4.3±0.3	3.5±0.6	3.6±0.5	3.9±0.6	3.9±0.4	3.8±0.3
D-44	4.9±0.7	4.3±0.7	5.1±0.4	5.4±0.9	4.6±0.5	4.7±0.2
D-45	4.3±0.3	4.4±0.6	4.9±0.3	5.1±0.6	ND[a]	4.9±0.3
D-46	4.8±0.4	4.6±0.6	4.5±0.3	5.5±0.5	4.7±0.2	5.1±0.5
D-47	4.8±0.2	4.2±0.6	4.7±0.3	5.5±0.7	4.7±0.4	5.3±0.2
D-48	4.9±0.2	4.4±0.3	4.7±0.5	5.5±0.4	4.4±0.3	5.0±0.5
Mean ± s.d.	4.2±0.5	3.9±0.5	4.3±0.5	4.8±0.5	4.2±0.4	4.6±0.4

Table 23. (continued)

Location No.	Location Descr.	mR/30 days					
		January	February	March	April	May	June
D-76	0.5 mi NE	ND[a]	3.1±0.5	3.5±0.5	4.2±0.3	4.4±0.4	4.6±0.3
D-77	0.5 mi NE	3.1±0.6	3.3±0.6	3.4±0.3	3.6±0.2	3.7±0.2	4.0±0.5
D-78	0.5 mi NE	3.3±0.5	3.7±0.5	3.8±0.4	3.8±0.2	4.3±0.6	3.8±0.4
D-79	0.5 mi E	4.2±0.6	3.3±0.5	3.9±0.6	3.8±0.3	4.1±0.4	4.3±0.3
D-80	0.5 mi SE	2.6±0.6	3.0±0.4	3.4±0.4	3.6±0.4	3.6±0.4	3.9±0.3
D-81	0.5 mi SE	3.5±0.8	3.1±1.0	3.4±0.7	3.5±0.3	3.5±0.2	3.4±0.2
D-82	0.5 mi SE	3.7±1.2	2.4±0.5	3.2±0.4	3.3±0.3	3.4±0.3	3.1±0.3
D-83	0.5 mi S	ND[a]	2.9±0.5	3.9±0.6	3.7±0.2	3.8±0.4	4.0±0.6
D-84	0.5 mi SW	3.7±0.8	2.6±0.4	3.3±0.4	3.7±0.3	4.2±0.3	3.8±0.5
D-85	0.5 mi SW	3.4±0.5	3.0±0.5	3.4±0.3	3.9±0.5	4.3±0.7	3.8±0.4
D-86	0.5 mi SW	3.6±0.6	3.4±0.6	3.8±0.4	ND[a]	4.7±0.5	4.4±0.5
D-87	0.5 mi SW	3.3±0.8	2.6±0.4	3.5±0.8	4.6±0.3	5.4±0.3	4.7±0.5
D-88	0.5 mi W	ND[a]	3.4±0.5	4.4±0.7	4.7±0.5	4.6±0.3	5.0±0.7
D-89	0.5 mi W	3.8±0.5	3.2±0.6	3.9±0.3	5.2±0.5	4.8±0.3	5.3±0.3
D-90	0.5 mi NW	4.5±0.8	3.7±0.7	4.2±0.5	4.6±0.2	5.4±0.5	5.5±0.6
D-91	0.5 mi N	4.0±0.8	3.4±0.7	3.8±0.3	4.6±0.5	4.7±0.6	4.5±0.8
Mean ± s.d.		3.6±0.5	3.1±0.4	3.7±0.3	4.1±0.6	4.3±0.6	4.3±0.7

Table 23. (continued)

Location	mrem/30 days					
	July	August	September	October	November	December
D-76	4.3±0.4	4.1±0.6	4.4±0.4	5.3±0.8	4.3±0.5	4.3±0.3
D-77	3.7±0.5	3.5±0.3	3.9±0.3	4.2±0.4	3.9±0.2	3.7±0.2
D-78	3.9±0.3	3.8±0.3	4.2±0.3	5.0±0.4	4.0±0.3	5.2±1.0
D-79	4.0±0.6	3.9±0.6	4.1±0.2	4.2±0.4	3.9±0.2	4.2±0.4
D-80	3.6±0.2	3.3±0.3	3.6±0.5	4.1±0.3	3.5±0.2	4.0±0.3
D-81	3.4±0.2	3.0±0.4	3.5±0.3	4.3±0.4	3.9±0.5	4.1±0.3
D-82	3.6±0.4	3.4±0.5	3.5±0.5	3.8±0.3	3.5±0.3	3.5±0.2
D-83	3.8±0.3	3.4±0.5	4.2±0.5	4.1±0.1	ND[a]	4.1±0.4
D-84	3.9±0.3	3.4±0.7	4.0±0.2	4.4±0.3	4.2±0.3	4.5±0.5
D-85	3.9±0.4	2.9±0.3	3.8±0.3	4.7±0.5	3.9±0.4	3.8±0.3
D-86	4.0±0.3	3.3±0.4	4.2±0.4	4.9±0.4	4.2±0.3	4.1±0.4
D-87	4.6±0.4	4.0±0.4	4.2±0.2	4.7±0.2	4.4±0.4	4.7±0.4
D-88	4.5±0.5	4.4±0.5	4.3±0.3	4.7±0.3	4.5±0.5	4.9±0.6
D-89	5.1±0.5	5.1±0.6	5.0±0.5	5.5±0.5	4.8±0.5	5.1±0.4
D-90	4.6±0.3	4.5±0.3	5.1±0.6	5.7±0.4	5.3±0.3	5.1±0.8
D-91	4.4±0.4	4.2±0.8	4.7±0.6	4.9±0.7	4.1±0.5	5.1±0.5
Mean ± s.d.	4.1±0.5	3.8±0.6	4.2±0.5	4.7±0.5	4.2±0.5	4.4±0.6

[a] ND = No data. TLDs lost in the field.

Table 24. Ambient gamma radiation (TLD), annual exposure.

Location	mR/365 days	Normalized to 30 days	Location	mR/365 days	Normalized to 30 days
D-1	40.5±4.6	3.3±0.4	D-33	44.2±3.4	3.6±0.3
D-2	43.9±3.1	3.6±0.3	D-34	47.0±3.8	3.9±0.3
D-3	42.1±1.5	3.5±0.1	D-35	48.8±4.3	4.0±0.4
D-4	41.1±4.0	3.4±0.3	D-36	48.0±5.5	3.9±0.5
D-6	45.1±5.0	3.7±0.4	D-37	60.8±4.3	5.0±0.4
D-7	45.5±3.2	3.7±0.3	D-38	LOST IN THE FIELD	
D-8.	51.1±2.3	4.2±0.2	D-39	53.2±5.2	4.4±0.4
D-9	55.3±3.2	4.5±0.3	D-40	47.1±5.2	3.9±0.4
D-10	49.1±7.0	4.0±0.6	D-41	LOST IN THE FILED	
D-11	50.2±3.5	4.1±0.3	D-42	48.2±2.9	4.0±0.2
D-12	41.9±5.0	3.4±0.4	D-43	46.1±2.5	3.8±0.2
D-13	60.5±3.7	5.0±0.3	D-44	62.4±5.4	5.1±0.4
D-14	55.3±1.7	4.5±0.1	D-45	LOST IN THE FIELD	
D-15	59.6±5.1	4.9±0.4	D-46	61.2±5.8	5.0±0.5
D-16	48.9±6.3	4.0±0.5	D-47	53.5±4.0	4.4±0.3
			D-48	66.2±2.3	5.4±0.2
Mean ± s.d	48.7±6.6	4.0±0.5	Mean ± s.d	52.8±7.4	4.3±0.6
D-17	50.0±4.4	4.1±0.4	D-76	51.3±7.2	4.2±0.6
D-18	49.2±3.1	4.0±0.3	D-77	47.2±3.4	3.9±0.3
D-19	43.2±2.5	3.5±0.2	D-78	53.1±5.0	4.4±0.4
D-20	49.8±4.3	4.1±0.4	D-79	48.2±2.7	4.0±0.2
D-21	45.1±4.6	3.7±0.4	D-80	47.3±2.7	3.9±0.2
D-22	45.2±4.4	3.7±0.4	D-81	43.4±4.3	3.6±0.4
D-23	45.7±4.1	3.7±0.3	D-82	40.6±4.2	3.3±0.3
D-24	46.1±3.7	3.8±0.3	D-83	49.9±2.7	4.1±0.2
D-25	50.2±4.3	4.1±0.4	D-84	52.4±4.9	4.3±0.4
D-26	47.5±3.9	3.9±0.3	D-85	50.7±3.7	4.2±0.3
D-27	50.2±3.2	4.1±0.3	D-86	52.5±1.9	4.3±0.2
D-28	53.1±3.8	4.4±0.3	D-87	49.4±2.0	4.1±0.2
D-29	55.6±4.6	4.6±0.4	D-88	56.1±3.6	4.6±0.3
D-30	61.0±6.1	5.0±0.5	D-89	60.6±5.4	5.0±0.4
D-31	63.3±3.1	5.2±0.3	D-90	60.8±6.6	5.0±0.5
D-32	56.0±3.9	4.6±0.3	D-91	56.9±5.2	4.6±0.4
Mean ± s.d.	50.7±5.8	4.2±0.5	Mean ± s.d	51.3±5.6	4.2±0.5

Table 25. Milk samples collected during the non-grazing season, analysis for Iodine-131. Collection: Monthly, October through April.

Location and Date Collected	Lab Code	Activity (pCi/l) I-131
Indicator		
Composite[a]		
1-06-82	DMI-32	<0.4
2-02-82	78	<0.4
3-02-82	131	<0.4
4-06-82	195	<0.4
10-05-82	1165	<0.4
11-02-82	1291	<0.4
12-07-82	1358	<0.4
Control		
Composite[b]		
1-06-82	DMI-33	<0.4
2-02-82	79	<0.4
3-02-82	132	<0.4
4-06-82	196	<0.4
10-05-82	1166	<0.4
11-02-82	1292	<0.4
12-07-82	1359	<0.4

[a] Composite of samples from locations D-63, D-72, D-93, D-94, D-96, D-101, and D-106.

[b] Composite of samples from locations D-102 and D-105.

Table 26. Milk samples collected during the grazing season, analysis for iodine-131 and gamma-emitting isotopes. Collection: Weekly, May through September.

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
D-63					
5-04-82	DMI-245	1230±180	<0.4	<15	<15
5-11-82	282	1250±130	<0.4	<15	<15
5-18-82	321	1230±170	<0.4	<15	<15
5-25-82	352	1100±200	<0.4	<15	<23
6-01-82	409,10	1190±90	<0.4	<15	<15
6-08-82	453	1380±210	<0.4	<15	<15
6-15-82	491	1390±150	<0.4	<15	<15
6-22-82	523	1330±140	<0.4	<15	<15
6-29-82	562	1060±170	<0.4	<15	<15
7-06-82	610	1050±190	<0.4	<15	<20
7-13-82	646	1300±220	<0.4	<15	<19
7-20-82	695	1180±180	<0.4	<15	<15
7-27-82	726	1340±140	<0.4	<15	<15
8-03-82	785	1680±120	<0.4	<15	<15
8-10-82	820	1400±160	<0.4	<15	<15
8-17-82	855,6	1330±110	<0.4	<15	<15
8-24-82	892,3	1530±60	<0.4	<15	<15
8-31-82	934	1470±210	<0.4	<15	<20
9-08-82	976	1510±110	<0.4	<15	<15
9-14-82	1016	1470±90	<0.4	<15	<15
9-21-82	1064	1400±100	<0.4	<15	<15
9-28-82	1102	1330±190	<0.4	<15	<17
Annual mean ± s.d.		1330±160	<0.4	<15	<23

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
D-93					
5-04-82	DMI-246	1590±150	<0.4	<15	<15
5-11-82	283	1390±140	<0.4	<15	<15
5-18-82	322	1660±200	<0.4	<15	<15
5-25-82	353	1530±170	<0.4	<15	<15
6-01-82	411	1630±160	<0.4	<15	<20
6-08-82	454	1510±220	<0.4	<15	<15
6-15-82	492	1510±210	<0.4	<15	<15
6-22-82	524	1620±150	<0.4	<15	<15
6-29-82	563	810±80	<0.4	<15	<15
7-06-82	611	1690±150	<0.4	<15	<15
7-13-82	647,8	1710±110	<0.4	<15	<15
7-20-82	696,7	1670±110	<0.4	<15	<15
7-27-82	727	1990±120	<0.4	<15	<15
8-03-82	786	2020±120	<0.4	<15	<17
8-10-82	821	2120±70	<0.4	<15	<15
8-17-82	857	1460±220	<0.4	<15	<22
8-24-82	894	1820±60	<0.4	<15	<15
8-31-82	935	1900±110	<0.4	<15	<15
9-07-82	977,8	1940±160	<0.4	<15	<15
9-14-82	1017	1970±70	<0.4	<15	<15
9-21-82	1065	1970±120	<0.4	<15	<15
9-28-82	1103	2040±250	<0.4	<15	<15
Annual mean ± s.d.		1710±290	<0.4	<15	<20

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
D-94					
5-04-82	DMI-247	1270±190	<0.4	<15	<15
5-11-82	284	1330±150	<0.4	<15	<15
5-18-82	323	1370±130	<0.4	<15	<15
5-25-82	354	1440±240	<0.4	<15	<15
6-01-82	412	1450±190	<0.4	<15	<20
6-08-82	455	1570±220	<0.4	<15	<15
6-15-82	493	1440±190	<0.4	<15	<15
6-22-82	525	1550±200	<0.4	<15	<15
6-29-82	564	1600±160	<0.4	<15	<15
7-06-82	612	1420±190	<0.4	<15	<15
7-13-82	649	1420±190	<0.4	<15	<15
7-20-82	698	1710±150	<0.4	<15	<15
7-27-82	728	1550±240	<0.4	<15	<15
8-03-82	787	1610±200	<0.4	<15	<15
8-10-82	822	1680±170	<0.4	<15	<15
8-17-82	858	1720±230	<0.4	<15	<15
8-24-82	895	1790±110	<0.4	<15	<15
8-31-82	936	1630±210	<0.4	<15	<17
9-07-82	979	1660±230	<0.4	<15	<15
9-14-82	1018	1610±170	<0.4	<15	<15
9-21-82	1066	1620±110	<0.4	<15	<15
9-28-82	1104	1560±220	<0.4	<15	<15
Annual mean ± s.d.		1540±140	<0.4	<15	<20

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
D-101					
5-04-82	DMI-248	1870±140	<0.4	<15	<15
5-11-82	285	1790±160	<0.4	<15	<15
5-18-82	324,5	1770±100	<0.4	<15	<15
5-25-82	355	1780±170	<0.4	<15	<15
6-01-82	413	1510±190	<0.4	<15	<15
6-08-82	456,7	1810±170	<0.4	<15	<15
6-15-82	494	1600±210	<0.4	<15	<15
6-22-82	526	1860±160	<0.4	<15	<15
6-29-82	565	1760±160	<0.4	<15	<15
7-06-82	613	1860±230	<0.4	<15	<15
7-13-82	650	1750±220	<0.4	<15	<15
7-20-82	699	1670±210	<0.4	<15	<15
7-27-82	729	1830±250	<0.4	<15	<15
8-03-82	788	1570±210	<0.4	<15	<15
8-10-82	823	1740±180	<0.4	<15	<19
8-17-82	859	1810±160	<0.4	<15	<15
8-24-82	896	2040±120	<0.4	<15	<15
8-31-82	937	2180±150	<0.4	<15	<15
9-07-82	980	1890±60	<0.4	<15	<15
9-14-82	1019	2090±120	<0.4	<15	<15
9-21-82	1067	2020±70	<0.4	<15	<15
9-28-82	1105	2210±270	<0.4	<15	<15
Annual mean ± s.d.		1840±180	<0.4	<15	<15

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
D-104					
5-04-82	DMI-249	1250±130	<0.4	<15	<15
5-11-82	286	780±100	<0.4	<15	<15
5-18-82	326	1340±180	<0.4	<15	<15
5-25-82	356	1020±170	<0.4	<15	<15
6-01-82	414	1100±190	<0.4	<15	<19
6-08-82	458	1120±190	<0.4	<15	<15
6-15-82	495	1300±120	<0.4	<15	<15
6-22-82	ND[b]	ND	ND	ND	ND
6-29-82	566	1190±140	<0.4	<15	<15
7-06-82	614	1310±160	<0.4	<15	<15
7-13-82	651	1320±140	<0.4	<15	<15
7-20-82	700	1370±90	<0.4	<15	<15
7-27-82	730	1550±100	<0.4	<15	<15
8-03-82	789	1580±110	<0.4	<15	<15
8-10-82	824	1180±150	<0.4	<15	<15
8-17-82	860	950±190	<0.4	<15	<15
8-24-82	897	1320±200	<0.4	<15	<15
D-106[c]					
8-31-82	938	1530±210	<0.4	<15	<15
9-07-82	981	1480±100	<0.4	<15	<17
9-14-82	1020	1370±50	<0.4	<15	<15
9-21-82	1068	1510±100	<0.4	<15	<15
9-28-82	1106	1460±50	<0.4	<15	<15
Annual mean ± s.d.		1290±210	<0.4	<15	<19

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
Indicator					
Composite[d]					
5-04-82	DMI-250	1210±180	<0.4	<15	<15
5-11-82[e]	287	1130±210	<0.4	<15	<15
5-18-82	327	1340±190	<0.4	<15	<15
5-25-82	357	1350±140	<0.4	<15	<15
6-01-82	415	1270±200	<0.4	<15	<15
6-08-82	459	1560±200	<0.4	<15	<15
6-15-82	497	1720±210	<0.4	<15	<15
6-22-82	527	1710±220	<0.4	<15	<15
6-29-82	567	1200±130	<0.4	<15	<15
7-06-82	615	1260±170	<0.4	<15	<15
7-13-82	651	1130±180	<0.4	<15	<15
7-20-82	701	1390±210	<0.4	<15	<15
7-27-82	731	1520±110	<0.4	<15	<15
8-03-82	790	860±200	<0.4	<15	<15
8-10-82	825	1050±120	<0.4	<15	<15
8-17-82	861	1250±150	<0.4	<15	<15
8-24-82	898	1440±50	<0.4	<15	<15
8-31-82	939	1230±50	<0.4	<15	<15
9-07-82	982	1440±50	<0.4	<15	<15
9-14-82	1021	1230±150	<0.4	<15	<15
9-21-82	1069	1310±170	<0.4	<15	<15
9-28-82	1107	1520±110	<0.4	<15	<15
Annual mean ± s.d.		1320±210	<0.4	<15	<15

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140[a]
Control					
Composite[f]					
5-04-82	DMI-251	1370±130	<0.4	<15	<15
5-11-82	288	1330±120	<0.4	<15	<15
5-18-82	328	1250±180	<0.4	<15	<15
5-25-82	358	1210±180	<0.4	<15	<15
6-01-82	416	1140±180	<0.4	<15	<15
6-08-82	460	1470±140	<0.4	<15	<15
6-15-82	498	1290±150	<0.4	<15	<15
6-22-82	528	1530±240	<0.4	<15	<15
6-29-82	568	1240±130	<0.4	<15	<15
7-06-82	616	1120±190	<0.4	<15	<20
7-13-82	653	1210±140	<0.4	<15	<15
7-20-82	702	1290±140	<0.4	<15	<15
7-27-82	732	1280±150	<0.4	<15	<15
8-03-82	791	720±70	<0.4	<15	<15
8-10-82	826	790±60	<0.4	<15	<15
8-17-82	862	1500±50	<0.4	<15	<15
8-24-82	899	1490±90	<0.4	<15	<15
8-31-82	940	1400±100	<0.4	<15	<15
9-07-82	983	1140±120	<0.4	<15	<15
9-14-82	1022	1190±50	<0.4	<15	<15
9-21-82	1070	1370±100	<0.4	<15	<15
9-28-82	1108	1170±50	<0.4	<15	<15
Annual mean ± s.d.		1250±200	<0.4	<15	<20

[a] Ba-140 minimum sensitivity is at counting time.
[b] ND = No Data. Sample not available.
[c] D-106 replaces D-104 starting 8-24-82 because farmer at location D-104 has gone out of the dairy business.
[d] Composite of samples from locations D-72 and D-96
[e] Composite does not include location D-96. Sample not available.
[f] Composite of samples from locations D-102 and D-73 (before 12 May, 1982) and locations D-102 and D-105 (after 12 May, 1982).

Table 27. Milk samples collected during the grazing season, analysis for strontium-89, strontium-90 and elemental calcium.
Collection: Monthly Composites - May through September

Location and Date Collected	Lab Code	Calcium g/l	Activity (pCi/l) Sr-89	Sr-90
Indicator				
D-63				
May Comp.	DMI-389	1.1	<10	2.7±0.8
June Comp.	580	1.3	<10	2.0±0.6
July Comp.	747	1.0	<10	2.8±0.7
Aug. Comp.	952	1.2	<10	2.1±0.7
Sept. Comp.	1120	1.3	<10	2.6±0.8
Annual Mean ± s.d.		1.2±0.1	<10	2.4±0.4
D-72				
May Comp.	DMI-390	1.1	<10	1.9±1.0
June Comp.	581	1.2	<10	1.7±0.5
July Comp.	748	1.2	<10	1.9±0.6
Aug. Comp.	961	1.1	<10	1.8±0.5
Sept. Comp.	1121	1.2	<10	2.1±0.8
Annual Mean ± s.d.		1.2±0.1	<10	1.9±0.1
D-93				
May Comp.	DMI-391	1.4	<10	7.9±1.6
June Comp.	582	1.4	<10	6.7±0.7
July Comp.	749,50	1.5	<10	5.5±0.8
Aug. Comp.	953	1.3	<10	4.1±0.8
Sept. Comp.	1122	1.2	<10	4.9±1.0
Annual Mean ± s.d.		1.4±0.1	<10	5.8±1.5

Table 27 (continued)

Location and Date Collected	Lab Code	Calcium g/l	Activity (pCi/l) Sr-89	Sr-90
D-94				
May Comp.	DMI-392	1.3	<10	4.9±0.9
June Comp.	583	1.4	<10	5.0±0.7
July Comp.	751	1.3	<10	3.8±0.7
Aug. Comp.	954	1.3	<10	5.4±2.4
Sept. Comp	1123	1.3	<10	2.2±0.8
Annual Mean ± s.d.		1.3±0.1	<10	4.3±1.3
D-96				
May Comp.	DMI-393	1.3	<10	3.2±2.1
June Comp.	584	1.2	<10	2.1±0.6
July Comp.	752	1.2	<10	1.6±0.7
Aug. Comp.	955	1.2	<10	1.8±0.7
Sept. Comp.	1124	1.2	<10	1.7±0.8
Annual Mean ± s.d.		1.2±0.1	<10	2.1±0.7
D-101				
May Comp.	DMI-394	1.3	<10	2.4±1.3
June Comp.	585	1.1	<10	2.5±0.8
July Comp.	753	1.1	<10	3.1±0.7
Aug. Comp.	956,7	1.2	<10	4.6±0.6
Sept. Comp.	1125,6	1.1	<10	2.3±0.7
Annual Mean ± s.d.		1.2±0.1	<10	3.0±1.0

Table 27. (continued)

Location and Date Collected		Lab Code	Calcium g/l	Activity (pCi/l) Sr-89	Sr-90
D-104[a]					
May	Comp.	DMI-396	1.4	<10	4.9±0.8
June	Comp.	586,7	1.3	<10	2.7±0.5
July	Comp.	755	1.3	<10	7.8±0.9
Aug.	Comp.	959	1.4	<10	3.6±0.6
D-106					
Sept.	Comp.	DMI-1129	1.3	<10	2.0±0.6
	Annual Mean ± s.d.		1.3±0.1	<10	4.2±2.3
Control					
D-102					
May	Comp.	DMI-395	1.3	<10	2.7±0.8
June	Comp.	588	1.2	<10	9.7±0.9
July	Comp.	754	1.2	<10	2.6±0.7
Aug.	Comp.	958	1.1	<10	2.0±0.7
Sept.	Comp.	1127	1.2	<10	2.0±0.5
	Annual Mean ± s.d.		1.2±0.1	<10	3.8±3.3
D-105					
May	Comp.	DMI-397	1.2	<10	2.5±1.6
June	Comp.	589	1.6	<10	4.3±0.7
July	Comp.	756	1.1	<10	1.8±0.5
Aug.	Comp.	960	1.1	<10	1.8±0.5
Sept.	Comp.	1128	1.3	<10	2.4±0.7
	Annual Mean ± s.d.		1.3±0.2	<10	2.6±1.0

[a] Location D-104 was replaced by Location D-106 starting 8-24-82.

Table 28. Ground water samples, analysis for gross beta. Collection: Monthly

Location and Date Collected	Lab Code	Gross Beta (pCi/l)	Location and Date Collected	Lab Code	Gross Beta (pCi/l)
D-53			D-54		
Treated Municipal Water			Inlet to Municipal Water Treatment		
1/82	DWW-338	3.2±0.5	1/82	DWW-339	2.9±0.5
2/82	554,5	2.8±0.4	2/82	556	1.9±0.5
3/82	806	2.8±0.6	3/82	807,8	2.3±0.4
4/82	1197	2.7±0.6	4/82	1198	3.1±0.6
5/82	1515	2.1±0.5	5/82	1516	3.3±0.6
6/82	1783	3.2±0.7	6/82	1784	2.7±0.6
7/82	2179	2.2±0.5	7/82	2180	3.2±0.6
8/82	2455	2.6±0.6	8/82	2456	3.1±0.7
9/82	2761	2.6±0.5	9/82	2762	2.7±0.5
10/82	3128	3.3±0.7	10/82	3129	3.3±0.7
11/82	3444,5	2.9±0.5	11/82	3446	7.2±2.3
12/82	3748	3.0±0.6	12/82	3749	3.8±1.1
Annual Mean ± s.d.		2.8±0.4	Annual Mean ± s.d.		3.3±1.3
D-55			D-57		
On-Site Well			Bull		
1/29/82	DWW-267,8	2.0±0.4	1/29/82	DWW-269	1.5±0.5
2/22/82	473	2.1±0.5	2/22/82	474,5	1.6±0.3
3/29/82	802	3.3±0.7	3/29/82	803	1.7±0.6
4/26/82	1199,1200	0.7±0.3	4/26/82	1201	1.4±0.5
5/24/82	1437	1.1±0.5	5/24/82	1438	1.5±0.5
6/30/82	1785	0.7±0.5	6/30/82	1786	0.8±0.5
7/27/82	2181	1.6±0.5	7/27/82	2182	1.4±0.5
8/30/82	2457	1.2±0.6	8/30/82	2458	0.8±0.6
9/30/82	2723	<0.8	9/27/82	2724	2.0±0.5
10/26/82	3119	2.4±0.6	10/26/82	3120	2.0±0.6
11/29/82	3439	2.2±0.6	11/29/82	3440	2.0±0.9
12/27/82	3717	1.7±0.5	12/27/82	3718	1.4±0.7
Annual Mean ± s.d.		1.7±0.8	Annual Mean ± s.d.		1.5±0.4

Table 28. (continued)

Location and Date Collected	Lab Code	Gross Beta (pCi/l)
D-58		
Frantz		
1/29/82	DWW-270	6.0±0.5
2/22/82	476	4.2±0.6
3/29/82	804	4.8±0.7
4/26/82	1202	4.5±0.7
5/24/82	1439	4.5±0.6
6/30/82	1787	3.4±0.7
7/27/82	2183,4	1.1±0.3
8/30/82	2459	4.7±0.8
9/27/82	2725,6	4.5±0.4
10/26/82	3121	6.7±0.8
11/29/82	3441	7.9±1.2
12/27/82	3719,20	5.7±0.9
Annual Mean ± s.d.		4.8±1.7
D-59		
Frantz Cottage		
1/82	--	ND[a]
2/82	--	ND
3/82(3-29-82)	DWW-805	3.5±0.6
4/82(4-26-82)	1203	3.0±0.6
5/24/82	1440	2.1±0.5
6/30/82	1788	3.8±0.7
7/27/82	2185	5.1±0.7
8/30/82	2460	3.4±0.7
9/27/82	2727	3.6±0.6
10/26/82	3122	5.1±0.8
11/29/82	3442	4.3±1.0
12/27/82	3721	4.6±0.9
Annual Mean ± s.d.		3.9±1.0
D-60		
Comp[c]		
1/82	--	ND[a]
2/82	--	ND
3/82	--	NC[b]
4/82	--	NC
5/82	--	NC
6/82	--	NC
7/27/82	DWW-2186	1.2±0.5
8/30/82	2461	1.1±0.5
9/27/82	2728	1.1±1.4
10/26/82	3130	1.0±0.5
11/29/82	3443	1.6±0.7
12/27/82	3722	1.0±0.4
Annual Mean ± s.d.		1.2±0.2

[a] ND = No Data. Samples were not collected due to frozen well.
[b] NC = No Collection. Pump was still off.
[c] New location replaces Wiley Farm. Collection started 7/27/82.

Table 29. Well water samples, quarterly composites of monthly samples, analysis for gross beta and tritium.

Location and Date Collected	Lab Code	Activity (pCi/l) Gross Beta	H-3
D-53			
Treated Municipal Water			
1st Q, 1982	DWW-853	2.6±0.6	<330
2nd Q, 1982	1832	2.2±0.6	<330
3rd Q, 1982	2801	2.7±0.5	<330
4th Q, 1982	3788	2.5±0.6	<330
Annual Mean ± s.d.		2.5±0.2	<330
D-54			
Inlet to Municipal Water Treatment			
1st Q, 1982	DWW-854	8.0±0.8	<330
2nd Q, 1982	1833,4	2.5±0.4	<330
3rd Q, 1982	2802	3.5±0.6	<330
4th Q, 1982	3789	4.1±1.2	<330
Annual Mean ± s.d.		4.5±2.4	<330
D-55			
On-site Well			
1st Q, 1982	DWW-855	1.9±0.5	<330
2nd Q, 1982	1835	0.7±0.6	<330
3rd Q, 1982	2803	1.2±0.5	<330
4th Q, 1982	3790	1.9±0.5	<330
Annual Mean ± s.d.		1.4±0.6	<330
D-57			
Bull			
1st Q, 1982	DWW-856	2.1±0.6	<330
2nd Q, 1982	1836	1.6±0.6	<330
3rd Q, 1982	2804	1.1±0.5	<330
4th Q, 1982	3791	1.2±0.7	<330
Annual Mean ± s.d.		1.5±0.5	<330

Table 29. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) Gross beta	H-3
D-58			
Frantz			
1st Q, 1982	DWW-857	5.3±0.7	<330
2nd Q, 1982	1837	5.8±0.8	<330
3rd Q, 1982	2805	3.2±0.6	<330
4th Q, 1982	3792	6.4±1.0	<330
Annual Mean ± s.d.		5.2±1.4	<330
D-59			
Frantz Cottage			
1st Q, 1982	DWW-858[a]	3.5±0.6	<330
2nd Q, 1982	1838	3.1±0.6	<330
3rd Q, 1982	2806	1.7±0.5	<330
4th Q, 1982	3793	4.3±0.8	<330
Annual Mean ± s.d.		3.2±1.1	<330
D-60			
Willey			
1st Q, 1982	--	ND[b]	ND
2nd Q, 1982	--	ND	ND
3rd Q, 1982	DWW-2807	1.5±0.5	<330
4th Q, 1982	3794,5	1.0±0.6	<330
Annual Mean ± s.d.		1.3±0.4	<330

[a] Only sample collected in March is included in the composite, because there were no collections in January and February due to frozen well.

[b] No Data. No sample collections because well was off.

Table 30. Vegetation samples (broad leaf), analysis for iodine-131. Collection: Annually.

Location	Date Collected	Lab Code	Activity (pCi/g) wet I-131
Indicator			
D-57	7-26-82	DG-65	<0.028
D-58	7-26-82	DG-66	<0.029
D-63	7-27-82	DG-67	<0.034
D-72	7-30-82	DG-68,69	<0.029
D-93	7-27-82	DG-70	<0.023
D-94	7-13-82	DG-54	<0.070
D-96	7-27-82	DG-71	<0.036
D-101	7-27-82	DG-72	<0.048
D-104	7-30-82	DG-73	<0.026
Control			
D-102	9-21-82[a]	DG-106	<0.050
D-105	7-20-82	DG-64	<0.031

[a] Grass in lieu of broad leaf vegetation sample.

Table 31. Vegetation samples analysis for strontium-90 and gamma-emitting isotopes. Collection: Annually.

Sample Description and Activity (pCi/g wet)				
	Indicator			
Location	D-57	D-58	D-63	D-63
Date Collected	11-08-82	11-08-82	11-02-82	11-02-82
Type	Dried corn	Dried corn	Dried corn	Hay
Lab Code	DVE-83	DVE-82	DVE-68	DVE-87
Sr-90	<0.006	<0.008	<0.004	0.213±0.024
K-40	3.09±0.54	5.42±0.41	2.94±0.21	13.10±0.86
Mn-54	<0.048	<0.017	<0.034	<0.11
Co-58	<0.080	<0.028	<0.052	<0.16
Co-60	<0.054	<0.017	<0.033	<0.16
Nb-95	<0.11	<0.045	<0.086	<0.27
Zr-95	<0.12	<0.056	<0.11	<0.33
Ru-103	<0.085	<0.047	<0.078	<0.23
Ru-106	<0.42	<0.20	<0.31	<1.15
Cs-134	<0.043	<0.033	<0.036	<0.12
Cs-137	<0.044	<0.023	<0.034	<0.12
Ce-141	<0.15	<0.091	<0.12	<0.46
Ce-144	<0.28	<0.17	<0.23	<0.86
Location	D-72	D-72	D-93	D-93
Date Collected	11-02-82	11-16-82	11-02-82	11-02-82
Type	Dried corn	Hay	Dried corn	Soy beans
Lab Code	DVE-69	DVE-88,9	DVE-70	DVE-76
Sr-90	<0.005	0.159±0.023	<0.003	0.033±0.011
K-40	3.58±0.61	19.20±1.68	2.87±0.53	12.20±1.10
Mn-54	<0.040	<0.096	<0.053	<0.051
Co-58	<0.070	<0.12	<0.072	<0.075
Co-60	<0.041	<0.089	<0.049	<0.050
Nb-95	<0.11	<0.15	<0.11	<0.13
Zr-95	<0.11	<0.22	<0.13	<0.14
Ru-103	<0.087	<0.13	<0.095	<0.11
Ru-106	<0.45	<0.70	<0.37	<0.43
Cs-134	<0.044	<0.072	<0.043	<0.041
Cs-137	<0.049	<0.076	<0.053	<0.053
Ce-141	<0.13	<0.22	<0.12	<0.25
Ce-144	<0.23	<0.48	<0.23	<0.44

Table 31. (continued)

Sample Description and Activity (pCi/g wet)				
Location	D-93	D-94	D-94	D-94
Date Collected	11-16-82	11-03-82	11-03-82	11-16-82
Type	Hay	Dried corn	Soy beans	Hay
Lab Code	DVE-90	DVE-71	DVE-77,8	DVE-91
Sr-90	0.140±0.027	<0.003	0.031±0.006	0.311±0.028
K-40	12.50±1.85	2.24±0.47	8.09±0.36	8.50±1.50
Mn-54	<1.30	<0.020	<0.056	<0.056
Co-58	<0.18	<0.022	<0.079	<0.060
Co-60	<0.14	<0.022	<0.055	<0.074
Nb-95	<0.32	<0.048	<0.13	<0.091
Zr-95	<0.36	<0.063	<0.15	<0.23
Ru-103	<0.23	<0.065	<0.11	<0.15
Ru-106	<1.33	<0.20	<0.45	<0.91
Cs-134	<0.13	<0.025	<0.039	<0.054
Cs-137	<0.13	<0.023	<0.052	<0.088
Ce-141	<0.52	<0.085	<0.29	<0.19
Ce-144	<0.[illegible]4	<0.14	<0.51	<0.59
Location	D-96	D-96	D-96	D-10[illegible]
Date Collected	11-02-82	11-02-82	11-16-82	11-16-82
Type	Dried corn	Soy beans	Hay	Hay
Lab Code	DVE-72	DVE-79	DVE-92	DVE-93
Sr-9[illegible]	<0.003	0.055±0.018	0.260±0.029	0.344±0.027
K-40	2.91±0.48	15.30±1.64	11.90±2.10	7.57±0.98
Mn-54	<0.041	<0.086	<0.15	<0.042
Co-58	<0.054	<0.10	<0.24	<0.048
Co-60	<0.042	<0.089	<0.18	<0.037
Nb-95	<0.10	<0.25	<0.40	<0.079
Zr-95	<0.12	<0.26	<0.46	<0.11
Ru-103	<0.063	<0.17	<0.33	<0.078
Ru-106	<0.31	<0.69	<1.51	<0.40
Cs-134	<0.036	<0.065	<0.15	<0.039
Cs-137	<0.032	<0.089	<0.15	<0.060
Ce-141	<0.12	<0.41	<0.61	<0.19
Ce-144	<0.23	<0.75	<1.16	<0.36

Table 31. (continued)

Sample Description and Activity (pCi/g wet)		
Location	D-106	D-106
Date Collected	11-02-82	11-16-82
Type	Dried corn	Hay
Lab Code	DVE-75	DVE-96
Sr-90	<0.004	0.264±0.026
K-40	3.39±0.53	12.60±1.05
Mn-54	<0.042	<0.066
Co-58	<0.060	<0.099
Co-60	<0.034	<0.076
Nb-95	<0.088	<0.15
Zr-95	<0.11	<0.17
Ru-103	<0.094	<0.13
Ru-106	<0.38	<0.64
Cs-134	<0.039	<0.066
Cs-137	<0.042	<0.065
Ce-141	<0.23	<0.27
Ce-144	<0.043	<0.52

Table 31. (continued)

Sample Description and Activity (pCi/g wet)			
	CONTROL		
Location	D-102	D-102	D-102
Date Collected	11-02-82	11-02-82	11-16-82
Type	Dried corn	Soy beans	Hay
Lab Code	DVE-73	DVE-80	DVE-94
Sr-90	<0.003	0.054±0.025	0.160±0.034
K-40	3.00±0.23	12.61±1.10	12.10±1.92
Mn-54	<0.039	<0.048	<0.15
Co-58	<0.054	<0.045	<0.24
Co-60	<0.032	<0.039	<0.13
Nb-95	<0.082	<0.053	<0.36
Zr-95	<0.099	<0.091	<0.36
Ru-103	<0.088	<0.079	<0.32
Ru-106	<0.35	<0.37	<1.43
Cs-134	<0.034	<0.040	<0.16
Cs-137	<0.037	<0.045	<0.15
Ce-141	<0.20	<0.16	<0.64
Ce-144	<0.38	<0.23	<1.33
Location	D-105	D-105	D-105
Date Collected	11-02-82	11-02-82	11-16-82
Type	Dried corn	Soy beans	Hay
Lab Code	DVE-74	DVE-81	DVE-95
Sr-90	<0.004	0.042±0.023	0.219±0.029
K-40	2.84±0.22	14.70±1.44	13.40±0.48
Mn-54	<0.039	<0.065	<0.064
Co-58	<0.056	<0.076	<0.093
Co-60	<0.040	<0.074	<0.056
Nb-95	<0.085	<0.18	<0.081
Zr-95	<0.099	<0.21	<0.11
Ru-103	<0.081	<0.15	<0.084
Ru-106	<0.31	<0.68	<0.66
Cs-134	<0.032	<0.060	<0.047
Cs-137	<0.039	<0.065	<0.065
Ce-141	<0.20	<0.38	<0.13
Ce-144	<0.35	<0.62	<0.34

Table 32. Meat and poultry samples, analysis of edible portion for gamma-emitting isotopes. Collection: Annually.

Sample Description and Activity (pCi/g wet)			
		Outside 10 Miles of Plant	
Location	D-94	Bill Cook	Floyd Young
Date Collected	10-05-82	9-28-82	9-28-82
Type	Chicken	Beef	Pork
Lab Code	DME-9	DME-13	DME-15
K-40	2.31±0.43	3.18±0.47	2.51±0.47
Mn-54	<0.015	<0.023	<0.031
Co-58	<0.029	<0.026	<0.023
Co-60	<0.020	<0.026	<0.023
Nb-95	<0.028	<0.034	<0.037
Zr-95	<0.045	<0.073	<0.048
Ru-103	<0.053	<0.091	<0.060
Ru-106	<0.19	<0.28	<0.29
Cs-134	<0.020	<0.031	<0.025
Cs-137	<0.023	<0.026	<0.028
Ce-141	<0.10	<0.074	<0.074
Ce-144	<0.22	<0.26	<0.16
		Inside 10 Miles of Plant	
Location	D-102	Eugene Hugh's	Paul Quass
Date Collected	10-05-82	9-23-82	10-18-82
Type	Chicken	Beef	Pork
Lab Code	DME-10,11	DME-12	DME-14
K-40	2.74±0.29	2.62±0.51	2.48±0.42
Mn-54	<0.026	<0.022	<0.023
Co-58	<0.031	<0.047	<0.043
Co-60	<0.023	<0.019	<0.034
Nb-95	<0.034	<0.026	<0.026
Zr-95	<0.047	<0.064	<0.070
Ru-103	<0.065	<0.040	<0.088
Ru-106	<0.20	<0.26	<0.23
Cs-134	<0.025	<0.022	<0.025
Cs-137	<0.019	<0.043	<0.025
Ce-141	<0.081	<0.067	<0.071
Ce-144	<0.16	<0.13	<0.16

Table 33. Wildlife sample, analysis for gamma-emitting isotopes. Collection: Annually.

Sample Description and Activity (pCi/g wet)	
Location	Inside 10 Miles of Plant (300' from site front gate)
Date Collected	1-28-82
Type	Squirrel
Lab Code	DWL-1
K-40	3.61±0.62
Mn-54	<0.050
Co-58	<0.088
Co-60	<0.050
Nb-95	<0.17
Zr-95	<0.14
Ru-103	<0.11
Ru-106	<0.37
Cs-134	<0.056
Cs-137	<0.064
Ce-141	<0.33
Ce-144	<0.39

Table 34. Soil samples, analysis for strontium-90 and gamma-emitting isotopes. Collection: Tri-annually.

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-15	D-15	D-15
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-1	DSO-75	DSO-90
Sr-90	0.103±0.011	0.071±0.012	0.034±0.013
K-40	16.68±0.92	16.62±1.30	16.68±0.97
Mn-54	<0.056	<0.079	<0.056
Co-58	<0.033	<0.064	<0.059
Co-60	<0.060	<0.079	<0.040
Nb-95	<0.034	<0.059	<0.060
Zr-95	<0.047	<0.13	<0.11
Ru-103	<0.073	<0.17	<0.077
Ru-106	<0.28	<0.76	<0.51
Cs-134	0.168±0.033	<0.088	<0.062
Cs-137	0.377±0.046	0.193±0.049	0.141±0.038
Ce-141	<0.079	<0.12	<0.13
Ce-144	<0.25	<0.43	<0.26
Location	D-16	D-16	D-16
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-2	DSO-76	DSO-91
Sr-90	0.111±0.013	0.067±0.014	0.074±0.015
K-40	16.75±1.40	11.53±0.99	11.06±0.86
Mn-54	<0.057	<0.048	<0.043
Co-58	<0.045	<0.042	<0.042
Co-60	<0.054	<0.070	<0.047
Nb-95	<0.073	<0.057	<0.036
Zr-95	<0.076	<0.099	<0.057
Ru-103	<0.048	<0.087	<0.071
Ru-106	<0.51	<0.47	<0.25
Cs-134	<0.078	<0.039	<0.034
Cs-137	0.410±0.057	0.208±0.040	0.214±0.035
Ce-141	<0.063	<0.093	<0.099
Ce-144	<0.28	<0.23	<0.20

Table 34. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-57	D-57	D-57
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-3	DSO-77,8	DSO-92
Sr-90	0.150±0.019	0.105±0.010	0.094±0.016
K-40	19.56±1.50	19.35±0.92	15.60±1.20
Mn-54	<0.023	<0.068	<0.062
Co-58	<0.028	<0.050	<0.059
Co-60	<0.034	<0.065	<0 065
Nb-95	<0.050	<0.074	<0.051
Zr-95	<0.064	<0.11	<0.081
Ru-103	<0.036	<0.093	<0.10
Ru-106	<0.15	<0.45	<0.36
Cs-134	<0.043	<0.078	<0.048
Cs-137	<0.057	0.563±0.048	0.302±0.050
Ce-141	<0.051	<0.17	<0.14
Ce-144	<0.15	<0.38	<0.29
Location	D-58	D-58	D-58
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-4	DSO-79	DSO-93
Sr-90	0.183±0.013	0.212±0.024	0.194±0.020
K-40	15.51±0.89	14.68±0.89	14.45±1.10
Mn-54	<0.054	<0.036	<0.034
Co-58	<0.039	<0.037	<0.054
Co-60	<0.070	<0.057	<0.053
Nb-95	<0.034	<0.040	<0.057
Zr-95	<0.060	<0.090	<0.087
Ru-103	<0.096	<0.064	<0.078
Ru-106	<0.37	<0.39	<0.50
Cs-134	<0.045	<0.048	<0.068
Cs-137	0.579±0.050	0.534±0.050	0.531±0.060
Ce-141	<0.073	<0.087	<0.096
Ce-144	<0.25	<0.22	<0.28

Table 34. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-63	D-63	D-63
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DS0-5	DS0-80	DS0-94
Sr-90	0.109±0.011	0.297±0.025	0.285±0.022
K-40	18.69±1.20	16.25±1.30	16.72±1.40
Mn-54	<0.068	<0.059	<0.064
Co-58	<0.074	<0.045	<0.056
Co-60	<0.056	<0.057	<0.060
Nb-95	<0.071	<0.062	<0.12
Zr-95	<0.11	<0.12	<0.096
Ru-103	<0.11	<0.13	<0.15
Ru-106	<0.53	<0.65	<0.79
Cs-134	<0.074	<0.090	<0.10
Cs-137	0.390±0.053	1.37±0.095	1.27±0.099
Ce-141	<0.11	<0.17	<0.20
Ce-144	<0.29	<0.37	<0.40
Location	D-72	D-72	D-72
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DS0-6	DS0-81	DS0-95
Sr-90	0.129±0.013	0.138±0.022	0.132±0.015
K-40	16.69±0.93	14.40±1.10	15.16±1.10
Mn-54	<0.048	<0.068	<0.057
Co-58	<0.060	<0.060	<0.036
Co-60	<0.043	<0.068	<0.057
Nb-95	<0.067	<0.082	<0.079
Zr-95	<0.082	<0.091	<0.10
Ru-103	<0.067	<0.13	<0.14
Ru-106	<0.28	<0.37	<0.50
Cs-134	<0.051	<0.071	<0.057
Cs-137	0.402±0.044	0.299±0.045	0.350±0.049
Ce-141	<0.11	<0.17	<0.096
Ce-144	<0.23	<0.29	<0.34

Table 34. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-93	D-93	D-93
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-7	DSO-82	DSO-96
Sr-90	0.135±0.015	0.191±0.023	0.164±0.016
K-40	16.84±1.00	17.31±1.20	17.95±1.30
Mn-54	<0.064	<0.056	<0.045
Co-58	<0.059	<0.057	<0.057
Co-60	<0.067	<0.051	<0.057
Nb-95	<0.082	<0.084	<0.060
Zr-95	<0.11	<0.084	<0.11
Ru-103	<0.15	<0.11	<0.12
Ru-106	<0.42	<0.50	<0.43
Cs-134	<0.060	<0.067	<0.088
Cs-137	0.310±0.047	0.386±0.049	0.487±0.063
Ce-141	<0.13	<0.19	<0.016
Ce-144	<0.28	<0.31	<0.33
Location	D-94	D-94	D-94
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-8	DSO-83	DSO-97
Sr-90	0.226±0.014	0.254±0.035	0.227±0.020
K-40	13.67±0.81	15.80±1.40	13.41±1.10
Mn-54	<0.031	<0.071	<0.053
Co-58	<0.039	<0.070	<0.048
Co-60	<0.056	<0.065	<0.045
Nb-95	<0.060	<0.099	<0.059
Zr-95	<0.079	<0.19	<0.11
Ru-103	<0.058	<0.20	<0.10
Ru-106	<0.43	<0.64	<0.51
Cs-134	<0.036	<0.087	<0.053
Cs-137	0.560±0.048	0.730±0.081	0.600±0.064
Ce-141	<0.095	<0.25	<0.13
Ce-144	<0.25	<0.64	<0.33

Table 34. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-96	D-96	D-96
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-9	DSO-84	DSO-98
Sr-90	0.160±0.017	0.149±0.022	0.125±0.017
K-40	18.60±1.20	16.97±1.50	17.38±1.40
Mn-54	<0.087	<0.067	<0.054
Co-58	<0.076	<0.053	<0.098
Co-60	<0.062	<0.090	<0.087
Nb-95	<0.098	<0.12	<0.12
Zr-95	<0.090	<0.14	<0.12
Ru-103	<0.095	<0.14	<0.24
Ru-106	<0.54	<0.54	<0.88
Cs-134	<0.082	<0.079	<0.10
Cs-137	0.665±0.071	0.622±0.085	0.464±0.067
Ce-141	<0.19	<0.16	<0.17
Ce-144	<0.33	<0.43	<0.42
Location	D-101	D-101	D-101
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-10,11	DSO-85	DSO-99,100
Sr-90	0.137±0.009	0.178±0.024	0.142±0.015
K-40	14.00±0.62	15.06±1.30	14.81±0.66
Mn-54	<0.050	<0.053	<0.053
Co-58	<0.026	<0.070	<0.033
Co-60	<0.060	<0.065	<0.037
Nb-95	<0.031	<0.095	<0.064
Zr-95	<0.065	<0.16	<0.068
Ru-103	<0.062	<0.15	<0.074
Ru-106	<0.31	<0.68	<0.31
Cs-134	<0.053	<0.084	<0.047
Cs-137	0.511±0.034	0.453±0.063	0.460±0.024
Ce-141	<0.079	<0.22	<0.091
Ce-144	<0.23	<0.33	<0.22

Table 34. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-104	D-106	D-106
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DS0-13	DS0-88,89	DS0-103
Sr-90	0.040±0.007	0.020±0.007	0.058±0.014
K-40	8.26±0.64	9.96±0.54	10.05±0.64
Mn-54	<0.022	<0.028	<0.032
Co-58	<0.031	<0.039	<0.020
Co-60	<0.028	<0.040	<0.031
Nb-95	<0.025	<0.040	<0.025
Zr-95	<0.082	<0.065	<0.068
Ru-103	<0.087	<0.062	<0.050
Ru-106	<0.22	<0.19	<0.17
Cs-134	<0.033	<0.036	<0.037
Cs-137	1.37±0.066	0.101±0.021	0.208±0.027
Ce-141	<0.10	<0.062	<0.056
Ce-144	<0.23	<0.16	<0.15

Table 34. (continued)

Sample Description and Activity (pCi/g dry)			
	Control		
Location	D-105	D-105	D-105
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-14	DSO-87	DSO-102
Sr-90	0.152±0.012	0.140±0.018	0.127±0.014
K-40	19.58±1.40	19.19±1.60	18.21±1.30
Mn-54	<0.081	<0.062	<0.047
Co-58	<0.070	<0.099	<0.051
Co-60	<0.067	<0.088	<0.081
Nb-95	<0.056	<0.13	<0.10
Zr-95	<0.16	<0.19	<0.11
Ru-103	<0.081	<0.22	<0.16
Ru-106	<0.47	<0.90	<0.42
Cs-134	<0.078	<0.096	<0.081
Cs-137	0.558±0.067	0.550±0.080	0.477±0.060
Ce-141	<0.14	<0.25	<0.20
Ce-144	<0.32	<0.43	<0.34
Location	D-102	D-102	D-102
Date Collected	4-14-82	9-21-82	9-28-82
Lab Code	DSO-12	DSO-86	DSO-101
Sr-90	0.079±0.009	0.075±0.020	0.038±0.009
K-40	10.91±0.82	9.80±0.85	10.09±0.83
Mn-54	<0.037	<0.026	<0.042
Co-58	<0.026	<0.043	<0.039
Co-60	<0.034	<0.040	<0.065
Nb-95	<0.043	<0.067	<0.037
Zr-95	<0.070	<0.096	<0.050
Ru-103	<0.054	<0.070	<0.10
Ru-106	<0.26	<0.26	<0.23
Cs-134	<0.034	<0.050	<0.037
Cs-137	0.440±0.045	0.342±0.044	0.201±0.036
Ce-141	<0.070	<0.14	<0.088
Ce-144	<0.19	<0.22	<0.37

Table 36. Surface water samples, analysis for gamma-emitting isotopes.
Collection: Monthly

Location	Sample Description and Activity (pCi/l)			
Lewis Access				
Indicator				
D-49	Date Collected	1/82	5/24/82	9/27/82
	Lab Code	ND[a]	DSW-1429	DSW-2716
	Mn-54		<15	<15
	Co-58		<15	<15
	Co-60		<15	<15
	Nb-95		<15	<15
	Zr-95		<15	<15
	Cs-134		<15	<15
	Cs-137		<15	<15
	Date Collected	2/22/82	6/30/82	10/26/82
	Lab Code	DSW-466	DSW-1775	DSW-3111
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-794	DSW-2171	DSW-3431
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<20	<17
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1190	DSW-2447	DSW-3710
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<17	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 36. (continued)

Location	Sample Description and Activity (pCi/l)			
Plant Intake				
Indicator				
D-50	Date Collected	1/29/82	5/24/82	9/27/82
	Lab Code	DSW-261	DSW-1430	DSW-2717
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<24	<15	<20
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	2/22/82	6/30/82	10/27/82
	Lab Code	DSW-467	DSW-1776	DSW-3112
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<16	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-795	DSW-2172,3	DSW-3432
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<19
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1191	DSW-2448	DSW-3711
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 36. (continued)

Location		Sample Description and Activity (pCi/l)		
Plant Discharge				
Indicator				
D-51	Date Collected	1/29/82	5/24/82	9/27/82
	Lab Code	DSW-262	DSW-1431,2	DSW-2718
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<16	<15	<17
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	2/22/82	6/30/82	10/26/82
	Lab Code	DSW-468	DSW-1777	DSW-3113
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<17	<15	<19
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-796,7	DSW-2174	DSW-3433,4
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<18	<22
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1192	DSW-2449	DSW-3712
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<20
	Zr-95	<15	<20	<30
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 36. (continued)

Location	Sample Description and Activity (pCi/l)			
Cedar Rapids City Park				
Indicator				
D-52	Date Collected	1/29/82	5/24/82	9/27/82
	Lab Code	DSW-263	DSW-1433	DSW-2719
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<19	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	2/22/82	6/30/82	10/26/82
	Lab Code	DSW-469	DSW-1778,9	DSW-3114
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<20	<15	<25
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-798	DSW-2175	DSW-3435
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<18	<19	<23
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1193	DSW-2450	DSW-3713
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<18
	Zr-95	<15	<20	<21
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 36. (continued)

Location	Sample Description and Activity (pCi/l)			
Farm Pond				
Control				
D-73	Date Collected	1/29/82	5/24/82	9/27/82
	Lab Code	DSW-264	DSW-1434	DSW-2720
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	2/22/82	6/30/82	10-27-82
	Lab Code	DSW-470	DSW-1780	DSW-3115
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<17	<15	<17
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-799	DSW-2176	DSW-3436
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<19	<15	<23
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1194	DSW-2451	DSW-3714
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 36. (continued)

Location	Sample Description and Activity (pCi/l)		
Pleasant Creek			
Indicator			
D-99	Date Collected	1/29/82	5/24/82	9/27/82
	Lab Code	DSW-265	DSW-1435	DSW-2721
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<21	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	2/22/82	6/30/82	10/26/82
	Lab Code	DSW-471	DSW-1781	DSW-3116,7
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<19	<15	<17
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-800	DSW-2177	DSW-3437
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<19	<15	<23
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1195	DSW-2452,3	DSW-3715
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<19	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 36. (continued)

Location	Sample Description and Activity (pCi/l)			
Park Pond				
Indicator				
D-103	Date Collected	1/29/82	5/24/82	9/27/82
	Lab Code	DSW-266	DSW-1436	DSW-2722
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	2/22/82	6/30/82	10/26/82
	Lab Code	DSW-472	DSW-1782	DSW-3118
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<23	<15	<19
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	3/29/82	7/27/82	11/29/82
	Lab Code	DSW-801	DSW-2178	DSW-3438
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
	Date Collected	4/26/82	8/30/82	12/27/82
	Lab Code	DSW-1196	DSW-2454	DSW-3716
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

[a] ND = No Data. Sample could not be collected because the road was closed due to snow.

Table 37. Surface water samples, quarterly composites of monthly samples, analysis for gross beta, tritium, strontium-89, and strontium-90.

Location and Period Collected	Lab Code	Activity (pCi/l) Gross Beta	H-3	Sr-89	Sr-90
Indicator					
D-50					
1st Q, 1982	DSW-860,1	5.9±0.5	<330	<1.1	<0.7
2nd Q, 1982	1828	4.0±0.7	<330	<1.6	0.8±0.6
3rd Q, 1982	2796	2.4±0.5	<330	<2.6	<0.9
4th Q, 1982	3783	3.2±0.8	<330	<1.5	<1.0
Annual Mean ± s.d.		3.9±1.5	<330	<2.6	0.8±0.6
D-51					
1st Q, 1982	DSW-862	4.7±0.7	<330	<1.1	<0.7
2nd Q, 1982	1829	3.8±0.7	<330	<1.4	1.1±0.5
3rd Q, 1982	2797	3.6±0.6	<330	<3.0	<1.0
4th Q, 1982	3784,5	3.2±0.5	<330	<1.5	<1.0
Annual Mean ± s.d.		3.8±0.6	<330	<3.0	1.1±0.5
D-52					
1st Q, 1982	DSW-863	4.2±0.7	<330	<1.1	0.6±0.4
2nd Q, 1982	1830	4.4±0.7	<330	<1.6	<1.2
3rd Q, 1982	2798	3.0±0.5	<330	<2.6	<0.9
4th Q, 1982	3786	2.9±0.7	<330	<1.3	<1.0
Annual Mean ± s.d.		3.6±0.8	<330	<2.6	0.6±0.4
D-99					
1st Q, 1982	DSW-864	7.7±0.8	<330	<1.8	1.8±0.7
2nd Q, 1982	1831	5.8±0.7	<330	<1.6	1.5±0.6
3rd Q, 1982	2799,2800	6.0±0.5	<330	<3.5	1.2±0.4
4th Q, 1982	3787	4.2±0.8	<330	<1.7	<0.9
Annual Mean ± s.d.		5.9±1.4	<330	<3.5	1.5±0.3
Control					
D-49					
1st Q, 1982	DSW-859	2.8±0.6	<330	<1.0	0.6±0.5
2nd Q, 1982	1827	3.8±0.7	<330	<1.5	<0.7
3rd Q, 1982	2795	2.7±0.5	<330	<2.5	<0.7
4th Q, 1982	3782	4.2±0.8	<330	<1.3	<0.8
Annual Mean ± s.d.		3.4±0.7	<330	<2.5	0.6±0.5

Table 38. Fish samples, analysis of edible portion for gamma-emitting isotopes. Collection: Semi-annually.

Sample Description and Activity (pCi/g wet)			
		Indicator	
Location	D-61	D-61	D-61
Date Collected	5-26-82	5-26-82	11-17-82
Type	River Carpsucker	Carp	River Carpsucker
Lab Code	DF-43,4	DF-45	DF-135
K-40	3.55±0.31	2.95±0.41	3.81±0.47
Mn-54	<0.022	<0.045	<0.040
Co-58	<0.023	<0.047	<0.053
Co-60	<0.020	<0.036	<0.038
Nb-95	<0.037	<0.037	<0.085
Zr-95	<0.057	<0.073	<0.11
Ru-103	<0.067	<0.040	<0.081
Ru-106	<0.19	<0.26	<0.40
Cs-134	<0.029	<0.037	<0.040
Cs-137	<0.029	<0.029	<0.043
Ce-141	<0.054	<0.10	<0.18
Ce-144	<0.13	<0.23	<0.37
Location	D-61	D-61	
Date Collected	11-17-82	12-01-82	
Type	Carp	Golden Redhorse	
Lab Code	DF-136	DF-140	
K-40	3.97±0.59	4.56±0.54	
Mn-54	<0.042	<0.050	
Co-58	<0.061	<0.072	
Co-60	<0.058	<0.041	
Nb-95	<0.083	<0.13	
Zr-95	<0.097	<0.14	
Ru-103	<0.077	<0.098	
Ru-106	<0.38	<0.40	
Cs-134	<0.034	<0.041	
Cs-137	<0.042	<0.048	
Ce-141	<0.11	<0.15	
Ce-144	<0.25	<0.21	

Table 38. (continued)

Sample Description and Activity (pCi/g wet)			
		Control	
Location	D-49	D-49	D-49
Date Collected	5-26-82	5-26-82	11-17-82
Type	Quillback	River Carpsucker	River Carpsucker
Lab Code	DF-39	DF-40	DF-134
K-40	3.10±0.56	2.87±0.62	4.98±0.62
Mn-54	<0.037	<0.036	<0.054
Co-58	<0.051	<0.025	<0.077
Co-60	<0.048	<0.028	<0.059
Nb-95	<0.037	<0.034	<0.11
Zr-95	<0.13	<0.067	<0.14
Ru-103	<0.065	<0.033	<0.11
Ru-106	<0.48	<0.36	<0.52
Cs-134	<0.053	<0.039	<0.052
Cs-137	<0.045	<0.023	<0.061
Ce-141	<0.073	<0.064	<0.24
Ce-144	<0.33	<0.17	<0.52
Location	D-49	D-49	D-49
Date Collected	12-01-82	12-01-82	12-01-82
Type	Bigmouth Buffalo	Carp	River Carpsucker
Lab Code	DF-137	DF-138	DF-139
K-40	4.21±0.50	3.10±0.47	3.23±0.53
Mn-54	<0.047	<0.034	<0.045
Co-58	<0.068	<0.055	<0.078
Co-60	<0.042	<0.047	<0.050
Nb-95	<0.12	<0.093	<0.12
Zr-95	<0.13	<0.11	<0.17
Ru-103	<0.093	<0.089	<0.11
Ru-106	<0.41	<0.33	<0.37
Cs-134	<0.040	<0.032	<0.044
Cs-137	<0.043	<0.041	<0.043
Ce-141	<0.13	<0.12	<0.15
Ce-144	<0.20	<0.18	<0.23

Table 39. Periphyton samples, analysis for gamma-emitting isotopes. Collection: Quarterly.

Sample Description and Activity (pCi/g wet)		
	Indicator	
Location	D-61	D-61
Date Collected	3-9-82	5-27-82
Lab Code	DBO-2	DBO-7
K-40	4.03±1.60	4.14±1.50
Mn-54	<0.14	<0.16
Co-58	<0.17	<0.11
Co-60	<0.14	<0.17
Nb-95	<0.20	<0.10
Zr-95	<0.34	<0.25
Ru-103	<0.28	<0.091
Ru-106	<1.40	<1.35
Cs-134	<0.11	<1.11
Cs-137	<0.10	<0.15
Ce-141	<0.22	<0.16
Ce-144	<0.56	<0.65
Location	D-61	D-61
Date Collected	8-19-82	11-18-82
Lab Code	DBO-13	DBO-17
K-40	4.28±2.20	9.31±1.73
Mn-54	<0.16	<0.22
Co-58	<0.12	<0.32
Co-60	<0.23	<0.22
Nb-95	<0.23	<0.40
Zr-95	<0.29	<0.54
Ru-103	<0.15	<0.37
Ru-106	<1.7	<1.92
Cs-134	<0.15	<0.21
Cs-137	<0.20	<0.23
Ce-141	<0.22	<0.80
Ce-144	<0.82	<1.84

Table 39. (continued)

Sample Description and Activity (pCi/g wet)		
		Control
Location	D-49	D-49
Date Collected	3-9-82	5-27-82
Lab Code	DBO-1	DBO-6
K-40	1.87±1.30	<6.36
Mn-54	<0.10	<0.16
Co-58	<0.22	<0.26
Co-60	<0.11	<0.23
Nb-95	<0.14	<0.40
Zr-95	<0.37	<0.43
Ru-103	<0.22	<0.19
Ru-106	<1.29	<2.64
Cs-134	<0.16	<0.31
Cs-137	<0.096	0.69±0.24
Ce-141	<0.25	<0.37
Ce-144	<0.50	<1.44
Location	D-49	D-49
Date Collected	8-19-82	11-18-82
Lab Code	DBO-12	DBO-16
K-40	3.91±2.20	6.11±1.35
Mn-54	<0.20	<0.20
Co-58	<0.13	<0.25
Co-60	<0.22	<0.18
Nb-95	<0.16	<0.35
Zr-95	<0.22	<0.47
Ru-103	<0.13	<0.30
Ru-106	<1.55	<1.64
Cs-134	<0.14	<0.16
Cs-137	<0.14	<0.19
Ce-141	<0.25	<0.63
Ce-144	<0.99	<1.47

Table 40. River sediment samples, analysis for strontium-90 and gamma-emitting isotopes. Collection: Semi-annually.

Sample Description and Activity (pCi/g dry)		
		Indicator
Location	D-50	D-50
Date Collected	5-27-82	11-18-82
Lab Code	DBS-27	DBS-97
Sr-90	0.043±0.009	<0.012
K-40	12.27±0.77	10.80±1.14
Mn-54	<0.053	<0.051
Co-58	<0.039	<0.060
Co-60	<0.036	<0.038
Nb-95	<0.051	<0.11
Zr-95	<0.053	<0.14
Ru-103	<0.070	<0.094
Ru-106	<0.28	<0.52
Cs-134	<0.047	<0.076
Cs-137	0.35±0.04	<0.052
Ce-141	<0.065	<0.13
Ce-144	<0.22	<0.26
Location	D-51	D-51
Date Collected	5-27-82	11-18-82
Lab Code	DBS-28	DBS-98
Sr-90	<0.021	<0.014
K-40	9.72±0.61	10.50±1.14
Mn-54	<0.040	<0.052
Co-58	<0.039	<0.070
Co-60	<0.036	<0.061
Nb-95	<0.039	<0.10
Zr-95	<0.071	<0.12
Ru-103	<0.054	<0.10
Ru-106	<0.28	<0.44
Cs-134	<0.036	<0.071
Cs-137	<0.039	<0.042
Ce-141	<0.070	<0.14
Ce-144	<0.17	<0.29

Table 40. (continued)

Sample Description and Activity (pCi/g dry)		
	Indicator	
Location	D-61	D-61
Date Collected	5-27-82	11-18-82
Lab Code	DBS-29	DBS-99
Sr-90	<0.027	<0.016
K-40	8.81±0.55	9.78±0.46
Mn-54	<0.019	<0.033
Co-58	<0.025	<0.048
Co-60	<0.026	<0.037
Nb-95	<0.029	<0.072
Zr-95	<0.047	<0.094
Ru-103	<0.029	<0.084
Ru-106	<0.14	<0.39
Cs-134	<0.026	<0.053
Cs-137	<0.023	<0.037
Ce-141	<0.050	<0.092
Ce-144	<0.20	<0.21
	Control	
Location	D-49	D-49
Date Collected	5-27-82	11-18-82
Lab Code	DBS-26	DBS-96
Sr-90	0.009±0.006	0.008±0.007
K-40	9.80±0.60	9.79±1.06
Mn-54	<0.025	<0.055
Co-58	<0.025	<0.070
Co-60	<0.023	<0.050
Nb-95	<0.026	<0.079
Zr-95	<0.057	<0.11
Ru-103	<0.034	<0.098
Ru-106	<0.26	<0.047
Cs-134	<0.020	<0.080
Cs-137	0.09±0.02	<0.058
Ce-141	<0.056	<0.13
Ce-144	<0.13	<0.26

Table 41. Precipitation samples, analysis for gross beta and tritium. Collection: Monthly.

Collection Date	Lab Code	pCi/l Gross Beta	pCi/l H-3
1/82	DP-6	16.1±3.1	<280
2/82	17	12.5±1.4	<280
3/82	27,8	2.2±1.1	<280
4/82	46	2.9±0.5	<280
5/82	58	3.3±0.5	<280
6/82	75	11.8±0.9	<280
7/82	90	2.1±0.5	<280
8/82	101	1.9±0.6	<280
9/82	115	7.2±0.8	<280
10/82	131	3.1±0.6	<280
11/82	143	9.8±1.1	<280
12/82	157	1.8±0.6	<280
Annual mean ± s.d.		6.2±5.1	<280

Appendix A

Crosscheck Program Results

Appendix A

Crosscheck Program Results

The Nuclear Sciences Department of Hazleton Environmental Sciences 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 (e.g., milk or water) 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 the laboratory's analytical procedures and to alert it to any possible problems.

Participant laboratories measure the concentrations 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.

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk and water samples during the period 1975 through 1982. This program has been conducted by the U. S. Environmental Protection Agency Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada.

The results in Table A-2 were obtained for thermoluminescent dosimeters (TLD's) during the period 1976, 1977, 1979, 1980, and 1981 through participation in the Second, Third, Fourth, and Fifth International Intercomparison of Environmental Dosimeters under the sponsorships listed in Table A-2.

Table A-1. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and Hazleton ES results for milk and water samples, 1975 through 1982[a].

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ , n=i[d]
STM-40	Milk	Jan. 1975	Sr-89	<2	0±15
			Sr-90	73±2.5	75±11.4
			I-131	99±4.2	101±15.3
			Cs-137	76±0.0	75±15
			Ba-140	<3.7	0±15.0
			K(mg/l)	1470±5.6	1510±228
STW-45	Water	Apr. 1975	Cr-51	<14	0
			Co-60	421±6	425±63.9
			Zn-65	487±6	497±74.7
			Ru-106	505±16	497±74.7
			Cs-134	385±3	400±60.0
			Cs-137	468±3	450±67.5
STW-47	Water	Jun. 1975	H-3	1459±144	1499±1002
STW-48	Water	Jun. 1975	H-3	2404±34	2204±1044
STW-49	Water	Jun. 1975	Cr-51	<14	0
			Co-60	344±1	350±53
			Zn-65	330±5	327±49
			Ru-106	315±7	325±49
			Cs-134	291±1	304±46
			Cs-137	387±2	378±57
STW-53	Water	Aug. 1975	H-3	3317±64	3200±1083
STW-54	Water	Aug. 1975	Cr-51	223±11	225±38
			Co-60	305±1	307±46
			Zn-65	289±3	281±42
			Ru-106	346±5	279±57
			Cs-134	238±1	256±38
			Cs-137	292±2	307±46
STW-58	Water	Oct. 1975	H-3	1283±80	1203±988

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ , n=1[d]
STM-61	Milk	Nov. 1975	Sr-90	68.9±2.1	74.6±11.2
			I-131	64.6±3.8	75±15
			Cs-137	75.6±20	75±15
			Ba-140	<3.7	0
			K(Mg/l)	1435±57	1549±233
STW-63	Water	Dec. 1975	H-3	1034±39	1002±972
STW-64	Water	Dec. 1975	Cr-51	<14	0
			Co-60	221±1	203±30.5
			Zn-65	215±6	201±30.2
			Ru-106	171±9	181±27.2
			Cs-134	198±2	202±30.3
			Cs-137	152±4	151±22.7
STW-68	Water	Feb. 1976	H-3	1124±31	1080±978
STW-78	Water	Jun. 1976	H-3	2500±44	2502±1056
STW-84	Water	Aug. 1976	H-3	3097±21	3100±1080
STM-91	Milk	Nov. 1976	I-131	83±0.6	85±15
			Ba-140	<4	0
			Cs-137	12±1.7	11±15
			K(mg/l)	1443±31	1510±228
STW-93	Water	Dec. 1976	Cr-51	105±15	104±15
			Co-60	<4	0
			Zn-65	97±4	102±15
			Ru-106	87±3	99±15
			Cs-134	85±4	93±15
			Cs-137	103±4	101±15
STW-94	Water	Dec. 1976	H-3	2537±15	2300±1049
STM-97	Milk	Mar. 1977	I-131	55±2.5	51±15
			Ba-140	<6	0
			Cs-137	34±1	29±15
			K(mg/l)	1520±35	1550±233
STW-101	Water	Apr. 1977	H-3	1690±62	1760±1023

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ , n=1[d]
STM-130	Milk	May 1977	Sr-89	38±2.6	44±15
			Sr-90	12±2.1	10±4.5
			I-131	59±2.1	50±15
			Ba-140	53±4.4	72±15
			Cs-137	14±1.2	10±15
			K(mg/l)	1533±21	1560±234
STW-105	Water	Jun. 1977	Cr-51	<14	0
			Co-60	29±1	29±15
			Zn-65	74±7	74±15
			Ru-106	64±8	62±15
			Cs-134	41±1	44±15
			Cs-137	35±3	35±15
STW-107	Water	Jun. 1977	Ra-226	4.7±0.3	5.1±2.42
STW-113	Water	Aug. 1977	Sr-89	13±0[e]	14±15
			Sr-90	10±2[e]	10±4.5
STW-116	Water	Sep.1977	Gross Alpha	12±6	10±15
			Gross Beta	32±6	30±15
STW-118	Water	Oct., 1977	H-3	1475±29	1650±1017
STW-119	Water	Oct. 1977	Cr-51	132±14	153±24
			Co-60	39±2	38±15
			Zn-65	51±5	53±15
			Ru-106	63±6	74±15
			Cs-134	30±3	30±15
			Cs-137	26±1	25±15
STW-136	Water	Feb. 1978	H-3	1690±270	1680±1020
STW-137	Water	Feb. 1978	Cr-51	<27	0
			Co-60	36±2	34±15
			Zn-65	32±4	29±15
			Ru-106	41±2	36±15
			Cs-134	47±2	52±15
			Cs-137	<2	0

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ , n=1[d]
STW-138g	Water	Mar. 1978	Ra-226	5.4±0.1	5.5±0.6
			Ra-228	NA[f]	16.7±2.5
STW-150	Water	Apr. 1978	H-3	2150±220	2220±1047
STW-151	Water	Apr. 1978	Gross Alpha	20±1	20±15
			Gross Beta	56±4	59±15
			Sr-89	19±2	21±15
			Sr-90	8±1	10±4.5
			Co-60	19±3	20±15
			Cs-134	16±1	15±15
			Cs-137	<2	0
STM-152	Milk	Apr.1978	Sr-89	85±4	101±15
			Sr-90	8±1	9±4.5
			I-131	78±1	82±15
			Cs-137	29±3	23±15
			Ba-140	<11	0
			K(mg/l)	1503±90	1500±225
STW-154g	Water	May 1978	Gross Alpha	12±1	13±15
			Gross Beta	21±4	18±15
STW-157g	Water	Jun. 1978	Ra-226	4.0±1.0	3.7±0.6
			Ra-228	NA[f]	5.6±0.8
STW-159g	Water	Jul. 1978	Gross Alpha	19±3	22±6
			Gross Beta	28±3	30±5
STW-162	Water	Aug. 1978	H-3	1167±38	1230±990
STW-165g	Water	Sep. 1978	Gross Alpha	4±1	5±5
			Gross Beta	13±1	10±5

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3 σ, n=1[d]
STW-167	Water	Oct. 1978	Gross Alpha	19±2	19±15
			Gross Beta	36±2	34±15
			Sr-89	9±1	10±15
			Sr-90	4±0	5±2.4
			Ra-226	5.5±0.3	5.0±2.4
			Ra-228	NA[f]	5.4±2.4
			Cs-134	10±1	10±15
			Cs-137	15±1	13±15
STW-170	Water	Dec. 1978	Ra-226	11.5±0.6	9.2±1.4
			Ra-228	NA[f]	8.9±4.5
STW-172	Water	Jan. 1979	Sr-89	11±2	14±15
			Sr-90	5±2	6±4.5
STW-175	Water	Feb. 1979	H-3	1344±115	1280±993
STW-176	Water	Feb. 1979	Cr-51	<22	0
			Co-60	10±2	9±15
			Zn-65	26±5	21±15
			Rn-106	<16	0
			Cs-134	8±2	6±15
			Cs-137	15±2	12±15
STW-178	Water	Mar. 1979	Gross Alpha	6.3±3	10±15
			Gross Beta	15±4	16±15
STW-195g	Water	Aug. 1979	Gross Alpha	6.3±1.2	5±5
			Gross Beta	42.7±7.0	40±4
STW-193	Water	Sep. 1979	Sr-89	5.0±1.2	3.0±1.5
			Sr-90	25.0±2.7	28.0±4.5
STW-196	Water	Oct. 1979	Cr-51	135±5.0	113±18
			Co-60	7.0±1.0	6±5
			Cs-134	7.3±0.6	7±15
			Cs-137	12.7±1.2	11±15
STW-198	Water	Oct. 1979	H-3	1710±140	1560±1111

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ , n=1[d]
STW-199	Water	Oct. 1979	Gross Alpha	16.0±3.6	21±15
			Gross Beta	36.3±1.2	49±15
			Sr-89	10.7±0.6	12±15
			Sr-90	5.7±0.6	7±15
			Ra-226	11.1±0.3	11±5
			Ra-228	1.6±0.7	0
			Co-60	35.0±1.0	33±15
			Cs-134	50.7±2.3	56±15
			Cs-137	<3	0
STW-206	Water	Jan. 1980	Gross Alpha	19.0±2.0	30.0±8.0
			Gross Beta	48.0±2.0	45.0±5.0
STW-208	Water	Jan. 1980	Sr-89	6.1±1.2	10.0±0.5
			Sr-90	23.9±1.1	25.5±1.5
STW-209	Water	Feb. 1980	Cr-51	112±14	101±5.0
			Co-60	12.7±2.3	11±5.0
			Zn-65	29.7±2.3	25±5.0
			Ru-106	71.7±1.5	51±5
			Cs-134	12.0±2.0	10±5.0
			Cs-137	30.0±2.7	30±5.0
STW-210	Water	Feb. 1980	H-3	1800±120	1750±340
STW-211	Water	March 1980	Ra-226	15.7±0.2	16.0±2.4
			Ra-228	3.5±0.3	2.6±0.4
STM-217	Milk	May 1980	Sr-89	4.4±2.69	5±5
			Sr-90	10.0±1.0	12±1.5
STW-221	Water	June 1980	Ra-226	2.0±0.0	1.7±0.8
			Ra-228	1.6±0.1	1.7±0.8

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ[c]	EPA Result ±3σ, n=1[d]
STW-223	Water	July 1980	Gross Alpha	31±3.0	38±5.0
			Gross Beta	44±4	35±5.0
STW-224	Water	July 1980	Cs-137	33.9±0.4	35±5.0
			Ba-140	<12	0
			K-40	1350±60	1550±78
			I-131	<5.0	0
STW-225	Water	Aug. 1980	H-3	1280±50	1210±329
STW-226	Water	Sept. 1980	Sr-89	22±1.2	24±8.6
			Sr-90	12±0.6	15±2.6
STW-228	Water	Sept. 1980	Gross Alpha	NA[f]	32.0±8.0
			Gross Beta	22.5±0.0	21.0±5.0
STW-235	Water	Dec. 1980	H-3	2420±30	2240±604
STW-237	Water	Jan. 1981	Sr-89	13.0±1.0	16±8.7
			Sr-90	24.0±0.6	34±2.9
STM-239	Milk	Jan. 1981	Sr-89	<210	0
			Sr-90	15.7±2.6	20±3.0
			I-131	30.9±4.8	26±10.0
			Cs-137	46.9±2.9	43±9.0
			Ba-140	<21	0
			K-40	1330±53	1550±134
STW-240	Water	Jan. 1981	Gross alpha	7.3±2.0	9±5.0
			Gross beta	41.0±3.1	44±5.0
STW-243	Water	Mar. 1981	Ra-226	3.5±0.06	3.4±0.5
			Ra-228	6.5±2.3	7.3±1.1

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ, n=1[d]
STW-245	Water	Apr. 1981	H-3	3210±115	2710±355
STW-249	Water	May 1981	Sr-89	51±3.6	36±8.7
			Sr-90	22.7±0.6	22±2.6
STW-251	Water	May 1981	Gross alpha	24.0±5.29	21±5.25
			Gross beta	16.1±1.9	14±5.0
STW-252	Water	Jun. 1981	H-3	2140±95	1950±596
STW-255	Water	Jul. 1981	Gross alpha	20±1.5	22±9.5
			Gross beta	13.0±2.0	15±8.7
STW-259	Water	Sep. 1981	Sr-89	16.1±1.0	23±5
			Sr-90	10.3±0.9	11±1.5
STW-265	Water	Oct. 1981	Gross alpha	71.2±19.1	80±20
			Gross beta	123.3±16.6	111±5.6
			Sr-89	14.9±2.0	21±5
			Sr-90	13.1±1.7	14.4±1.5
			Ra-226	13.0±2.0	12.7±1.9
STW-269	Water	Dec. 1981	H-3	2516±181	2700±355
STW-270	Water	Jan. 1982	Sr-89	24.3±2.0	21.0±5.0
			Sr-90	9.4±0.5	12.0±1.5
STW-273	Water	Jan. 1982	I-131	8.6±0.6	8.4±1.5
STW-275	Water	Feb. 1982	H-3	1580±147	1820±342
STW-276	Water	Feb. 1982	Cr-51	<61	0
			Co-60	26.0±3.7	20±5
			Zn-65	<13	15±5
			Ru-106	<46	20±5
			Cs-134	26.8±0.7	22±5
			Cs-137	29.7±1.4	23±5
STW-277	Water	Mar. 1982	Ra-226	11.9±1.9	11.6±1.7
STW-278	Water	Mar. 1982	Gross alpha	15.6±1.9	19±5
			Gross beta	19.2±0.4	19±5

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ , n=1[d]
STW-280	Water	Apr. 1982	H-3	2690±80	2860±360
STW-281	Water	Apr. 1982	Gross alpha	75±7.9	85±21
			Gross beta	114.1±5.9	106±5.3
			Sr-89	17.4±1.8	24±5
			Sr-90	10.5±0.6	12±1.5
			Ra-226	11.4±2.0	10.9±1.5
			Co-60	<4.6	0
STW-284	Water	May 1982	Gross alpha	31.5±6.5	27.5±7
			Gross beta	25.9±3.4	29±5
STW-285	Water	June 1982	H-3	1970±1408	1830±340
STW-286	Water	June 1982	Ra-226	12.6±1.5	13.4±3.5
			Ra-228	11.1±2.5	8.7±2.3
STW-287	Water	June 1982	I-131	6.5±0.3	4.4±0.7
STW-290	Water	Aug. 1982	H-3	3210±140	2890±619
STW-291	Water	Aug. 1982	I-131	94.6±2.5	87±15
STW-292	Water	Sept 1982	Sr-89	22.7±3.8	24.5±8.7
			Sr-90	10.9±0.3	14.5±2.6
STW-296	Water	Oct. 1982	Co-60	20.0±1.0	20±8.7
			Zn-65	32.3±5.1	24±8.7
			Cs-134	15.3±1.5	19.0±8.7
			Cs-137	21.0±1.7	20.0±8.7
STW-297	Water	Oct. 1982	H-3	2470±20	2560±612
STW-298	Water	Oct. 1982	Gross alpha	32±30	55±24
			Gross beta	81.7±6.1	81±8.7
			Sr-89	<2	0
			Sr-90	14.1±0.9	17.2±2.6
			Cs-134	<2	1.8±8.7
			Cs-137	22.7±0.6	20±8.7
			Ra-226	13.6±0.3	12.5±3.2
			Ra-228	3.9±1.0	3.6±0.9

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ, n=1[d]
STW-301	Water	Nov. 1982	Gross alpha	12.0±1.0	19.0±8.7
			Gross beta	34.0±2.7	24.0±8.7
STW-302	Water	Dec. 1982	I-131	40.0±0.0	37.0±10

[a]Results obtained by the Nuclear Sciences Department of Hazleton Environmental Sciences as a participant in the environmental sample crosscheck program operated by the Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, (EPA), Las Vegas, Nevada.
[b]All results are in pCi/l, except for elemental potassium (K) data which are in mg/l.
[c]Unless otherwise indicated, the HES results given as the mean ±2σ standard deviations for three determinations.
[d]USEPA results are presented as the known values ± control limits of 3σ for n=1.
[e]Mean ± 2σ standard deviations of two determinations.
[f]NA = Not analyzed.
[g]Analyzed but not reported to the EPA.

Table A-2. Crosscheck program results, thermoluminescent dosimeters (TLD's).

Lab Code	TLD Type	Measurement	mR: Hazleton Result ±2σ [a]	mR: Known Value	mR: Average ±2σ [d] (all participants)
2nd International Intercomparison[b]					
115-2[b]	CaF_2:Mn Bulb	Gamma-Field	17.0±1.9	17.1[c]	16.4±7.7
		Gamma-Lab	20.8±4.1	21.3[c]	18.8±7.6
3rd International Intercomparison[e]					
115-3[e]	CaF_2:Mn Bulb	Gamma-Field	30.7±3.2	34.9±4.8[f]	31.5±3.0
		Gamma-Lab	89.6±6.4	91.7±14.6[f]	86.2±24.0
4th International Intercomparison[g]					
115-4[g]	CaF_2:Mn Bulb	Gamma-Field	14.1±1.1	14.1±1.4[f]	16.09.0
		Gamma-Lab (Low)	9.3±1.3	12.2±2.4[f]	12.0±7.6
		Gamma-Lab (High)	40.4±1.4	45.8±9.2[f]	43.9±13.2
5th International Intercomparison[h]					
115-5A[h]	CaF_2:Mn Bulb	Gamma-Field	31.4±1.8	30.0±6.0[i]	30.2±14.6
		Gamma-Lab at beginning	77.4±5.8	75.2±7.6[i]	75.8±40.4
		Gamma-Lab at the end	96.6±5.8	88.4±8.8[i]	90.7±31.2

Table A-2. (Continued)

Lab Code	TLD Type	Measurement	mR: Hazleton Result ±2σ[a]	mR: Known Value	mR: Average ± 2σ[d] (all participants)
115-5B[h]	LiF-100 Chips	Gamma-Field	30.3±4.8	30.0±6[i]	30.2±14.6
		Gamma-Lab at beginning	81.1±7.4	75.2±7.6[i]	75.8±40.4
		Gamma-Lab at the end	85.4±11.7	88.4±8.8[i]	90.7±131.2

[a]Lab result given is the mean ±2σ standard deviations of three determinations.
[b]Second International Intercomparison of Environmental Dosimeters conducted in April of 1976 by the Health and Safety Laboratory (GASL), New York, New York, and the School of Public Health of the University of Texas, Houston, Texas.
[c]Value determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.
[d]Mean ±2σ standard deviations of results obtained by all laboratories participating in the program.
[e]Third International Intercomparison of Environmental Dosimeters conducted in summer of 1977 by Oak Ridge National Laboratory and the School of Public Health of the University of Texas, Houston, Texas.
[f]Value ±2σ standard deviations as determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.
[g]Fourth International Intercomparison of Environmental Dosimeters conducted in summer of 1979 by the School of Public Health of the University of Texas, Houston, Texas.
[h]Fifth International Intercomparison of Environmental Dosimeter conducted in fall of 1980 at Idaho Falls, Idaho and sponsored by the School of Public Health of the University of Texas, Houston, Texas and Environmental Measurements Laboratory, New York, New York, U.S. Department of Energy.
[i]Value determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.

Appendix B

Data Reporting Conventions

Data Reporting Conventions

1.0. All activities are decay corrected to collection time.

2.0. Single Measurements

Each single measurement is reported as follows:

$$x \pm s$$

where x = value of the measurement;

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

In cases where the activity is found to be below the lower limit of detection L it is reported as

$$< L \ .$$

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

3.0. Duplicate Analyses

3.1. Individual results: $x_1 \pm s_1$
$x_2 \pm s_2$

Reported result: $x \pm s$

where $x = (1/2)\ (x_1 + x_2)$

$$s = (1/2)\ \sqrt{s_1^2 + s_2^2}$$

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 $x \leq L$;
$< L$ 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 deviations of a set of n numbers $x_1, x_2, \ldots x_n$ are defined as follows:

$$\bar{x} = \frac{1}{n} \Sigma x$$

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

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

4.3 If all of the 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 figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.

4.5.2 If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.

4.5.3. If the figure following those to be retained is 5, and if there are no figures other than zeros beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.