

April 27, 2001

Technical Specification
6.7.C.1

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

2000 Annual Radiation Environmental Monitoring Report

In accordance with the Monticello Technical Specification 6.7.C.1, we are submitting the annual Radiation Environmental Monitoring Report, covering the period of January 1, 2000 to December 31, 2000.

This letter contains no new NRC commitments, nor does it modify any prior commitments.

Please contact Sam Shirey at (763) 295-1449 if you require further information.

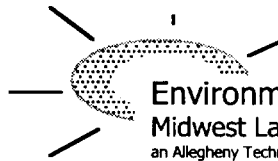


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Attachment: ANNUAL REPORT TO THE UNITED STATES NUCLEAR REGULATORY
COMMISSION, Radiation Environmental Monitoring Program, January 1 to
December 31, 2000

c: Regional Administrator – III, NRC
NRR Project Manager, NRC
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MONTICELLO NUCLEAR GENERATING PLANT
DOCKET NO. 50-263 LICENSE NO. DPR-22

ANNUAL REPORT
TO THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

Radiation Environmental Monitoring Program

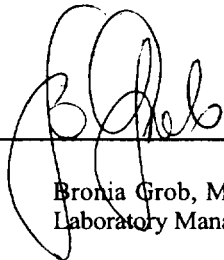
January 1 to December 31, 2000

Prepared under Contract by

ENVIRONMENTAL, Inc.
MIDWEST LABORATORY

Project No. 8010

Approved:



Bronia Grob, M.S.
Laboratory Manager

PREFACE

The staff of Environmental, Inc., Midwest Laboratory was responsible for the acquisition of data presented in this report. Samples were collected by personnel of the Monticello Nuclear Generating Plant, operated by Nuclear Management Company, LLC for Xcel Energy Corporation. This report was prepared by Environmental, Inc., Midwest Laboratory.

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1.0 INTRODUCTION

This report summarizes and interprets results of the Radiation Environmental Monitoring Program (REMP) conducted by Environmental, Inc., Midwest Laboratory for the Monticello Nuclear Generating Plant, Monticello, Minnesota, during the period January - December, 2000. This Program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the Plant on its surroundings.

Tabulation of the individual analyses made during the year are not included in this report. These data are included in a reference document (Environmental, Inc., Midwest Laboratory, 2001a) available at Monticello Nuclear Generating Plant, Radiological Services Department.

Monticello Nuclear Generating Plant is a boiling water reactor with a nominal generating capacity of 620 Mwe. It is located on the Mississippi River in Wright County, Minnesota, and operated by Nuclear Management Company, LLC. Initial criticality was achieved on December 10, 1970. Full power was achieved March 5, 1971 and commercial operation began on June 30, 1971.

2.0 SUMMARY

The Radiation Environmental Monitoring Program (REMP) required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Monticello Nuclear Generating Plant is described. Results for the year 2000 are summarized and discussed.

Program findings show background levels of radioactivity in the environmental samples collected in the vicinity of the Monticello Nuclear Generating Plant.

No effect on the environment due to the operation of the Monticello Nuclear Generating Plant is indicated.

3.0 RADIATION ENVIRONMENTAL MONITORING PROGRAM (REMP)

3.1 Program Design and Data Interpretation

The purpose of the Radiation Environmental Monitoring Program (REMP) at the Monticello Nuclear Generating Plant is to assess the impact of the Plant on its environment. For this purpose, samples are collected from the air, terrestrial, and aquatic environments and analyzed for radioactive content. In addition, ambient gamma radiation levels are monitored by thermoluminescent dosimeters (TLD's).

Sources of environmental radiation include the following:

- (1) Natural background radiation arising from cosmic rays and primordial radionuclides;
- (2) Fallout from atmospheric nuclear detonations;
- (3) Releases from nuclear power plants;
- (4) Industrial and medical radioactive waste; and
- (5) Fallout from nuclear accidents.

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

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

An additional interpretive technique involves analyses for specific radionuclides present in environmental samples collected from the Plant site. The Plant's monitoring program includes analyses for tritium and iodine-131. Most samples are also analyzed for gamma-emitting isotopes with results for the following groups quantified: zirconium-95, cesium-137, cerium-144, beryllium-7, and potassium-40. The first three gamma-emitting isotopes were selected as radiological impact indicators because of the different characteristic proportions in which they appear in the fission product mix produced by a nuclear reactor and that produced by a nuclear detonation. Each of the three isotopes is produced in roughly equivalent amounts by a reactor: each constitutes about 10% of the total activity of fission products 10 days after reactor shutdown. On the other hand, 10 days after a nuclear explosion, the contributions of zirconium-95, cerium-144, and cesium-137 to the activity of the resulting debris are in the approximate ratio 4:1:0.03 (Eisenbud, 1963). Beryllium-7 is of cosmogenic origin and potassium-40 is a naturally-occurring isotope. They were chosen as calibration monitors and should not be considered as radiological impact indicators.

The other group quantified consists of niobium-95, ruthenium-103 and -106, cesium-134, barium-lanthanum-140, and cerium-141. These isotopes are released in small quantities by nuclear power plants, but to date their major source of injection into the general

Program Design and Data Interpretation (continued)

environment has been atmospheric nuclear testing. Nuclides of the final group, manganese-54, iron-59, cobalt-58 and -60, and zinc-65, are activation products and arise from activation of corrosion products. They are typical components of a nuclear power plant's effluents, but are not produced in significant quantities by nuclear detonations.

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

3.2 Program Description

The sampling and analysis schedule for the Radiation Environmental Monitoring Program (REMP) at the Monticello Plant is summarized in Table 5.1 and briefly reviewed below. Table 5.2 defines the sampling location codes used in Table 5.1 and specifies for each location its type (indicator or control) and its distance, direction, and sector relative to the plant site. To assure that sampling is carried out in a reproducible manner, detailed sampling procedures have been prescribed (Monticello Generating Plant REMF Surveillances, Current Revision). Maps of sampling locations are included in Appendix D.

To monitor the air environment, airborne particulates are collected on membrane filters by continuous pumping at five locations. Also, airborne iodine is collected by continuous pumping through charcoal filters at all of these locations. Filters are changed and counted weekly. Particulate filters are analyzed for gross beta activity and charcoal filters for iodine-131. Quarterly composites of particulate filters from each location are gamma-scanned on a HPGe detector. One of the five locations is a control (M-1), and four are indicators (M-2, M-3, M-4, M-5). One of the indicators is located in the geographical sector expected to be most susceptible to any atmospheric emissions from the Plant (highest D/Q sector).

Ambient gamma radiation is monitored at forty locations, using $\text{CaSO}_4:\text{Dy}$ dosimeters with four sensitive areas at each location: fourteen in an inner ring in the general area of the site boundary, sixteen in the outer ring within 4-5 mile radius, six at special interest locations and four control locations, outside a 10 mile radius from the plant. They are replaced and measured quarterly. An emergency set of TLDs is placed in the field along side of the regular set. The emergency TLDs are returned to EIML quarterly for annealing and repackaging.

Milk samples are collected monthly from three farms (two indicator and one control). There are currently only two milk producers within the indicator area. The milk is collected biweekly during the growing season (May - October), because the milk animals may be on pasture. All samples are analyzed for iodine-131 and gamma-emitting isotopes.

Leafy green vegetables (cabbage) are collected annually from the highest D/Q garden and a control location and analyzed for iodine-131. Corn and potatoes are collected annually only if the field is irrigated by water in which radioactive effluent has been discharged. Analysis is for gamma-emitting isotopes.

The terrestrial environment is also monitored by the quarterly collections of well water from four locations. Samples are analyzed for tritium and gamma-emitting isotopes.

Program Description (continued)

River water is collected weekly at two locations, one upstream of the plant and one downstream. Monthly composites are analyzed for gamma-emitting isotopes. Quarterly composites are analyzed for tritium.

Drinking water is collected weekly from the City of Minneapolis water supply, which is taken from the Mississippi River downstream of the Plant. Monthly composites are analyzed for gross beta, iodine-131, and gamma-emitting isotopes. Quarterly composites are analyzed for tritium.

The aquatic environment is also monitored by semi-annual upstream and downstream collections of fish, invertebrates, and shoreline sediments. Shoreline sediment is also collected semi-annually from one downstream recreational location. All samples are analyzed for gamma-emitting isotopes.

3.3 Program Execution

The Program was executed as described in the preceding section with the following exceptions:

- (1) The surface water sample for location M-8, collected 01-05-00, could not be included in the monthly or quarterly composites. The sample container was damaged in transit.
- (2) No air particulate/air iodine samples were available from locations M-1 through M-5 for the week ending 04-12-00. The samples were lost in shipment.
- (3) TLD data was not available from location M-7B for the second quarter, 2000. Both the regular and emergency TLDs were lost in the field.
- (4) TLD data was not available from location M-5B for the third quarter, 2000. Both the regular and emergency TLDs were lost in the field.

Deviations from the program are summarized in Table 5.3.

3.4 Laboratory Procedures

The iodine-131 analyses in milk and drinking water were made using a sensitive radiochemical procedure which involves separation of the iodine using an ion-exchange method and solvent extraction and subsequent beta counting.

All gamma-spectroscopic analyses were performed with an HPGe detector. Levels of iodine-131 in cabbage and natural vegetation were determined by gamma spectroscopy. Concentrations of airborne iodine-131 in charcoal samples were also determined by gamma spectroscopy.

Tritium was determined by a liquid scintillation technique.

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

Environmental, Inc., Midwest Laboratory has a comprehensive quality control/quality assurance program designed to assure the reliability of data obtained. Details of the QA Program are presented elsewhere (Environmental, Inc., Midwest Laboratory, 2000). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained in the crosscheck programs are presented in Appendix A.

3.5 Program Modifications

There were no program modifications made during the year 2000.

3.6 Land Use Census

In accordance with the Technical Specifications 4.16 Paragraph B1, a land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence, and the nearest garden of greater than 500 ft² producing fresh leafy vegetables, in each of the 16 meteorological sectors within a distance of 5 miles. The census shall also identify the locations of all milk animals and all 500 ft² or greater gardens producing broad leaf vegetation in each of the meteorological sectors within a distance of three miles. This census shall be conducted at least once per year between the dates of May 1 and October 31. New locations shall be added to the radiation environmental monitoring program within 30 days and sampling locations having lower calculated doses or a lower dose commitment may be deleted from this monitoring program after October 31 of the year in which the land use census was conducted. The 2000 land use census was conducted between August 14 and September 15, 2000. The highest D/Q locations did not change from the 1999 census. Detailed land use census data are contained in the Land Use Census and Critical Receptor Report, Monticello Nuclear Generating Plant, Radiological Services Department.

4.0 RESULTS AND DISCUSSION

All of the scheduled collections and analyses were made except those listed in Table 5.3.

All results are summarized in Table 5.4 in a format recommended by the Nuclear Regulatory Commission in Regulatory Guide 4.8. For each type of analysis of each sampled medium, this table lists the mean and range for all indicator locations and for all control locations. The locations with the highest mean and range are also shown.

4.1 Atmospheric Nuclear Detonations and Nuclear Accidents

There were no reported accidents at nuclear facilities and no atmospheric nuclear tests conducted in the year 2000. The last reported test was made by the People's Republic of China on October 16, 1980.

4.2 Summary of Preoperational Data

The following constitutes a summary of preoperational studies conducted at the Monticello Nuclear Generating Plant during the years 1968 to 1970, to determine background levels expected in the environment, and provided, where applicable, as a means for comparison with present day levels. Strict comparisons, however, are difficult to make, since background levels of radiation were much higher in these years due to radioactive fallout from the atmosphere. Gross beta measurements in fallout averaged 20,600 pCi/m² in 1969 and 12,000 pCi/m² in 1970. These levels are reflected throughout the various media tested.

In the air environment, ambient gamma radiation (TLDs) averaged 9.1 mRem/4 weeks during preoperational studies (1970). Gross beta in air particulates in 1969 and 1970 averaged 0.20 pCi/m³. Present day levels have stabilized at around 0.025 pCi/m³. Airborne radioiodine remained below detection levels.

In the terrestrial environment of 1968 to 1970, milk, agricultural crops, and soil were monitored. In milk samples, low levels of Cs-137 and Sr-90 were detected. Cs-137 levels averaged 16.7 pCi/L. Soybean crop measurements in 1969 averaged 35.5 pCi/g for gross beta and 0.3 pCi/g for Cs-137. Gross beta measured in soil averaged 51.7 pCi/g. Present day measurements for cesium-137 are below detection levels in milk and agricultural crops.

The aqueous environment was monitored by testing of river water, bottom sediments, fish, aquatic vegetation, and periphyton. Specific location comparison of drinking, river, and well water concentrations for tritium and gross beta are not possible. However, tritium background levels, measured at seven separate locations from 1968 to 1970, averaged 970 pCi/L. Present day environmental samples measure below detection levels. Values for gross beta, measured from 1968 to 1970, averaged 9.8 pCi/L in upstream and downstream Mississippi River water, 4.4 pCi/L for well waters, and 18.6 pCi/L for lake waters. Gamma emitters were below the lower limit of detection (LLD). In shoreline sediments, gross beta background levels in 1970 averaged 49.8 pCi/g for both upstream and downstream samples. Cs-137 activity averaged 0.10 pCi/g for both upstream and downstream samples. Low levels of Cs-137, occasionally observed today can still be attributed to residual activity from atmospheric fallout. Gross beta levels in fish flesh averaged 5.3 pCi/g in 1968 and 1969. Cs-137, measured in 1969 and 1970, averaged 0.044 pCi/g. Gross beta background levels, in 1970, for aquatic vegetation, algae, and periphyton samples measured 86.7 pCi/g, 76.5 pCi/g, and 28.1 pCi/g respectively.

4.3 Program Findings

Results obtained show background levels of radioactivity in the environmental samples collected in the vicinity of the Monticello Nuclear Generating Plant.

Ambient Radiation (TLD's)

Ambient radiation was measured in the general area of the site boundary, at an outer ring 4 - 5 mi. distant from the Plant, at special interest areas and at one control location. The means were similar for both inner and outer rings (15.1 and 14.5 mRem/91 days, respectively). The mean for special locations was 14.4 mRem/91 days. The mean for control locations was 14.7 mRem/91 days. Dose rates measured at the inner and outer ring locations were similar to those observed from 1985 through 1999 and are tabulated below. No plant effect on ambient gamma radiation is indicated (Figure 5-1).

<u>Year</u>	<u>Inner Ring</u>	<u>Outer Ring</u>
<u>Dose rate (mRem/91 days)</u>		
1985	12.6	12.8
1986	14.6	14.1
1987	15.4	15.5
1988	14.8	14.7
1989	15.0	15.4
1990	16.1	16.2
1991	15.2	15.8
1992	15.1	15.1
1993	15.6	15.9
1994	14.6	14.0
1995	14.4	13.6
1996	14.0	13.5
1997	13.3	12.8
1998	15.0	14.4
1999	15.1	14.3
2000	15.1	14.5

Ambient gamma radiation as measured by thermoluminescent dosimetry.
Average quarterly dose rates, Inner vs. Outer Ring locations

Airborne Particulates

The average annual gross beta concentrations in airborne particulates were almost identical at indicator and control locations (0.027 pCi/m³ and 0.026 pCi/m³, respectively) and were similar to levels observed from 1985 through 1999. The results are tabulated below. The data for 1986 does not include the results from May 19 to June 9, 1986, which were influenced by the accident at Chernobyl. (Figure 5-2).

Year	Average of Indicators	Control
Concentration (pCi/m ³)		
1985	0.025	0.024
1986	0.026	0.026
1987	0.026	0.026
1988	0.030	0.030
1989	0.027	0.026
1990	0.023	0.023
1991	0.024	0.024
1992	0.023	0.023
1993	0.024	0.023
1994	0.023	0.024
1995	0.024	0.025
1996	0.023	0.023
1997	0.023	0.023
1998	0.023	0.023
1999	0.023	0.025
2000	0.027	0.026

Average annual gross beta concentrations in airborne particulates.

A spring peak in beta activity had been observed almost annually for many years (Wilson *et al.*, 1969). It had been attributed to fallout of nuclides from the stratosphere (Gold *et al.*, 1964). It was pronounced in 1981, occurred to a lesser degree in 1982, and has not occurred since 1983. The highest averages for gross beta occur during the months of January and December, and the first and fourth quarters, as in 1985 through 2000.

Two pieces of evidence indicate conclusively that the elevated activity observed during the first and fourth quarters was not attributable to the Plant operation. In the first place, elevated activity of similar size occurred simultaneously at both indicator and control locations. Secondly, an identical pattern was observed at the Prairie Island Nuclear Generating Plant, about 100 miles distant from the Monticello Nuclear Generating Plant (Xcel Energy Corp., 2001b).

Gamma spectroscopic analysis of quarterly composites of air particulate filters yielded similar results for indicator and control locations. Beryllium-7, which is produced continuously in the upper atmosphere by cosmic radiation (Arnold and Al-Salih, 1955) was detected in all samples, with an average activity of 0.059 pCi/m³ for all locations. All other gamma-emitting isotopes were below their respective LLD limits.

Airborne Iodine

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

Milk

Iodine-131 activity measured below the detection limit of 1.0 pCi/L in all samples. Cesium-137 results were below the LLD level of 15 pCi/L in all samples.

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

In summary, the milk data for 2000 show no radiological effects of the plant operation.

River Water and Drinking Water

Tritium was below the LLD of 330 pCi/L in all samples. Gross beta activity in Minneapolis drinking water averaged 2.5 pCi/L and was similar to average levels observed from 1985 through 1999. Gross beta averages are tabulated below.

<u>Year</u>		Gross Beta (pCi/L)
1985		2.8
1986		2.5
1987		2.4
1988		2.7
1989		2.6
1990		2.2
1991		2.9
1992		2.1
1993		2.6
1994		2.0
1995		2.3
1996		2.1
1997		2.3
1998		2.4
1999		2.2
2000		2.5

Average annual concentrations; Gross beta in drinking water.

Comparisons with data reported by the USEPA for Minneapolis drinking water samples collected in 1975, 1976, 1977, and 1978 indicate that concentrations of these nuclides are remaining fairly constant and are consistent with drinking water levels in other parts of the country. Gamma-emitting isotopes were below detection limits in all surface water samples. There was no indication of a plant effect.

Well Water

Tritium measured below the LLD level of 330 pCi/L in all samples. All gamma isotopic results were below detection limits. There was no indication of a plant effect.

Crops

Two samples of cabbage were collected in August and analyzed for iodine-131. The I-131 level was below 0.013 pCi/g wet weight in both samples. There was no indication of a plant effect. There were no crops irrigated from the Mississippi River within 5 miles of the plant in 2000; therefore, no corn or potato samples were collected for analysis from irrigated fields.

Fish

Fish samples were collected in May and October. Flesh was separated from the bones and gamma-scanned. Naturally-occurring potassium-40 was found to be similar in upstream and downstream samples (2.91 and 2.92 pCi/g wet weight, respectively). All gamma-emitting isotopes were below their respective LLD levels. There was no indication of any plant effect.

Invertebrates

Two samples were collected in May and June and two in October. The samples were analyzed for gamma-emitting isotopes. Naturally occurring potassium-40 was detected in one sample. All other gamma-emitting isotopes were below detection limits. There was no indication of a plant effect.

Shoreline Sediments

Upstream, downstream and downstream recreational area shoreline sediment collections were made in May and October and analyzed for gamma-emitting isotopes. Cesium-137 was detected in both downstream samples, averaging 0.081 pCi/g dry weight, and two recreational area samples, averaging 0.14 pCi/g dry weight, and indicate the influence of fallout deposition. Similar levels of activities and distribution were observed in 1978-1999. The only other gamma-emitting isotopes detected were naturally-occurring beryllium-7 and potassium-40. There was no indication of a plant effect.

5.0 FIGURES AND TABLES

Table 5.1. Sample collection and analysis program, Monticello Nuclear Generating Plant.

Medium	Location		Collection Type and Frequency ^b	Analysis Type and Frequency ^c
	No.	Codes (and Type) ^a		
Ambient radiation (TLDs)	40	M-01A - M-14A M-01B - M-16B M-01S - M-06S M-01C - M-04C	C/Q	Ambient gamma
Airborne Particulates	5	M-1(C), M-2, M-3, M-4, M-5	C/W	GB, GS (QC of each location)
Airborne Iodine	5	M-1(C), M-2, M-3, M-4, M-5	C/W	I-131
Milk	3	M-10 (C), M-24, M-28	G/M ^d	I-131, GS
Surface water	2	M-8(C), M-9	G/W	GS(MC), H-3(QC)
Drinking water	1	M-14	G/W	GB(MC), I-131(MC) GS (MC), H-3 (QC)
Well water	4	M-10(C), M-11, M-12, M-27	G/Q	H-3, GS
Edible cultivated crops -				
Corn ^e	1	M-19	G/A	GS
Leafy Vegetable	2	M-27, St. Cloud Farmer's Mkt. (C)	G/A	I-131
Potatoes ^e	1	M-21	G/A	GS
Fish (one species, edible portion)	2	M-8(C), M-9	G/SA	GS
Periphyton or invertebrates	2	M-8(C), M-9	G/SA	GS
Shoreline sediment	3	M-8(C), M-9, M-15	G/SA	GS

^a Location codes are defined in Table D-2. Control stations are indicated by (C). All other stations are indicators.

^b Collection type is coded as follows: C/ = continuous, G/ = grab. Collection frequency is coded as follows: W= weekly, M = monthly, Q = quarterly, SA = semiannually, A = annually.

^c Analysis type is coded as follows: GB = gross beta, GS = gamma spectroscopy, H-3 = tritium, I-131 = iodine 131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

^d Milk is collected biweekly during the grazing season (May - October), if milch animals are on pasture.

^e Collected only if the field is irrigated by water in which liquid radioactive effluent has been discharged.

Table 5.2. Sampling locations, Monticello Nuclear Generating Plant.

Code	Type ^a	Collection Site	Sample Type ^b	Distance and Direction from Plant Site
M-1	C	Air Station M-1	AP, AI	11.1 mi @ 306°/NW
M-2		Air Station M-2	AP, AI	0.8 mi @ 140°/SE
M-3		Air Station M-3	AP, AI	0.6 mi @ 104°/ESE
M-4		Air Station M-4	AP, AI	0.9 mi @ 150°/SSE
M-5		Air Station M-5	AP, AI	2.7 mi @ 136°/SE
M-8	C	Upstream of Plant	SW, SS, BO, F	0.2 mi @ 285°/WNW
M-9		Downstream of Plant	SW, SS, BO, F	0.2 mi @ 62°/ENE
M-10	C	Goenner Farm	M, WW	12.4 mi @ 323°/NW
M-11		City of Monticello	WW	3.2 mi @ 128°/SE
M-12		Plant Well #1	WW	0.2 mi @ 267°/W
M-14		City of Minneapolis	DW	36.0 mi @ 128°/SE
M-15		Montissippi Park	SS	1.6 mi @ 117°/ESE
M-19		River Irrigated Corn Field ^c		
M-21		River Irrigated Potato Field ^c		
M-24		Weinand Farm	M	4.8 mi @ 180°/S
M-27		Wise Residence (Highest D/Q Garden)	VE, WW	0.6 mi @ 208°/SSW
M-28		Hoglund Farm	M	3.7 mi @ 300°/WNW

General Area of the Site Boundary

M-01A	North Boundary Road	TLD	0.7 mi @ 353°/N
M-02A	North Boundary Road	TLD	0.8 mi @ 23°/NNE
M-03A	North Boundary Road	TLD	1.0 mi @ 43°/NE
M-04A	Biology Station Road	TLD	0.7 mi @ 92°/E
M-05A	Biology Station Road	TLD	0.6 mi @ 112°/ESE
M-06A	Biology Station Road	TLD	0.6 mi @ 133°/SE
M-07A	County Road 75	TLD	0.5 mi @ 158°/SSE
M-08A	County Road 75	TLD	0.5 mi @ 183°/S
M-09A	County Road 75	TLD	0.4 mi @ 203°/SSW
M-10A	County Road 75	TLD	0.3 mi @ 225°/SW
M-11A	County Road 75	TLD	0.4 mi @ 250°/WSW
M-12A	County Road 75	TLD	0.7 mi @ 273°/W
M-13A	North Boundary Road	TLD	1.1 mi @ 317°/NW
M-14A	North Boundary Road	TLD	0.8 mi @ 338°/NNW

Table 5.2. Sampling locations, Monticello Nuclear Generating Plant, (continued).

Code	Type ^a	Collection Site	Sample Type ^b	Distance and Direction from Plant Site
<u>Approximately 4 to 5 miles Distant from the Plant</u>				
M-01B		Sherco #1 Air Station	TLD	4.6 mi @ 02°/N
M-02B		County Road 11	TLD	4.4 mi @ 17°/NNE
M-03B		Intersection of County Road 73 & 81	TLD	4.5 mi @ 49°/NE
M-04B		Sherco #6 Air Station	TLD	4.2 mi @ 67°/ENE
M-05B		City of Big Lake	TLD	4.4 mi @ 87°/ESE
M-06B		County Road #14 and 196th Street	TLD	4.3 mi @ 116°/ESE
M-07B		Monte Industrial Drive	TLD	4.4 mi @ 135°/SE
M-08B		Dale K. Larson Residence	TLD	4.6 mi @ 162°/SSE
M-09B		Norbert Weinand Farm	TLD	4.7 mi @ 180°/S
M-10B		John Reisewitz Farm	TLD	4.4 mi @ 206°/SSW
M-11B		Clifford Vanlith Farm	TLD	4.2 mi @ 225°/SW
M-12B		Lake Maria State Park	TLD	4.4 mi @ 253°/WSW
M-13B		Bridgewater Station	TLD	4.1 mi @ 271°/W
M-14B		Richard K. Anderson Residence	TLD	4.5 mi @ 228°/NW
M-15B		Gary Williamson Residence	TLD	4.5 mi @ 308°/NNW
M-16B		Sand Plain Research Farm	TLD	4.5 mi @ 338°/NNW
<u>Special Interest Locations</u>				
M-01S		Oowski Orchard Fun Market	TLD	0.7 mi @ 130°/SW
M-02S		Edgar Klucas Residence	TLD	0.7 mi @ 142°/SE
M-03S		Big Oaks Park	TLD	1.3 mi @ 89°/E
M-04S		Pinewood School	TLD	2.3 mi @ 132°/SE
M-05S		Rivercrest Christian Academy	TLD	2.6 mi @ 112°/ESE
M-06S		Monticello Public Works	TLD	2.7 mi @ 136°/SE
M-01C	C	Kirchenbauer Farm	TLD	11.5 mi @ 323°/NW
M-02C	C	Sherburne County Roads 4 and 15	TLD	11.2 mi @ 47°/NE
M-03C	C	Wright County Rd 19 and Jason Ave.	TLD	13.0 mi @ 100°/E
M-04C	C	Maple Lake Water Tower	TLD	10.3 mi @ 226°/SW

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

^b Sample Codes:

AP	Airborne particulates	F	Fish
AI	Airborne Iodine	M	Milk
BS	Bottom (river) sediments	RW	River Water
BO	Bottom organisms	SS	Shoreline Sediments
DW	Drinking Water	VE	Vegetation / Vegetables
		WW	Well Water

^c Collected only if the field is irrigated by water in which liquid radioactive effluent has been discharged.

Table 5.3. Missed collections and analyses at the Monticello Nuclear Generating Plant.

All required samples were collected and analyzed as scheduled with the following exceptions:

Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
SW	Gamma, H-3, I-131	M-8	1/5/00	Sample container leaked during shipment.	Isolated incident; will monitor for recurrence and commence use of cardboard overpacks as necessary.
AP/AI	Beta, I-131	M-1, 2, 3 M-4, 5	4/12/00	Samples lost in shipment.	Isolated incident; no action required.
TLD	Ambient Gamma	M-7B	6/28/00	TLD lost in the field.	Vanadalism is suspected; will monitor for recurrence and move TLD if necessary.
TLD	Ambient Gamma	M-5B	10/3/00	TLD lost in the field.	Vandalism suspected due to entire cage missing; will relocate TLD if necessary.

Figure 5-1. Offsite Ambient Radiation (TLDs); Inner Ring versus Outer Ring locations.

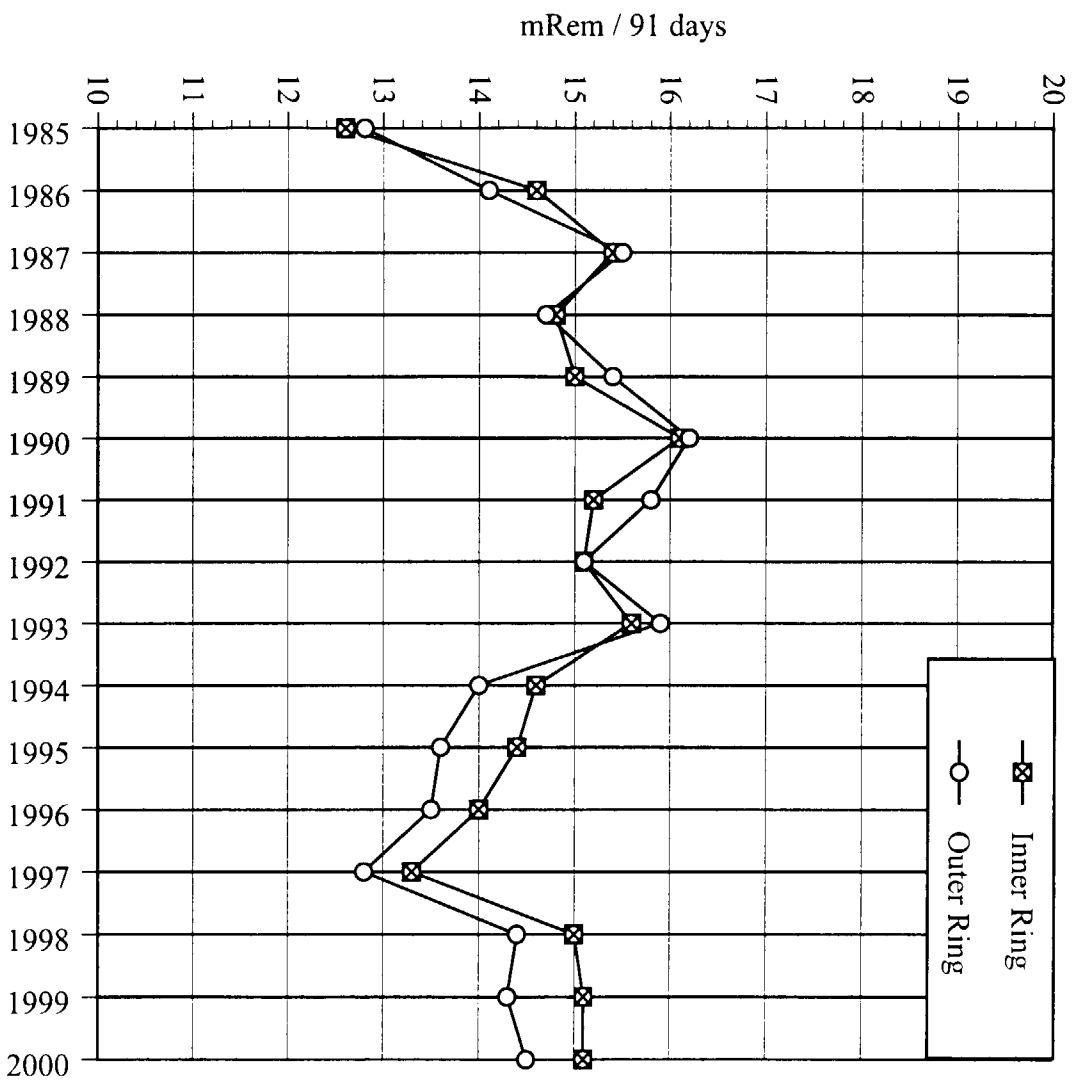


Figure 5-2. Airborne Particulates; analysis for gross beta, average mean of all indicator locations versus control location.

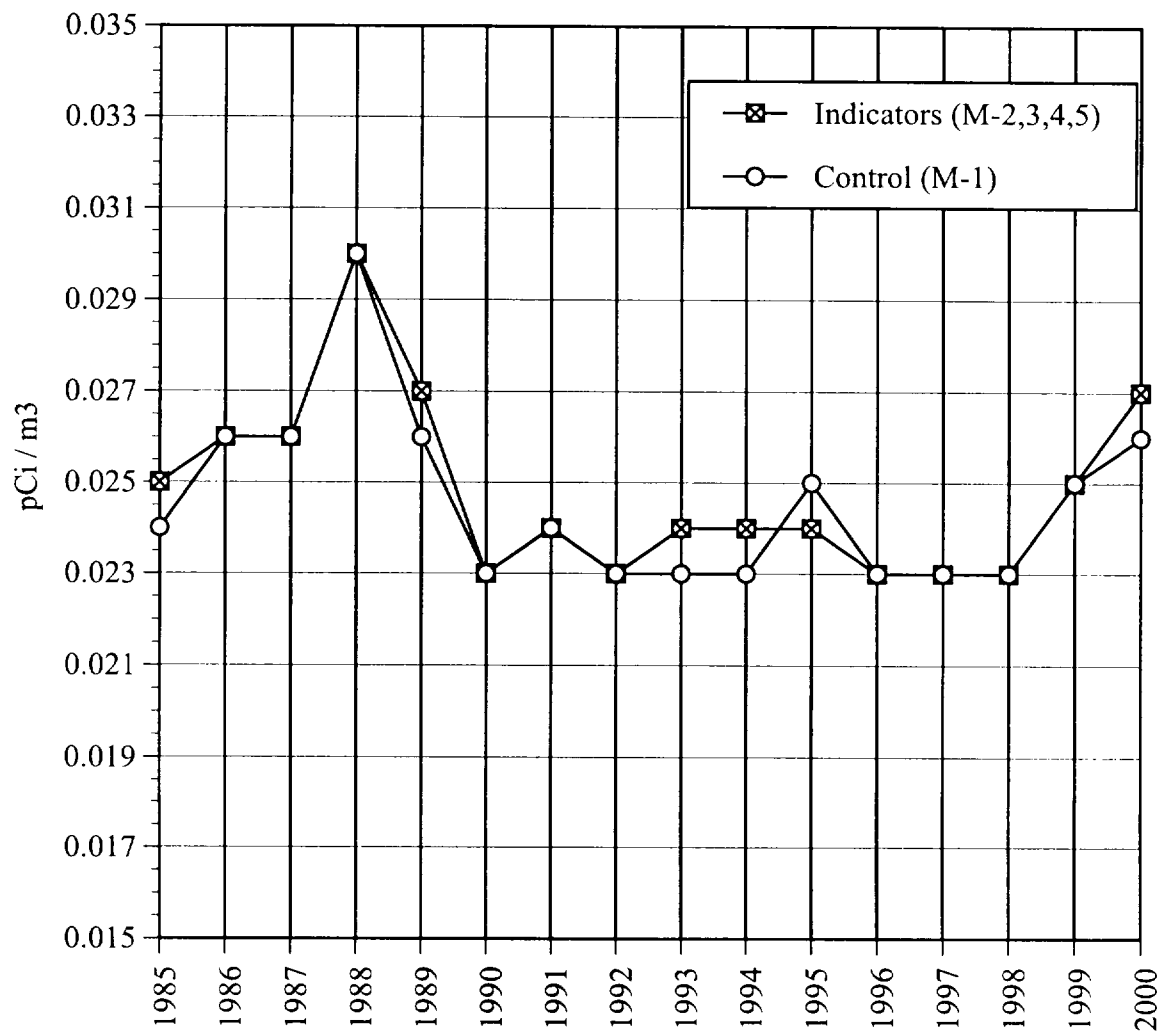


Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility Monticello Nuclear Generating Plant
 Location of Facility Wright, Minnesota
 (County, State)

Docket No. 50-263
 Reporting Period January-December, 2000

Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^c	Location with Highest Annual Mean		Control Locations Mean (F) ^c Range ^c	Number Non-Routine Results ^c
				Location ^d	Mean (F) ^c Range ^c		
TLD (Inner Ring, General Area at Site Boundary) mRem/91 days)	Gamma 56	3.0	15.1 (56/56) (13.3-17.4)	M-12A, Cty Rd. 75 0.7 mi. @ 273° /W	16.9 (4/4) (16.5-17.4)	(See Control below.)	0
TLD (Outer Ring, 4-5 mi. distant) mRem/91 days)	Gamma 62	3.0	14.5 (62/62) (10.9-16.3)	M-09B, Weinand Farm 4.7 mi. @ 180° /S	16.2 (4/4) (16.1-16.3)	(See Control below.)	0
TLD (Special Interest Areas) mRem/91 days)	Gamma 24	3.0	14.4 (24/24) (11.6-16.5)	M-06S, Monticello 2.7 mi. @ 136° /SE	16.2 (4/4) (15.9-16.5)	(See Control below.)	0
TLD (Control) mRem/91 days)	Gamma 16	3.0	None	M-03C, 13 mi. @ 100°/E	16.0 (4/4) (15.1-17.0)	14.7 (16/16) (12.3-17.0)	0
Airborne Particulates (pCi/m ³)	GB 260	0.005	0.027 (207/208) (0.009-0.075)	M-05, Air Station 2.7 mi. @ 136° /SE	0.028 (52 /52) (0.010-0.075)	0.026 (52/52) (0.010-0.063)	0
	GS 20						
	Be-7	0.015	0.059 (16/16) (0.045-0.072)	M-1 (C), Air Station 11.1 mi @ 306°/NW	0.061 (4/4) (0.037-0.077)	0.061 (4/4) (0.037-0.077)	0
	Mn-54	0.0009	< LLD	-	-	< LLD	0
	Co-58	0.0009	< LLD	-	-	< LLD	0
	Co-60	0.0008	< LLD	-	-	< LLD	0
	Zn-65	0.0009	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.0014	< LLD	-	-	< LLD	0
	Ru-103	0.0012	< LLD	-	-	< LLD	0
	Ru-106	0.0085	< LLD	-	-	< LLD	0
	Cs-134	0.0060	< LLD	-	-	< LLD	0
	Cs-137	0.0008	< LLD	-	-	< LLD	0
	Ba-La-140	0.0025	< LLD	-	-	< LLD	0
	Ce-141	0.0019	< LLD	-	-	< LLD	0
	Ce-144	0.0048	< LLD	-	-	< LLD	0
Airborne Iodine (pCi/m ³)	I-131 260	0.07	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

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Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^c	Location with Highest Annual Mean		Control Locations Mean (F) ^c Range ^c	Number Non-Routine Results ^c
				Location ^d	Mean (F) ^c Range ^c		
Milk (pCi/L)	I-131 57	1.0	< LLD	-	-	< LLD	0
	GS 57						
	K-40 200		1391 (38/38) (1165-1640)	M-28, Hoglund Farm 3.7 mi @ 300°/WNW	1393 (19 /19) (1165-1640)	1385 (19/19) (1148-1522)	0
	Cs-134 15		< LLD	-	-	< LLD	0
	Cs-137 15		< LLD	-	-	< LLD	0
	Ba-La-140 15		< LLD	-	-	< LLD	0
River Water (pCi/L)	II-3 8	330	< LLD	-	-	< LLD	0
	GS 24						
	Mn-54 15		< LLD	-	-	< LLD	0
	Fe-59 30		< LLD	-	-	< LLD	0
	Co-58 15		< LLD	-	-	< LLD	0
	Co-60 15		< LLD	-	-	< LLD	0
	Zn-65 30		< LLD	-	-	< LLD	0
	Zr-Nb-95 15		< LLD	-	-	< LLD	0
	Cs-134 15		< LLD	-	-	< LLD	0
	Cs-137 18		< LLD	-	-	< LLD	0
	Ba-La-140 15		< LLD	-	-	< LLD	0
	Ce-144 65		< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

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Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^c	Location with Highest Annual Mean		Control Locations Mean (F) ^c Range ^c	Number Non-Routine Results ^c
				Location ^d	Mean (F) ^c Range ^c		
Drinking Water (pCi/L)	GB 12	1.0	2.5 (12/12) (1.8-3.4)	M-14, Minneapolis 36 mi. @ 128° /SE	2.5 (12/12) (1.8-3.4)	None	0
	I-131 12	1.0	< LLD	-	-	None	0
	H-3 4	330	< LLD	-	-	None	0
	GS 12						
	Mn-54 15	15	< LLD	-	-	None	0
	Fe-59 30	30	< LLD	-	-	None	0
	Co-58 15	15	< LLD	-	-	None	0
	Co-60 15	15	< LLD	-	-	None	0
	Zn-65 30	30	< LLD	-	-	None	0
	Zr-Nb-95 15	15	< LLD	-	-	None	0
	Cs-134 10	10	< LLD	-	-	None	0
	Cs-137 18	18	< LLD	-	-	None	0
	Ba-La-140 15	15	< LLD	-	-	None	0
	Ce-144 68	68	< LLD	-	-	None	0
Well Water (pCi/L)	II-3 16	330	< LLD	-	-	< LLD	0
	GS 16						
	Mn-54 15	15	< LLD	-	-	< LLD	0
	Fe-59 30	30	< LLD	-	-	< LLD	0
	Co-58 15	15	< LLD	-	-	< LLD	0
	Co-60 15	15	< LLD	-	-	< LLD	0
	Zn-65 30	30	< LLD	-	-	< LLD	0
	Zr-Nb-95 15	15	< LLD	-	-	< LLD	0
	Cs-134 10	10	< LLD	-	-	< LLD	0
	Cs-137 18	18	< LLD	-	-	< LLD	0
	Ba-La-140 15	15	< LLD	-	-	< LLD	0
	Ce-144 49	49	< LLD	-	-	< LLD	0
Crops - Cabbage (pCi/gwet)	I-131 2	0.013	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

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Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^c	Location with Highest Annual Mean		Control Locations Mean (F) ^c Range ^c	Number Non-Routine Results ^e
				Location ^d	Mean (F) ^c Range ^c		
Fish (pCi/g wet)	GS 4						
	K-40	0.10	2.92 (2/2) (2.82-3.01)	M-9, Downstream 0.2 mi. @ 62° /ENE	2.92 (2/2) (2.82-3.01)	2.91 (2/2) (2.72-3.10)	0
	Mn-54	0.007	< LLD	-	-	< LLD	0
	Fe-59	0.050	< LLD	-	-	< LLD	0
	Co-58	0.010	< LLD	-	-	< LLD	0
	Co-60	0.011	< LLD	-	-	< LLD	0
	Zn-65	0.026	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.032	< LLD	-	-	< LLD	0
	Cs-134	0.015	< LLD	-	-	< LLD	0
	Cs-137	0.015	< LLD	-	-	< LLD	0
	Ba-La-140	0.020	< LLD	-	-	< LLD	0
	Ce-144	0.081	< LLD	-	-	< LLD	0
Invertebrates (pCi/g wet)	GS 4						
	Be-7	2.19	< LLD	-	-	< LLD	0
	K-40	4.01	< LLD	M-8, Upstream 0.2 mi @ 285°/WNW	4.01 (1/2)	< LLD	0
	Mn-54	0.16	< LLD	-	-	< LLD	0
	Fe-59	0.19	< LLD	-	-	< LLD	0
	Co-58	0.19	< LLD	-	-	< LLD	0
	Co-60	0.14	< LLD	-	-	< LLD	0
	Zn-65	0.39	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.29	< LLD	-	-	< LLD	0
	Cs-134	0.15	< LLD	-	-	< LLD	0
	Cs-137	0.12	< LLD	-	-	< LLD	0
	Ba-La-140	0.33	< LLD	-	-	< LLD	0
	Ce-144	0.89	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility Monticello Nuclear Generating Plant
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Sample Type (Units)	Type and Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c Range ^c	Location with Highest Annual Mean		Control Locations Mean (F) ^c Range ^c	Number Non-Routine Results ^c
				Location ^d	Mean (F) ^c Range ^c		
Shoreline Sediments (pCi/g dry)	GS 6						
	Bc-7	0.24	< LLD	M-8, Upstream 0.2 mi @ 285°/WNW	0.39 (1/2)	< LLD	0
	K-40	0.10	10.55 (4/4) (10.12-11.32)	M-9, Downstream 0.2 mi. @ 62° /ENE	10.72 (2/2) (10.12-11.32)	10.29 (1/2) (9.44-11.13)	0
	Mn-54	0.026	< LLD	-	-	< LLD	0
	Co-58	0.021	< LLD	-	-	< LLD	0
	Co-60	0.023	< LLD	-	-	< LLD	0
	Zn-65	0.061	< LLD	-	-	< LLD	0
	Nb-95	0.043	< LLD	-	-	< LLD	0
	Zr-95	0.048	< LLD	-	-	< LLD	0
	Ru-103	0.020	< LLD	-	-	< LLD	0
	Ru-106	0.20	< LLD	-	-	< LLD	0
	Cs-134	0.032	< LLD	-	-	< LLD	0
	Cs-137	0.014	0.11 (4/4) (0.042-0.24)	M-15, Montissippi Park 1.6 mi. @ 117°/ ESE	0.14 (2/2) (0.042-0.24)	0.031 (1/2)	0
	Ba-La-140	0.080	< LLD	-	-	< LLD	0
	Ce-144	0.13	< LLD	-	-	< LLD	0

^a GB = gross beta, GS = gamma scan.

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

^c Mean and range are based on detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

^d Locations are specified: (1) by name, and/or station code (Table 2) and (2) by distance (miles) and direction relative to reactor site.

^e Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten time the typical preoperational value for the medium or location.

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

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

January, 2000 through December, 2000

Appendix A

Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory, formerly Teledyne Brown Engineering Environmental Services Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of its quality control program in December 1971. These programs are operated by agencies which supply environmental type samples (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 a laboratory's analytical procedures and to alert it of any possible problems.

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

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk, water and air filters during the past twelve months. Data for previous years is available upon request.

This program was conducted by the U.S. Environmental Protection Agency Office of Research and Development National Exposure Research Laboratory Characterization Research Division-Las Vegas, Nevada.

The results in Table A-2 were obtained for Thermoluminescent Dosimeters (TLDs), via various International Intercomparisons of Environmental Dosimeters under the sponsorships listed in Table A-2. Results of crosscheck testing with Teledyne Brown Engineering are also listed.

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

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

Table A-5 list results of the in-house "duplicate" program for the past twelve months. Acceptance is based on the difference of the results being less than the sum of the errors. Data for previous years available upon request.

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

The results in Table A-7 were obtained through participation in the Environmental Measurement Laboratory Quality Assessment Program.

Attachment A lists acceptance criteria for "spiked" samples.

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

12-31-00

ATTACHMENT A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES^a

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

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

^b Laboratory limit.

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^b		
				Laboratory results ± 2 Sigma ^c	ERA Result ^d 1s, N=1	Control Limits
STW-863	WATER	Jan, 2000	Gr. Alpha	39.3 \pm 5.2	25.4 \pm 6.4	14.5 - 36.3
The analysis was repeated and recalculated with Am-241 efficiency; result of reanalysis 29.32 \pm 5.79 pCi/L. Internal spike program results do not indicate a problem.						
STW-863	WATER	Jan, 2000	Gr. Beta	40.7 \pm 1.2	42.1 \pm 4.2	33.4 - 50.8
STW-866	WATER	Jan, 2000	Sr-89	17.1 \pm 2.2	22.5 \pm 5.0	13.8 - 31.2
STW-866	WATER	Jan, 2000	Sr-90	8.1 \pm 0.6	9.6 \pm 5.0	0.9 - 18.3
STW-868	WATER	Feb, 2000	Ra-226	7.6 \pm 0.5	8.3 \pm 1.2	6.1 - 10.4
STW-868	WATER	Feb, 2000	Ra-228	5.6 \pm 1.0	2.3 \pm 0.6	1.3 - 3.2
Result of reanalysis: 6.34 \pm 0.94. Activity confirmed by gamma spectroscopy (6.00 \pm 1.42 pCi/L).						
STW-868	WATER	Feb, 2000	Uranium	5.4 \pm 0.2	6.1 \pm 3.0	0.9 - 11.3
STW-869	WATER	Mar, 2000	H-3	23,500.0 \pm 306.0	23,800.0 \pm 2,380.0	19,800.0 - 27,800.0
STW-867	WATER	Mar, 2000	Gr. Alpha	83.6 \pm 5.8	58.4 \pm 5.8	33.3 - 83.5
Results were recalculated with Am-241 efficiency; 57.80 \pm 5.73 pCi/L. Refer to STW-863.						
STW-867	WATER	Mar, 2000	Gr. Beta	15.4 \pm 0.9	16.8 \pm 1.7	8.1 - 25.5
STW-876	WATER	Mar, 2000	I-131	18.7 \pm 0.6	19.9 \pm 2.0	14.7 - 25.1
STW-877	WATER	Apr, 2000	Gr. Alpha	52.3 \pm 2.3	54.0 \pm 13.5	30.8 - 77.2
STW-877	WATER	Apr, 2000	Ra-226	17.5 \pm 1.1	18.6 \pm 2.8	13.8 - 23.4
STW-877	WATER	Apr, 2000	Ra-228	3.7 \pm 0.4	3.6 \pm 0.9	2.0 - 5.1
STW-878	WATER	Apr, 2000	Co-60	19.2 \pm 0.6	16.9 \pm 5.0	8.2 - 25.6
STW-878	WATER	Apr, 2000	Cs-134	81.0 \pm 1.3	86.4 \pm 5.0	77.7 - 95.1
STW-878	WATER	Apr, 2000	Cs-137	119.0 \pm 2.6	123.0 \pm 6.2	112.0 - 134.0
STW-878	WATER	Apr, 2000	Gr. Beta	276.0 \pm 9.6	289.0 \pm 43.4	214.0 - 364.0
STW-878	WATER	Apr, 2000	Sr-89	32.3 \pm 3.3	50.7 \pm 5.0	42.0 - 59.4
STW-878	WATER	Apr, 2000	Sr-90	11.3 \pm 1.0	32.8 \pm 5.0	24.1 - 41.5
An error was found in calculation. Result of recalculation: Sr-89, 55.5 \pm 7.2 pCi/L / Sr-90, 30.7 \pm 3.0 pCi/L. Results of reanalysis: Sr-89, 47.4 \pm 14.5 pCi/L / Sr-90, 33.0 \pm 1.35 pCi/L. Both results are within limits.						
STW-879	WATER	Jun, 2000	Ba-133	22.4 \pm 2.1	25.5 \pm 5.0	16.8 - 34.2
STW-879	WATER	Jun, 2000	Co-60	69.9 \pm 3.7	65.6 \pm 5.0	56.9 - 74.3
STW-879	WATER	Jun, 2000	Cs-134	13.5 \pm 0.8	13.8 \pm 5.0	5.1 - 22.5
STW-879	WATER	Jun, 2000	Cs-137	232.0 \pm 7.8	238.0 \pm 11.9	217.0 - 259.0
STW-879	WATER	Jun, 2000	Zn-65	50.9 \pm 3.8	54.6 \pm 5.5	45.3 - 63.9
STW-880	WATER	Jun, 2000	Ra-226	2.8 \pm 0.2	3.0 \pm 0.5	2.2 - 3.8
STW-880	WATER	Jun, 2000	Ra-228	10.0 \pm 0.9	13.0 \pm 3.3	7.4 - 18.6
STW-880	WATER	Jun, 2000	Uranium	57.0 \pm 4.4	63.4 \pm 6.3	52.6 - 74.2
STW-883	WATER	Jul, 2000	Gr. Alpha	6.9 \pm 1.1	7.2 \pm 5.0	0.0 - 15.9
STW-883	WATER	Jul, 2000	Gr. Beta	88.8 \pm 9.8	87.5 \pm 10.0	70.2 - 105.0
STW-884	WATER	Aug, 2000	H-3	8,740.0 \pm 174.0	8,320.0 \pm 832.0	6,910.0 - 9,730.0
STW-891	WATER	Sep, 2000	Ra-226	17.9 \pm 1.3	18.9 \pm 2.8	14.0 - 23.8
STW-891	WATER	Sep, 2000	Ra-228	5.7 \pm 0.5	6.2 \pm 1.6	3.5 - 8.8

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^b		
				Laboratory results ± 2 Sigma ^c	ERA Result ^d 1s, N=1	Control Limits
STW-891	WATER	Sep, 2000	Uranium	10.3 \pm 0.1	11.9 \pm 3.0	6.7 - 17.1
STW-892	WATER	Oct, 2000	I-131	16.9 \pm 0.3	15.9 \pm 1.6	10.7 - 21.1
STW-892	WATER	Oct, 2000	I-131(g)	17.1 \pm 5.4	15.9 \pm 1.6	10.7 - 21.1
STW-893	WATER	Oct, 2000	Gr. Alpha	66.3 \pm 5.3	74.4 \pm 18.6	42.2 - 107.0
STW-893	WATER	Oct, 2000	Ra-226	10.1 \pm 1.0	10.5 \pm 1.6	7.8 - 13.2
STW-893	WATER	Oct, 2000	Ra-228	21.2 \pm 0.5	19.4 \pm 4.9	11.0 - 27.8
STW-893	WATER	Oct, 2000	Uranium	41.4 \pm 1.9	44.5 \pm 4.5	36.8 - 52.2
STW-894	WATER	Oct, 2000	Co-60	93.4 \pm 1.6	91.1 \pm 5.0	82.4 - 99.8
STW-894	WATER	Oct, 2000	Cs-134	54.8 \pm 0.3	59.8 \pm 5.0	51.1 - 68.5
STW-894	WATER	Oct, 2000	Cs-137	45.5 \pm 2.3	45.0 \pm 5.0	36.3 - 53.7
STW-894	WATER	Oct, 2000	Gr. Beta	209.0 \pm 7.9	256.0 \pm 38.4	189.0 - 323.0
STW-894	WATER	Oct, 2000	Sr-89	32.8 \pm 3.0	41.3 \pm 5.0	32.6 - 50.0
STW-894	WATER	Oct, 2000	Sr-90	16.0 \pm 2.4	18.0 \pm 5.0	9.3 - 26.7
STW-895	WATER	Nov, 2000	Gr. Alpha	50.3 \pm 2.6	60.3 \pm 15.1	34.4 - 86.2
STW-895	WATER	Nov, 2000	Gr. Beta	28.6 \pm 1.3	25.5 \pm 5.0	16.8 - 34.2
STW-896	WATER	Nov, 2000	Ba-133	78.0 \pm 2.0	82.2 \pm 8.2	68.0 - 96.4
STW-896	WATER	Nov, 2000	Co-60	30.8 \pm 1.7	27.8 \pm 5.0	19.1 - 36.5
STW-896	WATER	Nov, 2000	Cs-134	67.2 \pm 3.3	76.0 \pm 5.0	67.3 - 84.7
The mean value for Cs-134 of all participating laboratories was 70.7 pCi/L. Other gamma emitters are within limits, the counting efficiency is not suspect. Library values were reviewed and found to be correct.						
STW-896	WATER	Nov, 2000	Cs-137	109.0 \pm 1.0	106.0 \pm 5.3	96.8 - 115.0
STW-896	WATER	Nov, 2000	Zn-65	81.5 \pm 7.4	79.0 \pm 7.9	65.3 - 92.7

^a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the environmental samples crosscheck program operated by Environmental Resources Associates (ERA).

^b All results are in pCi/L, except for elemental potassium (K) data in milk, which are in mg/L; air filter samples, which are in pCi/Filter.

^c Unless otherwise indicated, the laboratory results are given as the mean \pm 2 standard deviations for three determinations.

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

Table A-2. Crosscheck program results; Thermoluminescent Dosimeters. (TLDs).

Lab Code	TLD Type	Date	Measurement	mR		
				Laboratory results ± 2 Sigma	Known Value	Average ± 2 Sigma (All Participants)
<u>Environmental, Inc.</u>						
1999-1	LiF-100 Chips	Mar, 1999	Reader 1, #1	14.5 ± 0.5	15.4	-
1999-1	LiF-100 Chips	Mar, 1999	Reader 1, #2	29.3 ± 1.0	31.8	-
1999-1	LiF-100 Chips	Mar, 1999	Reader 1, #3	60.0 ± 0.2	59.1	-
<u>Environmental, Inc.</u>						
1999-2	CaSO ₄ : Dy Cards	Mar, 1999	Reader 1, #1	18.3 ± 0.5	15.4	-
1999-2	CaSO ₄ : Dy Cards	Mar, 1999	Reader 1, #2	35.9 ± 1.3	31.8	-
1999-2	CaSO ₄ : Dy Cards	Mar, 1999	Reader 1, #3	66.5 ± 4.4	59.1	-
Chips and Cards were irradiated by Teledyne Brown Engineering, Westwood, New Jersey, in March, 1999.						
<u>Environmental, Inc.</u>						
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #1	14.4 ± 0.2	17.8	-
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #2	32.4 ± 0.1	35.5	-
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #3	61.8 ± 0.9	62.2	-
<u>Environmental, Inc.</u>						
2000-2	CaSO ₄ : Dy Cards	Mar, 2000	Reader 1, #1	21.3 ± 0.3	17.8	-
2000-2	CaSO ₄ : Dy Cards	Mar, 2000	Reader 1, #2	40.1 ± 1.9	35.5	-
2000-2	CaSO ₄ : Dy Cards	Mar, 2000	Reader 1, #3	69.9 ± 3.5	62.2	-

Chips and Cards were irradiated by Teledyne Brown Engineering, Westwood, New Jersey, in March, 2000.

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^a		
				Laboratory results 2s, n=1 ^b	Known Activity	Control ^c Limits
SPW-271	WATER	Jan, 2000	Ra-226	14.81 ± 0.44	13.76	9.63 - 17.89
SPW-271	WATER	Jan, 2000	Ra-228	16.97 ± 2.12	14.68	10.28 - 19.08
SPW-272	WATER	Jan, 2000	Gr. Alpha	44.35 ± 1.95	41.14	20.57 - 61.71
SPW-272	WATER	Jan, 2000	Gr. Beta	31.19 ± 5.02	29.50	19.50 - 39.50
SPW-756	WATER	Jan, 2000	H-3	56339.00 ± 666.00	57667.00	46133.60 - 69200.40
SPW-480	WATER	Jan, 2000	Co-60	32.33 ± 2.87	28.36	18.36 - 38.36
SPW-480	WATER	Jan, 2000	Cs-137	35.58 ± 4.20	36.83	26.83 - 46.83
SPMI-482	MILK	Jan, 2000	Sr-90	16.93 ± 1.07	14.10	4.10 - 24.10
SPAP-484	AIR FILTER	Jan, 2000	Cs-137	1.84 ± 0.01	1.72	1.03 - 2.41
SPW-917	WATER	Feb, 2000	Gr. Alpha	16.59 ± 1.90	41.10	20.55 - 61.65
An insufficient amount of Am-241 spike was available for an accurate test.						
SPW-917	WATER	Feb, 2000	Gr. Beta	32.61 ± 2.06	29.43	19.43 - 39.43
SPW-918	WATER	Feb, 2000	Ra-226	21.15 ± 0.49	20.68	14.48 - 26.88
SPW-918	WATER	Feb, 2000	Ra-228	14.24 ± 1.64	14.51	10.16 - 18.86
SPVE-1262	VEGETATION	Mar, 2000	I-131(g)	1.17 ± 0.07	1.12	0.67 - 1.57
SPCH-1264	CHARCOAL CANISTER	Mar, 2000	I-131(g)	0.56 ± 0.02	0.53	0.32 - 0.74
SPMI-1274	MILK	Mar, 2000	I-131	47.02 ± 3.36	48.00	36.00 - 60.00
SPW-1301	WATER	Mar, 2000	I-131	66.03 ± 1.06	76.84	61.47 - 92.21
SPW-1301	WATER	Mar, 2000	I-131(g)	80.31 ± 6.28	76.84	66.84 - 86.84
SPW-1477	WATER	Mar, 2000	Gr. Alpha	32.09 ± 1.82	41.13	20.57 - 61.70
SPW-1477	WATER	Mar, 2000	Gr. Beta	29.20 ± 1.56	29.38	19.38 - 39.38
SPW-1478	WATER	Mar, 2000	Ra-226	21.78 ± 0.47	20.69	14.48 - 26.90
SPW-1478	WATER	Mar, 2000	Ra-228	14.41 ± 1.70	14.39	10.07 - 18.71
SPMI-2275	MILK	Apr, 2000	Cs-134	33.53 ± 2.82	32.12	22.12 - 42.12
SPMI-2275	MILK	Apr, 2000	Cs-137	36.38 ± 4.94	36.66	26.66 - 46.66
SPMI-2275	MILK	Apr, 2000	I-131	46.06 ± 0.82	55.50	44.40 - 66.60
SPW-2277	WATER	Apr, 2000	Ra-226	20.51 ± 0.44	20.68	14.48 - 26.88
SPW-2278	WATER	Apr, 2000	Gr. Alpha	40.22 ± 2.50	38.44	19.22 - 57.66
SPW-2278	WATER	Apr, 2000	Gr. Beta	32.63 ± 1.81	29.30	19.30 - 39.30
SPW-2278	WATER	Apr, 2000	Ra-228	14.91 ± 1.70	14.25	9.98 - 18.53
SPW-2279	WATER	Apr, 2000	Co-60	37.12 ± 3.86	34.54	24.54 - 44.54
SPW-2279	WATER	Apr, 2000	Cs-134	34.70 ± 3.32	32.12	22.12 - 42.12
SPW-2279	WATER	Apr, 2000	Cs-137	39.60 ± 5.12	36.66	26.66 - 46.66
SPW-2279	WATER	Apr, 2000	I-131	49.92 ± 0.67	55.50	44.40 - 66.60
SPW-2279	WATER	Apr, 2000	I-131(g)	60.63 ± 6.58	55.50	45.50 - 65.50
SPW-2281	WATER	Apr, 2000	H-3	58829.00 ± 682.00	56996.00	45596.80 - 68395.20
SPAP-3097	AIR FILTER	Apr, 2000	Cs-137	1.81 ± 0.02	1.71	1.03 - 2.39
SPW-3093	WATER	May, 2000	I-131	83.39 ± 1.06	85.38	68.30 - 102.46
SPW-3094	WATER	May, 2000	Ra-226	20.86 ± 0.42	20.68	14.48 - 26.88
SPW-3094	WATER	May, 2000	Ra-228	14.17 ± 1.59	14.12	9.88 - 18.36
SPW-3095	WATER	May, 2000	Gr. Alpha	38.99 ± 2.09	38.44	19.22 - 57.66

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^a		
				Laboratory results 2s, n=1 ^b	Known Activity	Control ^c Limits
SPW-3095	WATER	May, 2000	Gr. Beta	30.65 ± 1.53	29.30	19.30 - 39.30
SPAP-274	AIR FILTER	May, 2000	Gr. Beta	5.08 ± 0.03	5.97	-4.03 - 15.97
SPMI-3138	MILK	May, 2000	I-131	85.08 ± 1.05	85.38	68.30 - 102.46
SPF-3180	FISH	May, 2000	Cs-134	0.52 ± 0.02	0.50	0.30 - 0.70
SPF-3180	FISH	May, 2000	Cs-137	0.65 ± 0.04	0.59	0.35 - 0.82
SPAP-3902	AIR FILTER	Jun, 2000	Gr. Beta	5.81 ± 0.03	5.35	-4.65 - 15.35
SPF-5182	FISH	Jun, 2000	Cs-134	0.60 ± 0.04	0.59	0.35 - 0.83
SPF-5182	FISH	Jun, 2000	Cs-137	0.60 ± 0.05	0.58	0.35 - 0.81
SPW-3911	WATER	Jun, 2000	Ra-226	23.73 ± 0.85	20.68	14.48 - 26.88
SPW-3911	WATER	Jun, 2000	Ra-228	20.43 ± 1.77	20.75	14.53 - 26.98
SPW-3910	WATER	Jun, 2000	Gr. Alpha	38.28 ± 2.12	38.44	19.22 - 57.66
SPW-3910	WATER	Jun, 2000	Gr. Beta	35.14 ± 1.74	29.22	19.22 - 39.22
SPW-4342	WATER	Jun, 2000	Sr-89	73.70 ± 4.77	81.00	64.80 - 97.20
SPW-4342	WATER	Jun, 2000	Sr-90	58.13 ± 2.17	55.90	44.72 - 67.08
SPW-4687	WATER	Jul, 2000	Ra-226	21.07 ± 0.56	20.68	14.48 - 26.88
SPW-4687	WATER	Jul, 2000	Ra-228	16.35 ± 1.70	20.75	14.53 - 26.98
SPW-4688	WATER	Jul, 2000	H-3	56205.00 ± 663.00	56228.00	44982.40 - 67473.60
SPAP-4807	AIR FILTER	Jul, 2000	Gr. Beta	6.07 ± 0.02	5.96	-4.04 - 15.96
SPAP-4809	AIR FILTER	Jul, 2000	Cs-137	1.82 ± 0.02	1.71	1.03 - 2.39
SPMI-4856	MILK	Jul, 2000	Cs-134	33.24 ± 3.74	29.56	19.56 - 39.56
SPMI-4856	MILK	Jul, 2000	Cs-137	39.80 ± 6.77	36.45	26.45 - 46.45
SPMI-4856	MILK	Jul, 2000	Sr-89	46.35 ± 5.10	56.34	45.07 - 67.61
SPMI-4856	MILK	Jul, 2000	Sr-90	70.47 ± 2.06	69.73	55.78 - 83.68
SPW-5372	WATER	Jul, 2000	Co-60	33.31 ± 4.61	33.24	23.24 - 43.24
SPW-5372	WATER	Jul, 2000	Cs-134	59.70 ± 4.57	58.26	48.26 - 68.26
SPW-5372	WATER	Jul, 2000	Cs-137	40.00 ± 5.58	36.42	26.42 - 46.42
SPW-4686	WATER	Aug, 2000	Gr. Alpha	34.12 ± 1.71	38.43	19.22 - 57.65
SPW-4686	WATER	Aug, 2000	Gr. Beta	35.42 ± 1.51	29.21	19.21 - 39.21
SPW-5564	WATER	Aug, 2000	Sr-89	62.97 ± 4.73	67.61	54.09 - 81.13
SPW-5564	WATER	Aug, 2000	Sr-90	65.40 ± 2.47	55.70	44.56 - 66.84
SPW-5792	WATER	Aug, 2000	Ra-226	12.82 ± 0.30	13.79	9.65 - 17.93
SPW-5792	WATER	Aug, 2000	Ra-228	15.00 ± 1.21	13.69	9.58 - 17.80
SPW-6631	WATER	Sep, 2000	Ra-228	22.20 ± 2.20	20.32	14.22 - 26.42
SPW-6632	WATER	Sep, 2000	Ra-226	13.58 ± 0.29	13.79	9.65 - 17.93
SPW-6632	WATER	Sep, 2000	Ra-228	18.84 ± 2.59	20.32	14.22 - 26.42
SPW-6633	WATER	Sep, 2000	Fe-55	1757.00 ± 674.00	1852.00	1481.60 - 2222.40
SPW-5791	WATER	Sep, 2000	Gr. Alpha	52.28 ± 9.41	69.00	34.50 - 103.50
SPW-5791	WATER	Sep, 2000	Gr. Beta	34.60 ± 4.71	29.10	19.10 - 39.10
SPW-6630	WATER	Sep, 2000	Gr. Alpha	71.54 ± 7.15	69.14	34.57 - 103.71
SPW-6630	WATER	Sep, 2000	Gr. Beta	37.78 ± 1.62	29.04	19.04 - 39.04
SPW-7744	WATER	Oct, 2000	Ra-226	12.36 ± 0.25	13.79	9.65 - 17.93

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L ^a		
				Laboratory results 2s, n=1 ^b	Known Activity	Control ^c Limits
SPW-7744	WATER	Oct, 2000	Ra-228	10.37 ± 1.15	13.40	9.38 - 17.42
SPW-7745	WATER	Oct, 2000	H-3	54650.00 ± 643.00	55391.00	44312.80 - 66469.20
SPAP-7764	AIR FILTER	Oct, 2000	Gr. Beta	6.14 ± 0.03	5.91	-4.09 - 15.91
SPAP-7766	AIR FILTER	Oct, 2000	Cs-137	1.84 ± 0.01	1.69	1.01 - 2.37
SPMI-8347	MILK	Oct, 2000	Cs-134	29.18 ± 6.51	26.83	16.83 - 36.83
SPMI-8347	MILK	Oct, 2000	Cs-134	29.37 ± 3.63	26.83	16.83 - 36.83
SPMI-8347	MILK	Oct, 2000	Cs-137	39.04 ± 8.76	36.20	26.20 - 46.20
SPMI-8347	MILK	Oct, 2000	Cs-137	34.89 ± 5.71	36.20	26.20 - 46.20
SPF-8349	FISH	Oct, 2000	Cs-134	0.56 ± 0.02	0.54	0.32 - 0.75
SPF-8349	FISH	Oct, 2000	Cs-137	0.92 ± 0.04	0.87	0.52 - 1.22
SPW-8369	WATER	Oct, 2000	Co-60	32.49 ± 1.86	32.19	22.19 - 42.19
SPW-8369	WATER	Oct, 2000	Cs-134	55.87 ± 1.71	53.66	43.66 - 63.66
SPW-8369	WATER	Oct, 2000	Cs-137	36.46 ± 2.73	36.21	26.21 - 46.21
SPW-7743	WATER	Oct, 2000	Gr. Alpha	51.28 ± 2.28	69.10	34.55 - 103.65
SPW-7743	WATER	Oct, 2000	Gr. Beta	36.86 ± 1.66	29.00	19.00 - 39.00
SPW-9101	WATER	Nov, 2000	Ra-226	14.35 ± 0.24	13.79	9.65 - 17.93
SPW-9101	WATER	Nov, 2000	Ra-228	22.14 ± 1.56	20.09	14.06 - 26.12
SPW-9102	WATER	Dec, 2000	Gr. Alpha	77.76 ± 3.02	69.14	34.57 - 103.71
SPW-9102	WATER	Dec, 2000	Gr. Beta	36.71 ± 1.65	28.99	18.99 - 38.99
SPW-9726	WATER	Dec, 2000	Gr. Alpha	43.03 ± 2.18	69.14	34.57 - 103.71
SPW-9726	WATER	Dec, 2000	Gr. Beta	32.17 ± 1.55	28.89	18.89 - 38.89
SPW-9727	WATER	Dec, 2000	Ra-226	13.35 ± 0.29	13.79	9.65 - 17.93
SPW-9727	WATER	Dec, 2000	Ra-228	15.44 ± 1.23	19.75	13.83 - 25.68
SPCH-10228	CHARCOAL CANISTER	Dec, 2000	Ba-133	1.80 ± 0.05	2.11	1.26 - 2.95

^a All results are in pCi/L, except for elemental potassium (K) in milk, which are in mg/L.; air filter samples, which are in pCi/Filter; and food products, which are in mg/kg.

^b All samples are the results of single determinations.

^c Control limits are based on Attachment A, page A2 of this report.

NOTE: For fish, Jello is used for the spike matrix. For vegetation, Sawdust is used for the spike matrix.

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a .		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPW-270	WATER	Jan 2000	Gr. Alpha	< 0.50	0.52 ± 0.41	< 1.0
SPW-270	WATER	Jan 2000	Gr. Beta	< 1.50	-0.34 ± 1.11	< 3.2
SPW-270	WATER	Jan 2000	Ra-226		0.06 ± 0.01	< 1.0
SPW-270	WATER	Jan 2000	Ra-228	< 0.94	0.14 ± 0.45	< 2.0
SPW-447	WATER	Jan 2000	H-3	< 184.00	-54.70 ± 88.60	< 200.0
SPW-481	WATER	Jan 2000	Co-60	< 2.42		< 10.0
SPW-481	WATER	Jan 2000	Cs-134	< 3.99		< 10.0
SPW-481	WATER	Jan 2000	Cs-137	< 2.90		< 10.0
SPMI-483	MILK	Jan 2000	Cs-137	< 2.73		< 10.0
SPMI-483	MILK	Jan 2000	Sr-90		1.03 ± 0.40	< 1.0
Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.						
SPAP-485	AIR FILTER	Jan 2000	Cs-137	< 1.64		< 100.0
SPW-919	WATER	Feb 2000	Gr. Alpha	< 0.80	0.56 ± 0.61	< 1.0
SPW-919	WATER	Feb 2000	Gr. Beta	< 1.65	0.11 ± 1.16	< 3.2
SPW-919	WATER	Feb 2000	Ra-226	< 0.02	0.02 ± 0.01	< 1.0
SPW-919	WATER	Feb 2000	Ra-228	< 0.60	0.02 ± 0.01	< 2.0
SPVE-1263	VEGETATION	Mar 2000	Cs-134	< 11.48		< 100.0
SPVE-1263	VEGETATION	Mar 2000	Cs-137	< 24.82		< 100.0
SPCH-1265	CHARCOAL CANISTER	Mar 2000	I-131(g)	< 7.00		< 9.6
SPMI-1292	MILK	Mar 2000	I-131	< 0.32	0.05 ± 0.18	< 0.5
SPMI-1292	MILK	Mar 2000	I-131(g)	< 4.60		< 20.0
SPW-1302	WATER	Mar 2000	I-131	< 0.30	0.01 ± 0.14	< 0.5
SPW-1479	WATER	Mar 2000	Gr. Alpha	< 0.84	-0.32 ± 0.53	< 1.0
SPW-1479	WATER	Mar 2000	Gr. Beta	< 1.86	-1.39 ± 1.19	< 3.2
SPW-1479	WATER	Mar 2000	Ra-226	< 0.01	0.06 ± 0.01	< 1.0
SPW-1479	WATER	Mar 2000	Ra-228	< 1.00	1.17 ± 0.60	< 2.0
SPMI-2276	MILK	Apr 2000	Cs-134	< 4.20		< 10.0
SPMI-2276	MILK	Apr 2000	Cs-137	< 3.33		< 10.0
SPMI-2276	MILK	Apr 2000	I-131	< 0.50	0.32 ± 0.30	< 0.5
SPW-2280	WATER	Apr 2000	Co-60	< 2.78		< 10.0
SPW-2280	WATER	Apr 2000	Cs-134	< 3.56		< 10.0

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a .		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPW-2280	WATER	Apr 2000	Cs-137	< 2.81		< 10.0
SPW-2280	WATER	Apr 2000	Gr. Alpha	< 0.60	0.55 ± 0.45	< 1.0
SPW-2280	WATER	Apr 2000	Gr. Beta	< 1.66	0.62 ± 1.11	< 3.2
SPW-2280	WATER	Apr 2000	I-131	< 0.29	-0.16 ± 0.19	< 0.5
SPW-2280	WATER	Apr 2000	I-131(g)	< 3.42		< 20.0
SPW-2280	WATER	Apr 2000	Ra-226		0.03 ± 0.01	< 1.0
SPW-2280	WATER	Apr 2000	Ra-228	< 0.87	0.65 ± 0.47	< 2.0
SPW-2282	WATER	Apr 2000	H-3	< 151.60	-5.40 ± 74.90	< 200.0
SPAP-3098	AIR FILTER	Apr 2000	Cs-137	< 1.37		< 100.0
SPW-3096	WATER	May 2000	Gr. Alpha	< 0.68		< 1.0
SPW-3096	WATER	May 2000	Gr. Beta	< 1.62		< 3.2
SPW-3096	WATER	May 2000	Ra-226		0.05 ± 0.01	< 1.0
SPW-3096	WATER	May 2000	Ra-228	< 0.90	0.05 ± 0.01	< 2.0
SPAP-273	AIR FILTER	May 2000	Gr. Beta	< 0.54	0.90 ± 0.32	< 3.2
SPMI-3139	MILK	May 2000	I-131	< 0.33		< 0.5
SPF-3181	FISH	May 2000	Cs-134	< 3.02		< 100.0
SPF-3181	FISH	May 2000	Cs-137	< 4.99		< 100.0
SPAP-3903	AIR FILTER	Jun 2000	Gr. Beta	< 0.48		< 3.2
SPW-3912	WATER	Jun 2000	Gr. Alpha	< 0.35	0.28 ± 0.28	< 1.0
SPW-3912	WATER	Jun 2000	Gr. Beta	< 1.22	0.54 ± 0.86	< 3.2
SPW-3912	WATER	Jun 2000	Ra-226		0.04 ± 0.02	< 1.0
SPW-3912	WATER	Jun 2000	Ra-228	< 0.65		< 2.0
SPMI-4343	MILK	Jun 2000	Sr-89	< 0.73		< 5.0
SPMI-4343	MILK	Jun 2000	Sr-90	< 0.56		< 1.0
SPW-4689	WATER	Jul 2000	Ra-226		0.03 ± 0.01	< 1.0
SPW-4689	WATER	Jul 2000	Ra-228	< 0.93	1.11 ± 0.55	< 2.0
SPW-4690	WATER	Jul 2000	H-3	< 178.00	18.57 ± 89.13	< 200.0
SPW-4808	WATER	Jul 2000	Gr. Alpha	< 0.45		< 1.0
SPAP-4810	AIR FILTER	Jul 2000	Cs-137	< 2.18		< 100.0
SPMI-4857	MILK	Jul 2000	Cs-137	< 6.13		< 10.0
SPMI-4857	MILK	Jul 2000	I-131(g)	< 7.19		< 20.0

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a .		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPMI-4857	MILK	Jul 2000	Sr-89	< 0.66		< 5.0
SPMI-4857	MILK	Jul 2000	Sr-90		1.15 ± 0.32	< 1.0
Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.						
SPF-5183	FISH	Jul 2000	Cs-134	< 17.71		< 100.0
SPF-5183	FISH	Jul 2000	Cs-137	< 12.81		< 100.0
SPW-4689	WATER	Jul 2000	Gr. Alpha	< 0.50		< 1.0
SPW-4689	WATER	Jul 2000	Gr. Beta	< 1.20		< 3.2
SPW-5373	WATER	Jul 2000	Co-60	< 5.20		< 10.0
SPW-5373	WATER	Jul 2000	Cs-134	< 4.80		< 10.0
SPW-5373	WATER	Jul 2000	Cs-137	< 4.00		< 10.0
SPW-5565	WATER	Aug 2000	Sr-89	< 1.56	-0.64 ± 1.11	< 5.0
SPW-5565	WATER	Aug 2000	Sr-90	< 0.59	0.17 ± 0.30	< 1.0
SPW-5793	WATER	Aug 2000	Gr. Alpha	< 0.51	0.02 ± 0.36	< 1.0
SPW-5793	WATER	Aug 2000	Ra-226		0.05 ± 0.02	< 1.0
SPW-5793	WATER	Aug 2000	Ra-228	< 0.95	0.26 ± 0.47	< 2.0
SPW-5793	WATER	Aug 2000	Gr. Beta	< 1.40	-0.13 ± 1.01	< 3.2
SPW-6634	WATER	Sep 2000	Fe-55	< 617.00	-105.90 ± 453.40	< 1000.0
SPW-6634	WATER	Sep 2000	Ra-226	< 0.01	0.03 ± 0.01	< 1.0
SPW-6634	WATER	Sep 2000	Ra-228	< 0.99	0.36 ± 0.51	< 2.0
SPW-6634	WATER	Sep 2000	Gr. Alpha	< 0.67	-0.22 ± 0.45	< 1.0
SPW-6634	WATER	Sep 2000	Gr. Beta	< 1.60	-0.20 ± 1.12	< 3.2
SPSO-10595	SOIL	Oct 2000	Cs-134	< 16.87		< 100.0
SPSO-10595	SOIL	Oct 2000	Cs-137	< 9.40		< 100.0
SPW-7746	WATER	Oct 2000	Ra-226	< 0.03	0.04 ± 0.02	< 1.0
SPW-7746	WATER	Oct 2000	Ra-228	< 1.08	0.00 ± 0.87	< 2.0
SPW-7747	WATER	Oct 2000	H-3	< 158.00	-38.00 ± 77.00	< 200.0
SPAP-7765	AIR FILTER	Oct 2000	Gr. Beta	< 0.64	0.00 ± 0.00	< 3.2
SPAP-7767	AIR FILTER	Oct 2000	Co-60	< 0.19		< 100.0
SPAP-7767	AIR FILTER	Oct 2000	Cs-134	< 0.32		< 100.0
SPAP-7767	AIR FILTER	Oct 2000	Cs-137	< 2.32		< 100.0
SPMI-8348	MILK	Oct 2000	Cs-134	< 3.35		< 10.0
SPMI-8348	MILK	Oct 2000	Cs-137	< 3.07		< 10.0

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L ^a		
				Laboratory results (4.66 Sigma)		Acceptance Criteria (4.66 Sigma)
				LLD	Activity ^b	
SPF-8350	FISH	Oct 2000	Cs-134	< 10.26		< 100.0
SPF-8350	FISH	Oct 2000	Cs-137	< 10.51		< 100.0
SPW-8370	WATER	Oct 2000	Co-60	< 4.67		< 10.0
SPW-8370	WATER	Oct 2000	Cs-134	< 5.28		< 10.0
SPW-8370	WATER	Oct 2000	Cs-137	< 4.93		< 10.0
SPW-7746	WATER	Oct 2000	Gr. Alpha	< 0.46	0.06 ± 0.33	< 1.0
SPW-7746	WATER	Oct 2000	Gr. Beta	< 1.24	0.00 ± 0.87	< 3.2
SPW-9103	WATER	Nov 2000	Ra-226	< 0.01	0.02 ± 0.01	< 1.0
SPW-9103	WATER	Nov 2000	Ra-228	< 1.00	0.14 ± 0.48	< 2.0
SPW-9729	WATER	Dec 2000	Gr. Alpha	< 0.46	0.23 ± 0.36	< 1.0
SPW-9729	WATER	Dec 2000	Gr. Beta	< 1.33	-0.46 ± 0.98	< 3.2
SPW-9729	WATER	Dec 2000	Ra-226	< 0.02	0.05 ± 0.01	< 1.0
SPW-9729	WATER	Dec 2000	Ra-228	< 0.70	0.22 ± 0.35	< 2.0
SPW-9103	WATER	Dec 2000	Gr. Alpha	< 0.51	-0.11 ± 0.37	< 1.0
SPW-9103	WATER	Dec 2000	Gr. Beta	< 1.21	0.55 ± 0.91	< 3.2
SPCH-10583	CHARCOAL CANISTER	Dec 2000	I-131(g)	< 1.49		< 9.6

^a Liquid sample results are reported in pCi/Liter, air filter sample results are in pCi/filter, charcoal sample results are in pCi/charcoal, and solid sample results are in pCi/kilogram.

^b The activity reported is the net activity result.

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
CF-23, 24	Jan, 2000	Gr. Beta	13.05 ± 0.39	12.46 ± 0.36	12.75 ± 0.26
CF-23, 24	Jan, 2000	K-40	13.00 ± 0.90	11.73 ± 0.79	12.36 ± 0.60
CF-23, 24	Jan, 2000	Sr-90	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00
WW-65, 66	Jan, 2000	Co-60	-0.53 ± 1.62	0.44 ± 2.11	-0.04 ± 1.33
WW-65, 66	Jan, 2000	Cs-137	-2.13 ± 1.70	0.41 ± 2.35	-0.86 ± 1.45
WW-65, 66	Jan, 2000	H-3	131.62 ± 84.13	182.81 ± 86.33	157.22 ± 60.27
WW-686, 687	Jan, 2000	Gr. Beta	4.76 ± 1.22	4.59 ± 1.27	4.67 ± 0.88
AP-1204, 1205	Jan, 2000	Be-7	0.19 ± 0.09	0.10 ± 0.07	0.14 ± 0.06
SW-68, 69	Jan, 2000	K-40 (FP)	1.30 ± 0.13	1.30 ± 0.13	1.30 ± 0.09
MI-277, 278	Jan, 2000	I-131	-0.08 ± 0.27	-0.00 ± 0.26	-0.04 ± 0.19
MI-277, 278	Jan, 2000	K-40	1,664.70 ± 113.20	1,431.30 ± 90.30	1,548.00 ± 72.40
MI-277, 278	Jan, 2000	Sr-90	0.63 ± 0.42	0.51 ± 0.40	0.57 ± 0.29
SW-728, 729	Jan, 2000	Co-60	0.39 ± 1.79	1.04 ± 1.53	0.72 ± 1.18
SW-728, 729	Jan, 2000	Cs-137	-0.67 ± 1.86	1.22 ± 1.38	0.27 ± 1.16
SW-403, 404	Jan, 2000	H-3	795.21 ± 109.04	857.22 ± 111.09	826.22 ± 77.83
SWT-437, 438	Jan, 2000	Gr. Beta	1.73 ± 0.57	2.60 ± 0.58	2.16 ± 0.41
PW-637, 638	Jan, 2000	Co-60	4.90 ± 2.92	-2.56 ± 2.80	1.17 ± 2.02
PW-637, 638	Jan, 2000	Cs-137	2.73 ± 2.51	-1.68 ± 2.71	0.53 ± 1.85
PW-637, 638	Jan, 2000	Gr. Beta	1.67 ± 1.31	4.00 ± 1.59	2.83 ± 1.03
SW-587, 588	Jan, 2000	Co-60	-1.24 ± 1.86	-0.27 ± 1.79	-0.76 ± 1.29
SW-587, 588	Jan, 2000	Cs-137	1.35 ± 1.94	0.23 ± 1.80	0.79 ± 1.32
SW-587, 588	Jan, 2000	Gr. Beta	3.80 ± 1.56	6.76 ± 1.75	5.28 ± 1.17
SW-611, 612	Jan, 2000	H-3	2,229.26 ± 158.61	2,115.19 ± 155.80	2,172.23 ± 111.16
SW-459, 460	Feb, 2000	Gr. Beta	2.15 ± 0.94	2.79 ± 0.94	2.47 ± 0.66
WW-774, 775	Feb, 2000	Co-60	4.26 ± 3.48	1.61 ± 4.46	2.93 ± 2.83
WW-774, 775	Feb, 2000	Cs-137	-1.19 ± 3.78	2.37 ± 4.65	0.59 ± 2.99
WW-774, 775	Feb, 2000	H-3	2,841.35 ± 174.48	2,566.76 ± 168.19	2,704.05 ± 121.17
SW-707, 708	Feb, 2000	Gr. Alpha	2.20 ± 1.73	0.16 ± 1.29	1.18 ± 1.08
SW-707, 708	Feb, 2000	Gr. Beta	7.90 ± 1.70	7.70 ± 1.70	7.80 ± 1.20
SW-707, 708	Feb, 2000	H-3	117.00 ± 92.00	69.00 ± 90.00	93.00 ± 64.35
CW-854, 855	Feb, 2000	Gr. Beta	2.13 ± 1.36	1.34 ± 1.25	1.74 ± 0.93
SW-881, 882	Feb, 2000	H-3	1,794.91 ± 145.81	1,762.31 ± 144.95	1,778.61 ± 102.80
SW-959, 960	Feb, 2000	Gr. Alpha	1.04 ± 1.00	0.92 ± 0.67	0.98 ± 0.60
SW-959, 960	Feb, 2000	Gr. Beta	1.24 ± 0.89	1.79 ± 0.90	1.51 ± 0.63
PW-1055, 1056	Feb, 2000	Co-60	-0.72 ± 3.18	1.73 ± 1.89	0.51 ± 1.85
PW-1055, 1056	Feb, 2000	Cs-137	0.55 ± 2.81	0.90 ± 1.86	0.72 ± 1.69
PW-1055, 1056	Feb, 2000	Gr. Beta	2.40 ± 1.52	2.20 ± 1.50	2.30 ± 1.07

Table A-5. In-house “duplicate” samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
MI-1079, 1080	Mar, 2000	Calcium	0.79 ± 0.08	0.78 ± 0.08	0.79 ± 0.06
MI-1079, 1080	Mar, 2000	K-40	1,229.00 ± 138.00	1,387.00 ± 162.00	1,308.00 ± 106.40
MI-1079, 1080	Mar, 2000	Sr-90	0.90 ± 0.40	1.70 ± 0.50	1.30 ± 0.32
CW-1156, 1157	Mar, 2000	H-3	1,994.51 ± 143.09	2,012.54 ± 143.55	2,003.53 ± 101.34
SW-1967, 1968	Mar, 2000	Gr. Beta	11.96 ± 1.31	12.57 ± 1.31	12.27 ± 0.93
SW-2468, 2469	Mar, 2000	Sr-90	0.93 ± 0.45	0.50 ± 0.29	0.72 ± 0.27
WW-1402, 1403	Mar, 2000	H-3	93.34 ± 97.05	60.63 ± 95.75	76.98 ± 68.17
LW-1269, 1270	Mar, 2000	Gr. Beta	1.97 ± 0.57	3.22 ± 0.69	2.60 ± 0.45
MI-1541, 1542	Mar, 2000	K-40	1,380.00 ± 122.00	1,476.00 ± 158.00	1,428.00 ± 99.81
AP-2113, 2114	Mar, 2000	Be-7	0.06 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
CW-1571, 1572	Mar, 2000	Gr. Beta	2.29 ± 1.48	1.35 ± 1.27	1.82 ± 0.98
CW-1693, 1694	Mar, 2000	Gr. Beta	0.56 ± 1.18	1.91 ± 1.49	1.24 ± 0.95
SWT-1821, 1822	Mar, 2000	Gr. Beta	2.36 ± 0.65	2.01 ± 0.57	2.19 ± 0.43
WW-1916, 1917	Mar, 2000	H-3	25.37 ± 90.21	3.90 ± 89.27	14.63 ± 63.46
AP-2155, 2156	Mar, 2000	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
SWU-2547, 2548	Mar, 2000	Sr-90	0.57 ± 0.24	0.55 ± 0.24	0.56 ± 0.17
CW-1798, 1799	Mar, 2000	Gr. Beta	2.73 ± 1.85	0.76 ± 1.71	1.75 ± 1.26
AP-2176, 2177	Mar, 2000	Be-7	0.06 ± 0.01	0.08 ± 0.02	0.07 ± 0.01
WW-2046, 2047	Mar, 2000	H-3	221.85 ± 101.64	185.19 ± 100.24	203.52 ± 71.38
SW-1967, 1968	Apr, 2000	K-40	9.20 ± 0.90	9.10 ± 0.90	9.15 ± 0.64
SW-2241, 2242	Apr, 2000	Gr. Alpha	2.49 ± 1.44	3.15 ± 1.53	2.82 ± 1.05
SW-2241, 2242	Apr, 2000	Gr. Beta	8.37 ± 1.36	7.20 ± 1.29	7.79 ± 0.94
WW-2342, 2343	Apr, 2000	Gr. Beta	4.20 ± 0.64	4.68 ± 0.73	4.44 ± 0.49
WW-2711, 2712	Apr, 2000	Cs-137	-0.76 ± 2.19	1.43 ± 3.63	0.34 ± 2.12
WW-2711, 2712	Apr, 2000	H-3	3,877.05 ± 192.54	3,951.88 ± 193.99	3,914.46 ± 136.66
WW-2511, 2512	Apr, 2000	H-3	108.10 ± 79.80	127.80 ± 80.70	117.95 ± 56.75
SO-2435, 2436	Apr, 2000	K-40	4.73 ± 0.38	4.83 ± 0.53	4.78 ± 0.33
SS-2669, 2670	Apr, 2000	K-40	8.60 ± 0.55	9.18 ± 0.45	8.89 ± 0.36
SWU-2732, 2733	Apr, 2000	Gr. Beta	3.33 ± 0.68	3.19 ± 0.69	3.26 ± 0.48
PW-2605, 2606	Apr, 2000	Co-60	0.36 ± 1.10	1.05 ± 2.03	0.71 ± 1.16
PW-2605, 2606	Apr, 2000	Cs-137	-0.07 ± 0.93	-0.98 ± 2.37	-0.53 ± 1.27
PW-2605, 2606	Apr, 2000	Gr. Beta	1.51 ± 1.31	2.91 ± 1.39	2.21 ± 0.96
WW-2711, 2712	Apr, 2000	H-3	3,877.00 ± 192.50	3,951.90 ± 194.00	3,914.45 ± 136.65
WW-2711, 2712	Apr, 2000	Co-60	0.97 ± 1.93	0.82 ± 3.64	0.90 ± 2.06
BS-3212, 3213	Apr, 2000	Gr. Beta	7.90 ± 1.97	7.57 ± 1.88	7.74 ± 1.36
MI-2810, 2811	May, 2000	K-40	1,285.00 ± 111.00	1,338.00 ± 127.00	1,311.50 ± 84.34
SW-3003, 3004	May, 2000	Gr. Beta	5.06 ± 0.73	5.27 ± 0.73	5.17 ± 0.52

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
SW-3003, 3004	May, 2000	K-40	1.30 ± 0.13	1.20 ± 0.12	1.25 ± 0.09
F-2831, 2832	May, 2000	Co-60	0.01 ± 0.01	0.00 ± 0.01	0.01 ± 0.01
F-2831, 2832	May, 2000	Cs-137	-0.00 ± 0.01	0.00 ± 0.01	0.00 ± 0.01
WW-3128, 3129	May, 2000	Gr. Beta	5.41 ± 1.35	4.43 ± 1.22	4.92 ± 0.91
BS-3411, 3412	May, 2000	Co-60	-0.00 ± 0.01	0.01 ± 0.01	0.00 ± 0.01
BS-3411, 3412	May, 2000	Cs-137	0.01 ± 0.01	0.00 ± 0.01	0.00 ± 0.00
F-3436, 3437	May, 2000	Co-60	0.01 ± 0.01	0.00 ± 0.01	0.01 ± 0.00
F-3436, 3437	May, 2000	Cs-137	0.00 ± 0.01	-0.00 ± 0.00	-0.00 ± 0.00
F-2978, 2979	May, 2000	K-40	2.72 ± 0.26	2.14 ± 0.30	2.43 ± 0.20
SS-3482, 3483	May, 2000	Cs-137	0.11 ± 0.03	0.12 ± 0.03	0.12 ± 0.02
SS-3482, 3483	May, 2000	K-40	11.26 ± 0.57	11.37 ± 0.54	11.32 ± 0.39
BS-3458, 3459	May, 2000	Co-60	0.01 ± 0.01	0.02 ± 0.01	0.01 ± 0.01
BS-3458, 3459	May, 2000	Cs-137	0.04 ± 0.01	0.03 ± 0.02	0.03 ± 0.01
MI-3510, 3511	May, 2000	Co-60	0.48 ± 3.05	-0.80 ± 2.74	-0.16 ± 2.05
MI-3510, 3511	May, 2000	Cs-137	1.17 ± 2.96	0.38 ± 2.60	0.77 ± 1.97
MI-3510, 3511	May, 2000	I-131	-0.06 ± 0.25	-0.04 ± 0.24	-0.05 ± 0.17
SO-3629, 3630	May, 2000	Cs-137	0.23 ± 0.03	0.20 ± 0.03	0.22 ± 0.02
SO-3629, 3630	May, 2000	Gr. Beta	20.49 ± 2.82	19.14 ± 2.73	19.82 ± 1.96
SO-3629, 3630	May, 2000	K-40	13.03 ± 0.61	12.25 ± 0.57	12.64 ± 0.42
SW-3904, 3905	May, 2000	Gr. Beta	6.27 ± 1.83	7.02 ± 1.90	6.65 ± 1.32
SW-3904, 3905	May, 2000	Co-60	-0.65 ± 1.54	1.32 ± 1.77	0.33 ± 1.17
SW-3904, 3905	May, 2000	Cs-137	0.19 ± 1.22	-0.16 ± 1.15	0.01 ± 0.84
SW-3904, 3905	May, 2000	Gr. Beta	6.27 ± 1.83	7.02 ± 1.90	6.64 ± 1.32
SP-3833, 3834	May, 2000	Gr. Alpha	4.19 ± 1.34	3.22 ± 1.20	3.71 ± 0.90
MI-3105, 3106	May, 2000	K-40	1,460.00 ± 173.00	1,452.00 ± 110.00	1,456.00 ± 102.50
VE-3191, 3192	May, 2000	Be-7	0.42 ± 0.23	0.39 ± 0.16	0.40 ± 0.14
VE-3191, 3192	May, 2000	Gr. Alpha	0.15 ± 0.06	0.28 ± 0.07	0.22 ± 0.05
VE-3191, 3192	May, 2000	Gr. Beta	3.76 ± 0.13	3.88 ± 0.14	3.82 ± 0.10
VE-3191, 3192	May, 2000	K-40	3.58 ± 0.43	3.47 ± 0.72	3.53 ± 0.42
MI-3718, 3719	May, 2000	K-40	1,447.00 ± 165.00	1,444.00 ± 177.00	1,445.50 ± 120.99
DW-3770, 3771	May, 2000	Gr. Beta	5.92 ± 1.32	4.54 ± 1.10	5.23 ± 0.86
MI-3653, 3654	Jun, 2000	K-40	1,407.00 ± 170.00	1,388.00 ± 102.00	1,397.50 ± 99.13
SW-4614, 4615	Jun, 2000	Sr-90	0.50 ± 0.27	0.55 ± 0.27	0.53 ± 0.19
WW-3883, 3884	Jun, 2000	H-3	4,401.80 ± 204.60	4,298.00 ± 202.70	4,349.90 ± 144.00
WW-3883, 3884	Jun, 2000	Co-60	0.91 ± 3.01	-0.28 ± 1.52	0.32 ± 1.69
WW-3883, 3884	Jun, 2000	Cs-137	0.49 ± 2.16	0.66 ± 1.82	0.57 ± 1.41
WW-3883, 3884	Jun, 2000	H-3	4,401.78 ± 204.63	4,297.96 ± 202.67	4,349.87 ± 144.00

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
BS-3980, 3981	Jun, 2000	Cs-137	0.07 ± 0.02	0.08 ± 0.02	0.08 ± 0.01
BS-3980, 3981	Jun, 2000	Cs-137	0.06 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
BS-3980, 3981	Jun, 2000	K-40	1,458.60 ± 69.40	1,421.90 ± 52.20	1,440.25 ± 43.42
VE-4065, 4066	Jun, 2000	K-40	6.37 ± 0.54	6.34 ± 0.51	6.36 ± 0.37
WW-4252, 4253	Jun, 2000	H-3	705.40 ± 114.10	718.90 ± 114.60	712.15 ± 80.86
TSWU-4283, 4284	Jun, 2000	Gr. Beta	3.24 ± 0.63	3.11 ± 0.62	3.18 ± 0.44
F-4438, 4439	Jun, 2000	Gr. Beta	2.25 ± 0.06	2.13 ± 0.06	2.19 ± 0.04
SW-4459, 4460	Jun, 2000	H-3	532.20 ± 108.10	670.50 ± 112.90	601.35 ± 78.15
WW-4480, 4481	Jun, 2000	H-3	601.50 ± 99.50	573.10 ± 108.50	587.30 ± 73.61
SW-4375, 4376	Jun, 2000	Gr. Beta	4.53 ± 1.59	4.43 ± 1.54	4.48 ± 1.11
SW-4375, 4376	Jun, 2000	Cs-137	-0.09 ± 1.61	-0.43 ± 1.39	-0.26 ± 1.06
AP-4712, 4713	Jun, 2000	Be-7	0.07 ± 0.02	0.09 ± 0.02	0.08 ± 0.01
AP-4754, 4755	Jun, 2000	Be-7	0.06 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
SW-4537, 4538	Jun, 2000	H-3	584.10 ± 108.80	599.20 ± 109.30	591.65 ± 77.11
SL-4636, 4637	Jul, 2000	Be-7	0.93 ± 0.18	0.56 ± 0.12	0.75 ± 0.11
SL-4636, 4637	Jul, 2000	Gr. Beta	2.41 ± 0.32	2.69 ± 0.32	2.55 ± 0.23
SL-4636, 4637	Jul, 2000	K-40	1.25 ± 0.24	1.13 ± 0.30	1.19 ± 0.19
SL-4636, 4637	Jul, 2000	Sr-90	0.04 ± 0.02	0.05 ± 0.03	0.05 ± 0.02
G-4667, 4668	Jul, 2000	Be-7	0.93 ± 0.20	0.98 ± 0.31	0.96 ± 0.18
G-4667, 4668	Jul, 2000	Gr. Beta	6.16 ± 0.13	6.68 ± 0.14	6.42 ± 0.10
G-4667, 4668	Jul, 2000	K-40	7.72 ± 0.51	8.43 ± 0.83	8.08 ± 0.49
WW-4818, 4819	Jul, 2000	H-3	13.30 ± 77.10	29.70 ± 77.90	21.50 ± 54.80
MI-4839, 4840	Jul, 2000	K-40	1,313.00 ± 173.00	1,398.00 ± 161.00	1,355.50 ± 118.16
MI-4949, 4950	Jul, 2000	K-40	1,307.00 ± 56.00	1,346.00 ± 58.00	1,326.50 ± 40.31
LW-4991, 4992	Jul, 2000	Gr. Beta	2.78 ± 0.66	2.22 ± 0.55	2.50 ± 0.43
MI-4903, 4904	Jul, 2000	K-40	1,383.10 ± 193.20	1,328.00 ± 153.10	1,355.55 ± 123.25
MI-4881, 4882	Jul, 2000	K-40	1,538.40 ± 103.00	1,438.00 ± 125.30	1,488.20 ± 81.10
MI-4881, 4882	Jul, 2000	Sr-90	1.01 ± 0.37	1.38 ± 0.42	1.19 ± 0.28
G-5388, 5389	Jul, 2000	Be-7	1.64 ± 0.16	1.52 ± 0.21	1.58 ± 0.13
G-5388, 5389	Jul, 2000	K-40	5.51 ± 0.33	5.86 ± 0.49	5.69 ± 0.30
G-5388, 5389	Jul, 2000	Gr. Beta	5.64 ± 0.15	5.81 ± 0.15	5.73 ± 0.11
SWU-5473, 5474	Jul, 2000	Gr. Beta	3.50 ± 0.67	3.17 ± 0.61	3.34 ± 0.45
SW-5410, 5411	Jul, 2000	Gr. Beta	1.95 ± 0.81	1.89 ± 1.04	1.92 ± 0.66
PW-5550, 5551	Jul, 2000	Gr. Beta	0.71 ± 1.15	2.50 ± 1.49	1.61 ± 0.94
WW-5623, 5624	Jul, 2000	H-3	22,713.90 ± 429.00	22,265.50 ± 424.90	22,489.70 ± 301.90
MI-5529, 5530	Aug, 2000	K-40	1,396.80 ± 103.80	1,278.20 ± 117.50	1,337.50 ± 78.39
VE-5745, 5746	Aug, 2000	K-40	1.66 ± 0.32	1.93 ± 0.33	1.80 ± 0.23

Table A-5. In-house “duplicate” samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
MI-5808, 5809	Aug, 2000	K-40	1,261.90 ± 124.40	1,234.40 ± 152.80	1,248.15 ± 98.52
CW-6514, 6515	Aug, 2000	Gr. Beta	1.42 ± 0.37	1.44 ± 0.41	1.43 ± 0.28
MI-5933, 5934	Aug, 2000	Calcium	0.88 ± 0.09	0.89 ± 0.09	0.89 ± 0.06
MI-5933, 5934	Aug, 2000	Sr-90	3.29 ± 0.51	1.72 ± 0.47	2.51 ± 0.35
VE-6002, 6003	Aug, 2000	Sr-90	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
VE-6002, 6003	Aug, 2000	K-40	1.44 ± 0.23	1.78 ± 0.18	1.61 ± 0.14
PW-6209, 6210	Aug, 2000	H-3	528.20 ± 112.70	578.50 ± 114.50	553.35 ± 80.33
SW-6291, 6292	Aug, 2000	Gr. Beta	4.14 ± 1.58	1.95 ± 1.32	3.05 ± 1.03
WW-6312, 6313	Aug, 2000	H-3	7,804.20 ± 262.70	7,221.70 ± 253.80	7,512.95 ± 182.64
WW-5981, 5982	Aug, 2000	Gr. Beta	4.85 ± 0.78	5.87 ± 0.79	5.36 ± 0.56
PW-6341, 6342	Aug, 2000	Gr. Beta	2.45 ± 1.42	2.63 ± 1.37	2.54 ± 0.99
CW-6514, 6515	Aug, 2000	H-3	5,600.10 ± 226.80	5,434.30 ± 223.90	5,517.20 ± 159.35
MI-6409, 6410	Sep, 2000	I-131	-0.04 ± 0.23	0.19 ± 0.24	0.08 ± 0.17
MI-6409, 6410	Sep, 2000	K-40	1,367.80 ± 111.40	1,368.60 ± 107.50	1,368.20 ± 77.41
MI-6409, 6410	Sep, 2000	Sr-90	1.19 ± 0.35	0.80 ± 0.30	1.00 ± 0.23
MI-6542, 6543	Sep, 2000	K-40	1,298.00 ± 140.10	1,470.60 ± 139.70	1,384.30 ± 98.92
MI-6450, 6451	Sep, 2000	K-40	1,237.20 ± 102.10	1,328.10 ± 108.30	1,282.65 ± 74.42
MI-7102, 7103	Sep, 2000	I-131	-0.11 ± 0.23	-0.02 ± 0.25	-0.07 ± 0.17
MI-7102, 7103	Sep, 2000	K-40	1,473.10 ± 101.40	1,400.70 ± 168.60	1,436.90 ± 98.37
SWT-7262, 7263	Sep, 2000	Gr. Beta	3.45 ± 0.66	2.32 ± 0.57	2.89 ± 0.44
SWU-7283, 7284	Sep, 2000	Gr. Beta	2.75 ± 0.55	2.87 ± 0.56	2.81 ± 0.39
SWU-7283, 7284	Sep, 2000	H-3	197.76 ± 94.07	172.31 ± 93.00	185.04 ± 66.14
SW-7081, 7082	Sep, 2000	H-3	89.32 ± 92.99	42.38 ± 90.37	65.85 ± 64.83
AP-7685, 7686	Sep, 2000	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
AP-7706, 7707	Sep, 2000	Be-7	0.06 ± 0.01	0.05 ± 0.01	0.05 ± 0.01
SW-7482, 7483	Sep, 2000	Gr. Beta	5.31 ± 1.75	6.70 ± 1.85	6.01 ± 1.27
SP-7347, 7348	Sep, 2000	Gr. Alpha	6.12 ± 1.54	5.68 ± 1.49	5.90 ± 1.07
SW-7436, 7437	Sep, 2000	H-3	40.60 ± 79.90	72.00 ± 81.40	56.30 ± 57.03
CW-7748, 7749	Sep, 2000	Gr. Alpha	0.47 ± 0.28	0.65 ± 0.36	0.56 ± 0.23
CW-7748, 7749	Sep, 2000	Gr. Beta	2.35 ± 0.39	2.02 ± 0.38	2.19 ± 0.27
BS-7512, 7513	Oct, 2000	Cs-137	0.84 ± 0.06	0.79 ± 0.06	0.81 ± 0.04
BS-7512, 7513	Oct, 2000	Gr. Beta	13.52 ± 1.61	14.88 ± 1.80	14.20 ± 1.21
SL-7304, 7305	Oct, 2000	Gr. Beta	2.94 ± 0.23	2.90 ± 0.23	2.92 ± 0.17
SL-7304, 7305	Oct, 2000	K-40	1.14 ± 0.36	1.73 ± 0.58	1.44 ± 0.34
BS-7369, 7370	Oct, 2000	Cs-137	10.79 ± 4.96	20.04 ± 9.40	15.41 ± 5.31
SO-7950, 7951	Oct, 2000	Ac-228	0.66 ± 0.10	0.77 ± 0.10	0.72 ± 0.07
SO-7950, 7951	Oct, 2000	Bi-214	0.42 ± 0.06	0.57 ± 0.07	0.49 ± 0.05

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
SO-7950, 7951	Oct, 2000	Cs-137	0.20 ± 0.31	0.21 ± 0.04	0.20 ± 0.16
SO-7950, 7951	Oct, 2000	Gr. Beta	29.22 ± 1.98	28.02 ± 1.98	28.62 ± 1.40
SO-7950, 7951	Oct, 2000	K-40	21.36 ± 0.93	21.77 ± 0.89	21.56 ± 0.64
SO-7950, 7951	Oct, 2000	Pb-212	0.72 ± 0.12	0.92 ± 0.12	0.82 ± 0.09
SO-7950, 7951	Oct, 2000	Ra-226	1.21 ± 0.33	1.30 ± 0.31	1.26 ± 0.22
SO-7950, 7951	Oct, 2000	Tl-208	0.21 ± 0.04	0.25 ± 0.03	0.23 ± 0.02
VE-7554, 7555	Oct, 2000	Gr. Beta	0.73 ± 0.02	0.74 ± 0.02	0.74 ± 0.01
MI-7622, 7623	Oct, 2000	K-40	1,505.90 ± 142.70	1,453.60 ± 172.00	1,479.75 ± 111.74
F-8219, 8220	Oct, 2000	K-40	2.94 ± 0.22	3.39 ± 0.38	3.16 ± 0.22
WW-7844, 7845	Oct, 2000	H-3	-68.13 ± 74.09	84.23 ± 81.38	8.05 ± 55.03
WW-8240, 8241	Oct, 2000	Gr. Beta	0.35 ± 1.89	1.61 ± 2.28	0.98 ± 1.48
WW-8240, 8241	Oct, 2000	H-3	72.46 ± 92.95	38.87 ± 91.51	55.66 ± 65.22
BS-8170, 8171	Oct, 2000	Gr. Beta	11.96 ± 2.55	11.30 ± 2.39	11.63 ± 1.75
BS-8170, 8171	Oct, 2000	K-40	8.36 ± 0.46	8.76 ± 0.47	8.56 ± 0.33
MI-8085, 8086	Oct, 2000	Calcium	0.94	0.94	0.94
MI-8085, 8086	Oct, 2000	Sr-90	1.04 ± 0.35	0.75 ± 0.31	0.90 ± 0.24
MI-8149, 8150	Oct, 2000	K-40	1,358.10 ± 95.81	1,341.80 ± 178.00	1,349.95 ± 101.07
SO-8967, 8968	Oct, 2000	Be-7	1.25 ± 0.37	1.27 ± 0.35	1.26 ± 0.26
SO-8967, 8968	Oct, 2000	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.02
SO-8967, 8968	Oct, 2000	K-40	4.53 ± 0.66	4.46 ± 0.58	4.50 ± 0.44
MI-8522, 8523	Oct, 2000	I-131	-0.05 ± 0.23	0.18 ± 0.25	0.07 ± 0.17
RW-8623, 8624	Oct, 2000	Ag-110M	99.79 ± 18.18	118.64 ± 21.79	109.21 ± 14.19
RW-8623, 8624	Oct, 2000	Co-60	2.47 ± 0.10	2.56 ± 0.10	2.51 ± 0.07
RW-8623, 8624	Oct, 2000	Cs-134	228.46 ± 17.29	229.75 ± 13.39	229.11 ± 10.93
RW-8623, 8624	Oct, 2000	Cs-137	3.59 ± 0.20	3.79 ± 0.20	3.69 ± 0.14
RW-8623, 8624	Oct, 2000	Gr. Alpha	14.57 ± 5.86	8.07 ± 4.74	11.32 ± 3.77
RW-8623, 8624	Oct, 2000	H-3	785.70 ± 5.98	786.80 ± 5.97	786.25 ± 4.22
RW-8623, 8624	Oct, 2000	Mn-54	1.06 ± 0.20	1.31 ± 0.20	1.19 ± 0.14
RW-8623, 8624	Oct, 2000	Pu-238	1.24 ± 0.54	1.11 ± 0.47	1.17 ± 0.36
RW-8623, 8624	Oct, 2000	Pu-239/40	3.45 ± 0.88	3.42 ± 0.81	3.44 ± 0.60
RW-8623, 8624	Oct, 2000	Sr-90	0.92 ± 0.08	0.95 ± 0.10	0.94 ± 0.06
RW-8623, 8624	Oct, 2000	Zn-65	86.33 ± 46.77	137.07 ± 46.07	111.70 ± 32.82
SWU-8894, 8895	Oct, 2000	Gr. Beta	3.63 ± 0.62	2.45 ± 0.61	3.04 ± 0.43
MI-8802, 8803	Nov, 2000	I-131	-0.22 ± 0.24	-0.25 ± 0.26	-0.24 ± 0.18
MI-8802, 8803	Nov, 2000	K-40	1,340.50 ± 113.80	1,453.50 ± 100.50	1,397.00 ± 75.91
MI-8802, 8803	Nov, 2000	Sr-89	0.19 ± 1.31	0.61 ± 1.34	0.40 ± 0.94
MI-8802, 8803	Nov, 2000	Sr-90	1.10 ± 0.39	0.90 ± 0.38	1.00 ± 0.27

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L ^a		
			First Result	Second Result	Averaged Result
LW-8823, 8824	Nov, 2000	Gr. Beta	2.13 ± 0.55	1.59 ± 0.52	1.86 ± 0.38
VE-9014, 9015	Nov, 2000	Gr. Alpha	0.10 ± 0.06	0.15 ± 0.07	0.12 ± 0.05
VE-9014, 9015	Nov, 2000	Gr. Beta	5.59 ± 0.17	5.90 ± 0.19	5.74 ± 0.13
F-9469, 9470	Nov, 2000	Gr. Beta	5.51 ± 1.34	5.16 ± 1.12	5.34 ± 0.87
PW-9991, 9992	Nov, 2000	Gr. Beta	2.50 ± 0.01	3.49 ± 1.18	3.00 ± 0.59
SW-9991, 9992	Nov, 2000	Co-60	1.16 ± 1.70	-2.94 ± 3.39	-0.89 ± 1.89
SW-9991, 9992	Nov, 2000	Cs-134	-0.07 ± 1.85	2.27 ± 3.73	1.10 ± 2.08
SW-9991, 9992	Nov, 2000	Cs-137	-0.88 ± 1.67	3.84 ± 3.45	1.48 ± 1.92
DW-9682, 9683	Dec, 2000	Gr. Beta	1.61 ± 1.02	2.10 ± 0.94	1.86 ± 0.69
MI-9749, 9750	Dec, 2000	K-40	1,562.40 ± 118.70	1,495.90 ± 168.30	1,529.15 ± 102.97
MI-9776, 9777	Dec, 2000	K-40	1,185.90 ± 88.05	1,409.60 ± 175.80	1,297.75 ± 98.31
PW-10234, 10235	Dec, 2000	H-3	104.66 ± 93.36	110.62 ± 93.61	107.64 ± 66.11
DW-10302, 10303	Dec, 2000	Gr. Beta	2.23 ± 1.62	2.08 ± 1.62	2.16 ± 1.15
AP-10845, 10846	Dec, 2000	Co-60	-0.00 ± 0.00	0.00 ± 0.00	-0.00 ± 0.00
AP-10845, 10846	Dec, 2000	Cs-134	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
AP-10845, 10846	Dec, 2000	Cs-137	0.00 ± 0.00	-0.00 ± 0.00	0.00 ± 0.00
AP-10782, 10783	Dec, 2000	Be-7	0.21 ± 0.10	0.31 ± 0.14	0.26 ± 0.09
AP-10824, 10825	Dec, 2000	Be-7	0.06 ± 0.02	0.07 ± 0.01	0.06 ± 0.01
AP-10866, 10867	Dec, 2000	Co-60	0.00 ± 0.00	-0.00 ± 0.00	0.00 ± 0.00
AP-10866, 10867	Dec, 2000	Cs-134	-0.00 ± 0.00	0.00 ± 0.00	-0.00 ± 0.00
AP-10866, 10867	Dec, 2000	Cs-137	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
WW-10424, 10425	Dec, 2000	H-3	1,690.87 ± 137.81	1,551.48 ± 1,339.42	1,621.18 ± 673.25
SW-10596, 10597	Dec, 2000	H-3	445.47 ± 106.70	423.46 ± 105.87	434.47 ± 75.16
LW-10529, 10530	Dec, 2000	Gr. Beta	2.21 ± 0.45	2.06 ± 0.40	2.14 ± 0.30

^a All results are in pCi/L, except for elemental potassium (K) in milk, which are in mg/L.; air filter samples, which are in pCi/Filter; and food products, which are in mg/kg.

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		
				Laboratory result ^c	MAPEP Result ^d 1s, N=1	Control Limits
STSO-882	SOIL	Jan, 2000	Am-241	64.90 ± 6.49	61.10	42.77 - 79.43
STSO-882	SOIL	Jan, 2000	Co-57	721.10 ± 83.80	949.00	664.30 - 1,233.70
The MAPEP soil sample (STSO-882), as received, did not closely match a standard gamma geometry. The results for gamma-emitting isotopes are reanalyses, with a reduced sample size.						
STSO-882	SOIL	Jan, 2000	Co-60	1,264.40 ± 78.60	1,180.00	826.00 - 1,534.00
STSO-882	SOIL	Jan, 2000	Cs-134	969.30 ± 76.90	1,047.00	732.90 - 1,361.10
STSO-882	SOIL	Jan, 2000	Cs-137	944.00 ± 92.00	930.00	651.00 - 1,209.00
STSO-882	SOIL	Jan, 2000	K-40	811.70 ± 79.90	652.00	456.40 - 847.60
STSO-882	SOIL	Jan, 2000	Mn-54	1,103.30 ± 64.20	1,023.00	716.10 - 1,329.90
STSO-882	SOIL	Jan, 2000	Ni-63	711.00 ± 71.10	960.00	672.00 - 1,248.00
STSO-882	SOIL	Jan, 2000	Pu-239/40	67.90 ± 6.79	74.40	52.08 - 96.72
STSO-882	SOIL	Jan, 2000	Sr-90	345.00 ± 34.50	304.00	212.80 - 395.20
STSO-882	SOIL	Jan, 2000	U-233/4	62.90 ± 6.29	90.00	63.00 - 117.00
Incomplete dissolution of the sample is suspected. Results of reanalysis: U-233/234 67.3 ± 3.3 pCi/g, U-238 68.1 ± 8.9 pCi/g.						
STSO-882	SOIL	Jan, 2000	U-238	63.20 ± 6.32	93.00	65.10 - 120.90
STSO-882	SOIL	Jan, 2000	Zn-65	1,544.30 ± 61.50	1,540.00	1,078.00 - 2,002.00

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

^b All results are in Bq/kg or Bq/L as requested by the Department of Energy.

^c Unless otherwise indicated, laboratory results are given as the mean ± 1 standard deviations for three determinations.

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

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^e
				Laboratory result ^c	EML Result ^d	
STSO-870	SOIL	Mar, 2000	Ac-228	98.300 ± 7.100	97.600	0.79 - 1.75
STSO-870	SOIL	Mar, 2000	Bi-212	98.500 ± 15.100	106.000	0.42 - 1.22
STSO-870	SOIL	Mar, 2000	Bi-214	88.000 ± 3.800	86.700	0.75 - 1.42
STSO-870	SOIL	Mar, 2000	Cs-137	324.000 ± 5.000	339.000	0.83 - 1.32
STSO-870	SOIL	Mar, 2000	K-40	872.000 ± 34.000	811.000	0.78 - 1.53
STSO-870	SOIL	Mar, 2000	Pb-212	93.700 ± 2.700	97.300	0.74 - 1.33
STSO-870	SOIL	Mar, 2000	Pb-214	100.100 ± 3.700	86.500	0.65 - 1.45
STSO-870	SOIL	Mar, 2000	Pu-238	19.800 ± 3.000	18.600	0.52 - 2.84
STSO-870	SOIL	Mar, 2000	Pu-239/40	8.100 ± 1.700	7.000	0.69 - 1.74
STSO-870	SOIL	Mar, 2000	Sr-90	13.600 ± 3.100	20.200	0.60 - 3.66
STVE-871	VEGETATION	Mar, 2000	Am-241	9.800 ± 0.900	10.400	0.68 - 2.70
STVE-871	VEGETATION	Mar, 2000	Co-60	46.500 ± 2.100	52.800	0.69 - 1.46
STVE-871	VEGETATION	Mar, 2000	Cs-137	1,872.000 ± 46.000	1,380.000	0.80 - 1.40
STVE-871	VEGETATION	Mar, 2000	K-40	506.400 ± 28.000	521.000	0.79 - 1.42
STVE-871	VEGETATION	Mar, 2000	Pu-239/40	14.300 ± 1.500	15.500	0.68 - 1.59
STVE-871	VEGETATION	Mar, 2000	Sr-90	1,198.000 ± 85.000	1,780.000	0.50 - 1.33
STAP-872	AIR FILTER	Mar, 2000	Co-57	5.900 ± 0.100	5.310	0.65 - 1.39
STAP-872	AIR FILTER	Mar, 2000	Co-60	5.900 ± 0.100	5.320	0.75 - 1.32
STAP-872	AIR FILTER	Mar, 2000	Cs-137	7.500 ± 0.100	6.100	0.73 - 1.37
STAP-872	AIR FILTER	Mar, 2000	Gr. Alpha	3.300 ± 0.100	3.020	0.50 - 1.55
STAP-872	AIR FILTER	Mar, 2000	Gr. Beta	2.700 ± 0.100	2.420	0.72 - 1.67
STAP-872	AIR FILTER	Mar, 2000	Mn-54	31.800 ± 0.300	27.200	0.76 - 1.33
STAP-872	AIR FILTER	Mar, 2000	Pu-238	0.060 ± 0.030	0.080	0.74 - 1.40
STAP-872	AIR FILTER	Mar, 2000	Pu-239/40	0.090 ± 0.010	0.089	0.76 - 1.44
STAP-872	AIR FILTER	Mar, 2000	Ru-106	3.500 ± 1.000	2.010	0.59 - 1.30
Result within activity ± error margin.						
STAP-872	AIR FILTER	Mar, 2000	Sr-90	0.310 ± 0.160	0.242	0.61 - 1.93
STAP-872	AIR FILTER	Mar, 2000	Uranium	0.120 ± 0.010	0.126	0.80 - 3.35
STW-874	WATER	Mar, 2000	Am-241	1.700 ± 0.220	1.950	0.75 - 1.49
STW-874	WATER	Mar, 2000	Co-60	51.000 ± 1.200	48.900	0.80 - 1.20

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^e
				Laboratory result ^c	EML Result ^d	
STW-874	WATER	Mar, 2000	Cs-137	108.600 ± 1.800	103.000	0.80 - 1.26
STW-874	WATER	Mar, 2000	Fe-55	33.000 ± 1.200	33.100	0.44 - 1.53
STW-874	WATER	Mar, 2000	Gr. Alpha	1,217.000 ± 35.000	1,700.000	0.61 - 1.32
STW-874	WATER	Mar, 2000	Gr. Beta	792.000 ± 25.000	690.000	0.55 - 1.54
STW-874	WATER	Mar, 2000	H-3	147.000 ± 26.000	79.400	0.71 - 1.79
Analysis was repeated; result of reanalysis; 97.5 ± 11.6 Bq/l.						
STW-874	WATER	Mar, 2000	Ni-63	101.000 ± 6.000	112.000	0.25 - 1.75
STW-874	WATER	Mar, 2000	Pu-238	0.750 ± 0.170	0.944	0.78 - 1.25
STW-874	WATER	Mar, 2000	Pu-239/40	0.990 ± 0.090	0.918	0.80 - 1.39
STW-874	WATER	Mar, 2000	Sr-90	4.460 ± 0.990	3.390	0.75 - 1.50
STW-874	WATER	Mar, 2000	Uranium	0.270 ± 0.020	0.995	0.67 - 1.42
Result reported was for U-234. Result for U (total); 0.58 ± 0.02 pCi/L.						
STSO-885	SOIL	Sep, 2000	Ac-228	78.000 ± 1.500	80.200	0.80 - 1.50
STSO-885	SOIL	Sep, 2000	Bi-212	73.000 ± 3.300	80.500	0.45 - 1.23
STSO-885	SOIL	Sep, 2000	Bi-214	91.000 ± 4.000	83.300	0.78 - 1.50
STSO-885	SOIL	Sep, 2000	Cs-137	925.700 ± 14.200	1,020.000	0.80 - 1.29
STSO-885	SOIL	Sep, 2000	K-40	713.600 ± 7.100	713.000	0.80 - 1.37
STSO-885	SOIL	Sep, 2000	Pb-212	66.100 ± 4.300	79.300	0.74 - 1.36
STSO-885	SOIL	Sep, 2000	Pb-214	100.100 ± 3.700	86.300	0.76 - 1.53
STSO-885	SOIL	Sep, 2000	Pu-239/40	18.400 ± 0.400	16.800	0.71 - 1.33
STSO-885	SOIL	Sep, 2000	Sr-90	39.900 ± 5.300	50.400	0.61 - 3.91
STSO-885	SOIL	Sep, 2000	Th-234	154.700 ± 9.300	148.000	0.68 - 2.36
STSO-885	SOIL	Sep, 2000	Uranium	254.300 ± 13.000	327.000	0.62 - 1.35
STW-886	WATER	Sep, 2000	Am-241	1.300 ± 0.200	1.190	0.76 - 1.48
STW-886	WATER	Sep, 2000	Co-60	71.900 ± 7.200	73.700	0.80 - 1.20
STW-886	WATER	Sep, 2000	Cs-137	62.700 ± 6.300	67.000	0.80 - 1.24
STW-886	WATER	Sep, 2000	H-3	92.300 ± 8.900	91.300	0.74 - 2.29
STW-886	WATER	Sep, 2000	Pu-238	0.700 ± 0.100	0.786	0.74 - 1.22
STW-886	WATER	Sep, 2000	Pu-239/40	0.600 ± 0.100	0.591	0.75 - 1.26
STW-886	WATER	Sep, 2000	Sr-90	4.600 ± 0.400	4.530	0.64 - 1.50

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^e
				Laboratory result ^c	EML Result ^d	
STW-886	WATER	Sep, 2000	Uranium	0.800 ± 0.100	0.916	0.73 - 1.37
STW-887	WATER	Sep, 2000	Gr. Alpha	1,113.700 ± 17.900	1,070.000	0.58 - 1.26
STW-887	WATER	Sep, 2000	Gr. Beta	1,129.400 ± 16.700	950.000	0.56 - 1.50
STAP-888	AIR FILTER	Sep, 2000	Am-241	0.060 ± 0.010	0.032	0.69 - 2.40
STAP-888	AIR FILTER	Sep, 2000	Co-57	16.500 ± 0.600	14.500	0.69 - 1.37
STAP-888	AIR FILTER	Sep, 2000	Co-60	9.200 ± 0.400	8.430	0.79 - 1.30
STAP-888	AIR FILTER	Sep, 2000	Cs-137	8.800 ± 0.500	7.410	0.78 - 1.35
STAP-888	AIR FILTER	Sep, 2000	Mn-54	50.200 ± 2.300	43.200	0.80 - 1.36
STAP-888	AIR FILTER	Sep, 2000	Pu-238	0.033 ± 0.010	0.045	0.66 - 1.35
STAP-888	AIR FILTER	Sep, 2000	Pu-239/40	0.080 ± 0.010	0.074	0.69 - 1.29
STAP-888	AIR FILTER	Sep, 2000	Sr-90	3.300 ± 0.100	1.640	0.55 - 2.05
STAP-888	AIR FILTER	Sep, 2000	U-233/4	0.034 ± 0.001	0.040	0.80 - 1.92
STAP-888	AIR FILTER	Sep, 2000	U-238	0.032 ± 0.010	0.041	0.80 - 1.59
Result within activity ± error margin.						
STAP-888	AIR FILTER	Sep, 2000	Uranium	0.070 ± 0.010	0.083	0.80 - 2.54
STAP-889	AIR FILTER	Sep, 2000	Gr. Alpha	2.840 ± 0.010	2.350	0.57 - 1.47
STAP-889	AIR FILTER	Sep, 2000	Gr. Beta	2.080 ± 0.020	1.520	0.76 - 1.52
STVE-890	VEGETATION	Sep, 2000	Am-241	5.900 ± 1.200	5.600	0.72 - 2.34
STVE-890	VEGETATION	Sep, 2000	Cm-244	3.200 ± 0.100	3.600	0.61 - 1.61
STVE-890	VEGETATION	Sep, 2000	Co-60	29.400 ± 0.400	32.800	0.75 - 1.51
STVE-890	VEGETATION	Sep, 2000	Cs-137	739.300 ± 23.000	867.000	0.80 - 1.37
STVE-890	VEGETATION	Sep, 2000	K-40	597.500 ± 49.300	639.000	0.78 - 1.43
STVE-890	VEGETATION	Sep, 2000	Pu-239/40	4.500 ± 0.200	9.600	0.67 - 1.49
No reason for deviation was found with original result. The result of reanalysis; 12.1 ± 1.1 Bq/kg.						
STVE-890	VEGETATION	Sep, 2000	Sr-90	1,201.500 ± 117.300	1,150.000	0.52 - 1.23

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)^a.

Lab Code	Sample Type	Date Collected	Analysis	Concentration ^b		Control Limits ^e
				Laboratory result ^c	EML Result ^d	

^a The Environmental Measurements Laboratory provides the following nuclear species : Air Filters, Soil, Vegetation and Water.

^b Results are reported in Bq/L with the following exceptions: Air Filter results are reported in Bq/Filter, Soil results are reported in Bq/Kg, Vegetation results are reported in Bq/Kg.

^c Laboratory results are reported as the mean of three determinations \pm standard deviation.

^d The EML result listed is the mean of replicate determinations for each nuclide \pm the standard error of the mean.

^e The control limits are reported by EML as the ratio of Reported Value / EML value.

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

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

In cases where the activity is less than the lower limit of detection L , it is reported as: $<L$, where L = the lower limit of detection based on $4.66s$ uncertainty for a background sample.

3.0. Duplicate analyses

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

- 4.5 In rounding off, the following rules are followed:

- 4.5.1. If the 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 equal to or greater than 5, the figure is dropped and the last retained figure is raised by 1. As an example, 11.445 is rounded off to 11.45.

APPENDIX C

Maximum Permissible Concentrations of Radioactivity in Air and Water Above Background in Unrestricted Areas

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

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

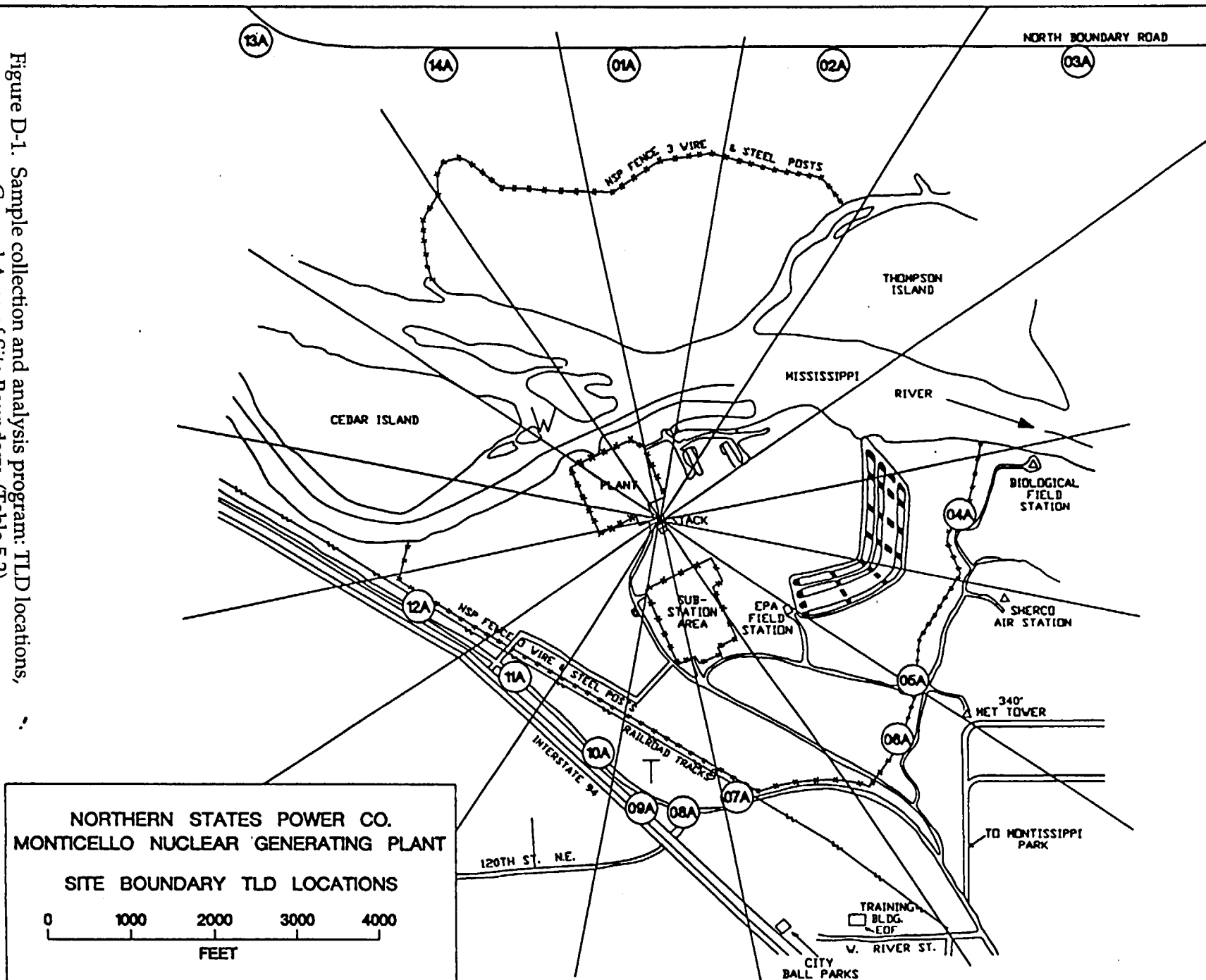
^a Taken from Table II of Appendix B to Code of Federal Regulations Title 10, Part 20, and appropriate footnotes. Concentrations may be averaged over a period not greater than one year.

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

^c A natural radionuclide.

APPENDIX D
Sampling Location Maps

Figure D-1. Sample collection and analysis program: TLD locations,
General Area of Site Boundary (Table 5.2).



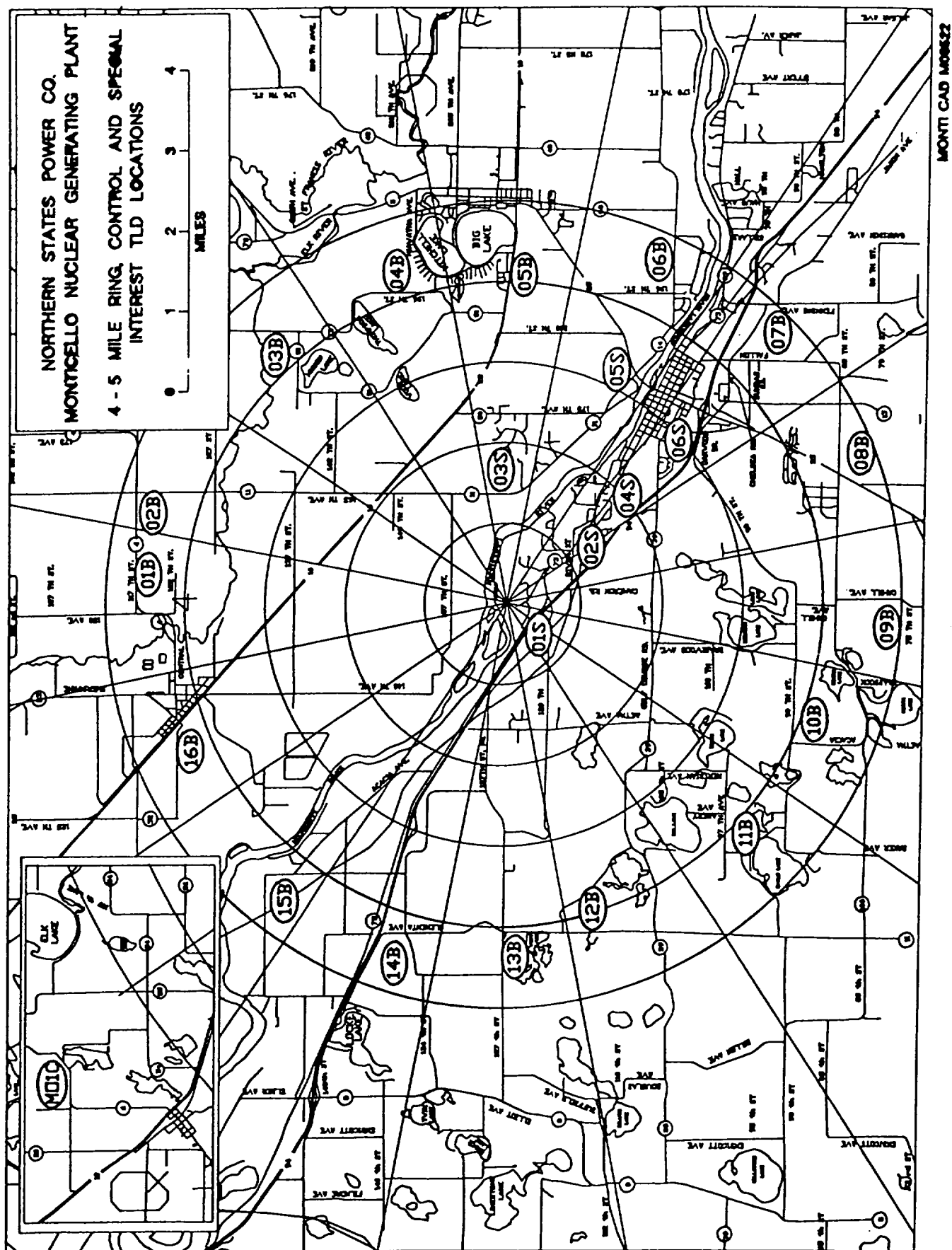


Figure D-2. Sample collection and analysis program: TLD locations, 4 to 5 miles Distant from the Plant, Control and Special Interest locations (Table 5.2).

