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Monticello Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

May 4, 2006

L-MT-06-031
Technical Specification 6.7.C.1

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Monticello Nuclear Generating Plant
Docket 50-263
License No. DPR-22

2005 Annual Radiological Environmental Operating Report

In accordance with the Monticello Nuclear Generating Plant Technical Specification 6.7.C.1, the Nuclear Management Company, LLC is submitting the Annual Radiological Environmental Operating Report for the year 2005.

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

John T. Conway
Site Vice President, Monticello Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
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ENCLOSURE 1

ANNUAL REPORT TO THE UNITED STATES NUCLEAR REGULATORY COMMISSION, RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM, JANUARY 1 TO DECEMBER 31, 2005

57 pages follow

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XCEL ENERGY CORPORATION

MONTICELLO NUCLEAR GENERATING PLANT
DOCKET NO. 50-263 LICENSE NO. DPR-22

ANNUAL REPORT
TO THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

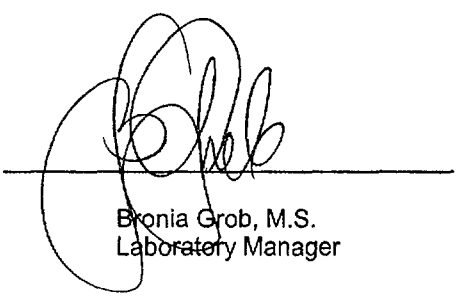
Radiological Environmental Monitoring Program

January 1 to December 31, 2005

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 Radiological Environmental Monitoring Program (REMP) conducted by Environmental, Inc., Midwest Laboratory for the Monticello Nuclear Generating Plant, Monticello, Minnesota, during the period January - December, 2005. This Program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the Plant on its surroundings.

Tabulation of the individual analyses made during the year are not included in this report. These data are included in a reference document (Environmental, Inc., Midwest Laboratory, 2006a) available at the Monticello Nuclear Generating Plant, Chemistry and Radiation Protection Department.

The 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 Radiological Environmental Monitoring Program (REMP) required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications and the Offsite Dose Calculation Manual (ODCM) for the Monticello Nuclear Generating Plant is described. Results for the year 2005 are summarized and discussed.

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

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

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

3.1 Program Design and Data Interpretation

The purpose of the Radiological 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 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.

Program Design and Data Interpretation (continued)

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 Radiological 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 REMP 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 determined by gamma spectroscopy. 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 $CaSO_4$: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. 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 liquid 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.

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.

Program Description (continued)

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) Surface water samples could not be collected from M-08 (upstream) for the weeks ending 01-05-05 through 03-16-05. The shoreline was frozen.

(2) No air particulate / air iodine sample was available from location M-2 for the week ending 05-11-05. The sampler pump failed.

(3) No air particulate / air iodine sample was available from location M-5 for the week ending 05-18-05. Power was interrupted due to an open fuse.

(4) Milk samples were not available from M-28 (Hoglund Farm) June 29th through October 5th, 2005. Dairy operations were temporarily discontinued. Collections were resumed on 10-20-05.

(5) No air particulate / air iodine sample was available from location M-4 for the week ending 09-14-05. The breaker was tripped due to lightning.

(6) The timer reading for air particulate / air iodine sampling from location M-3, for the week ending 09-28-05, showed a deficiency of approximately 15 hours.

(7) Bottom organisms from the upstream location M-8 were not available for the collection of 10-27-05.

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.

Gamma-spectroscopic analysis is performed using a high-purity germanium (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, 2003). 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 new program modifications in 2005.

3.6 Land Use Census

In accordance with the Offsite Dose Calculation Manual, sec. 07.01, 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 ft^2 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 ft^2 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 2005 land use census was conducted between August 29 and September 7, 2005.

An increased D/Q value (> 20%) was calculated for one nearest resident in the WNW sector. The change resulted from greater accuracy in measurement through the use of GPS location identification.

In summary, the highest D/Q locations for nearest garden, nearest residence and nearest milk animal did not change from the 2004 census.

Details of the land use census are contained in the Land Use Census and Critical Receptor Report, Monticello Nuclear Generating Plant, Chemistry and Radiation Protection 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 2005. 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/m^2 in 1969 and 12,000 pCi/m^2 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/m^3. Present day levels have stabilized at around 0.025 pCi/m^3. 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 four control locations. The means were similar for both inner and outer rings (15.6 and 15.2 mRem/91 days, respectively). The mean for special locations was 15.0 mRem/91 days. The mean for control locations was 15.1 mRem/91 days. Dose rates measured at the inner and outer ring locations were similar to those observed from 1990 through 2004 and are tabulated below. No plant effect on ambient gamma radiation is indicated (Figure 5-1).

Year	Inner Ring	Outer Ring
	Dose rate (mRem/91 days)	
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
2001	14.3	13.7
2002	15.9	14.8
2003	15.6	15.0
2004	16.0	15.4
2005	15.6	15.2

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 identical at indicator and control locations (0.025 pCi/m^3) and were similar to levels observed from 1990 through 2004. The results are tabulated below.

Year	Indicators	Control
	Concentration (pCi/m^3)	
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
2001	0.027	0.026
2002	0.028	0.028
2003	0.027	0.027
2004	0.024	0.024
2005	0.025	0.025

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 usually occur during the months of January and December, and the first and fourth quarters, as seen in 1990 through 2005.

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., 2005b).

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 0.057 pCi/m^3 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 0.03 pCi/m^3 in all samples.

Milk

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

One milk sample from location M-28 tested positive for Cs-137, at a concentration of 10.1 pCi/L. Low levels of cesium-137 are still detected in soil, and are generally attributed to fallout deposition. Ingestion of soil due to low grazing on pasture is the most likely source of Cs-137 activity in milk.

No other gamma-emitting isotopes except naturally-occurring potassium-40, were detected. 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. Common exceptions are radioisotopes of potassium, cesium, strontium, barium, and iodine.

In summary, the milk data for 2005 show no radiological effects of the plant operation.

River Water and Drinking Water

Tritium activity measured below the LLD of 500 pCi/L in all samples. Gross beta activity in Minneapolis drinking water averaged 2.8 pCi/L and was similar to average levels observed from 1990 through 2004. Gross beta averages are tabulated below.

Year		Gross Beta (pCi/L)
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
2001		2.5
2002		2.9
2003		3.0
2004		2.7
2005		2.8

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 500 pCi/L in all samples. All gamma isotopic results were below detection limits. There was no indication of a plant effect.

Crops

Cabbage and broccoli were collected in September from three locations and analyzed for iodine-131. Levels of I-131 measured below 0.031 pCi/g wet weight in both samples. Other gamma-emitting isotopes were below respective LLD levels. There was no indication of a plant effect.

There were no crops irrigated from the Mississippi River within 5 miles of the plant in 2005; 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 (3.07 and 3.11 pCi/g wet weight, respectively). All gamma-emitting isotopes were below their respective LLD levels. There was no indication of any plant effect.

Invertebrates

Samples were collected in May and October. The samples were analyzed for gamma-emitting isotopes. All gamma-emitting isotopes were below detection limits. There was no indication of any 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. Low levels of cesium-137 were detected in three of four downstream samples, averaging 0.14 pCi/g dry weight, and 0.029 pCi/g dry weight in one of two control samples. Similar levels of activity and distribution have been observed since 1978, and are indicative of the influence of fallout deposition The only other gamma-emitting isotope detected was naturally-occurring 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 No.	Location Codes (and Type)[a]	Collection Type and Frequency[b]	Analysis Type and Frequency[c]
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 5.2. 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 plant discharges radioactive effluent into the river, then only from river irrigated fields.

Table 5.2. Sampling locations, Monticello Nuclear Generating Plant.

Code	Type[a]	Collection Site	Sample Type[b]	Distance and Direction from Reactor
M-1	C	Air Station M-1	AP, AI	11.0 mi @ 307°/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	0.8 mi @ 146°/SSE
M-5		Air Station M-5	AP, AI	2.6 mi @ 134°/SE
M-8	C	Upstream of Plant	SW, SS, BO, F	< 1000' upstream of Plant Intake
M-9		Downstream of Plant	SW, SS, BO, F	< 1000' downstream of Plant Discharge
M-10	C	Campbell Farm	M, WW	10.6 mi @ 357°/N
M-11		City of Monticello	WW	3.3 mi @ 127°/SE
M-12		Plant Well #1	WW	0.26 mi @ 252°/SW
M-14		City of Minneapolis	DW	37.0 mi @ 132°/SE
M-15		Montissippi Park	SS	1.27 mi @ 114°/ESE
M-19		River Irrigated Corn Field[c]		
M-21		River Irrigated Potato Field[c]		
M-24		Weinand Farm	M	4.7 mi @ 180°/S
M-27		Wise residence (Highest D/Q Garden)	VE, WW	0.64 mi @ 207°/SSW
		a. Available Producer	VE	> 10.0 mi.
M-28		Hoglund Farm	M	3.8 mi @ 300°/WNW
General Area of the Site Boundary				
M-01A		Sherburne Ave. So.	TLD	0.75 mi @ 353°/N
M-02A		Sherburne Ave. So.	TLD	0.79 mi @ 23°/NNE
M-03A		Sherburne Ave. So.	TLD	1.29 mi @ 55°/NE
M-04A		Biology Station Road	TLD	0.5 mi @ 86°/E
M-05A		Biology Station Road	TLD	0.48 mi @ 118°/ESE
M-06A		Biology Station Road	TLD	0.54 mi @ 135°/SE
M-07A		County Road 75	TLD	0.5 mi @ 155°/SSE
M-08A		County Road 75	TLD	0.48 mi @ 172°/S
M-09A		County Road 75	TLD	0.38 mi @ 209°/SSW
M-10A		County Road 75	TLD	0.38 mi @ 226°/SW
M-11A		County Road 75	TLD	0.4 mi @ 239°/WSW
M-12A		County Road 75	TLD	0.5 mi @ 262°/W
M-13A		North Boundary Road	TLD	0.89 mi @ 324°/NW
M-14A		North Boundary Road	TLD	0.78 mi @ 334°/NNW

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

Code	Type[a]	Collection Site	Sample Type[b]	Distance and Direction from Reactor
Approximately 4 to 5 miles Distant from the Plant				
M-01B		Sherco #1 Air Station	TLD	4.66 mi @ 02°/N
M-02B		County Road 11	TLD	4.4 mi @ 18°/NNE
M-03B		County Road 73 & 81	TLD	4.3 mi @ 51°/NE
M-04B		County Road 73 (196th St.)	TLD	4.2 mi @ 67°/ENE
M-05B		City of Big Lake	TLD	4.3 mi @ 89°/E
M-06B		County Road 14 and 196th St.	TLD	4.3 mi @ 117°/ESE
M-07B		Monte Industrial Drive	TLD	4.3 mi @ 136°/SE
M-08B		Residence, Hwy 25 & Davidson Ave.	TLD	4.6 mi @ 162°/SSE
M-09B		Weinand Farm	TLD	4.7 mi @ 178°/S
M-10B		Reisewitz Farm, Acacia Ave.	TLD	4.2 mi @ 204°/SSW
M-11B		Vanlith Farm, 97th Ave.	TLD	4.0 mi @ 228°/SW
M-12B		Lake Maria State Park	TLD	4.2 mi @ 254°/WSW
M-13B		Bridgewater Station	TLD	4.1 mi @ 270°/W
M-14B		Anderson Residence, Cty Rd. 111	TLD	4.3 mi @ 289°/WNW
M-15B		Red Oak Wild Bird Farm	TLD	4.3 mi @ 309°/NW
M-16B		Sand Plain Research Farm	TLD	4.4 mi @ 341°/NNW
Special Interest Locations				
M-01S		Osowski Fun Market	TLD	0.66 mi @ 242°/WSW
M-02S		Krone Residence	TLD	0.5 mi @ 224°/SW
M-03S		Big Oaks Park	TLD	1.53 mi @ 102°/ESE
M-04S		Pinewood School	TLD	2.3 mi @ 131°/SE
M-05S		Rivercrest Christian Academy	TLD	3.0 mi @ 118°/ESE
M-06S		Monte Public Works	TLD	2.6 mi @ 134°/SE
M-01C	C	Kirchenbauer Farm	TLD	11.5 mi @ 323°/NW
M-02C	C	County Roads 4 and 15	TLD	11.2 mi @ 47°/NE
M-03C	C	County Rd 19 and Jason Ave.	TLD	11.6 mi @ 130°/SE
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	M	Milk
AI	Airborne Iodine	RW	River Water
BS	Bottom (river) sediments	SS	Shoreline Sediments
BO	Bottom organisms	TLD	Thermoluminescent Dosimeter
DW	Drinking Water	VE	Vegetation / vegetables
F	Fish	WW	Well Water

[c] Collected only if the plant discharges radioactive effluent into the river, then only from river irrigated fields.

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	M-08	01-05-05 through 03-16-05	Shoreline frozen	None required.
AP/AI	Beta, I-131	M-02	5/11/2005	Air sampler malfunction.	Sampler pump replaced.
AP/AI	Beta, I-131	M-05	5/18/2005	Air sampler failure due to open fuse.	Electrician checked sampler and replaced fuse.
MI	Gamma, I-131	M-28	6/29/2005 through 10/5/2005	Hoglund Dairy temporarily out of business for the summer.	Hoglund will inform the MNGP upon resumption of operation. Operation resumed 10/20/05.
AP/AI	Beta, I-131	M-04	9/14/2005	Breaker tripped during storm.	Reset breaker.
AP/AI	Beta, I-131	M-03	9/28/2005	Air sampler timer deficient by 15 hours.	Replaced timer.
BO	Gamma	M-08	10/27/2005	No sample available.	None required.

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

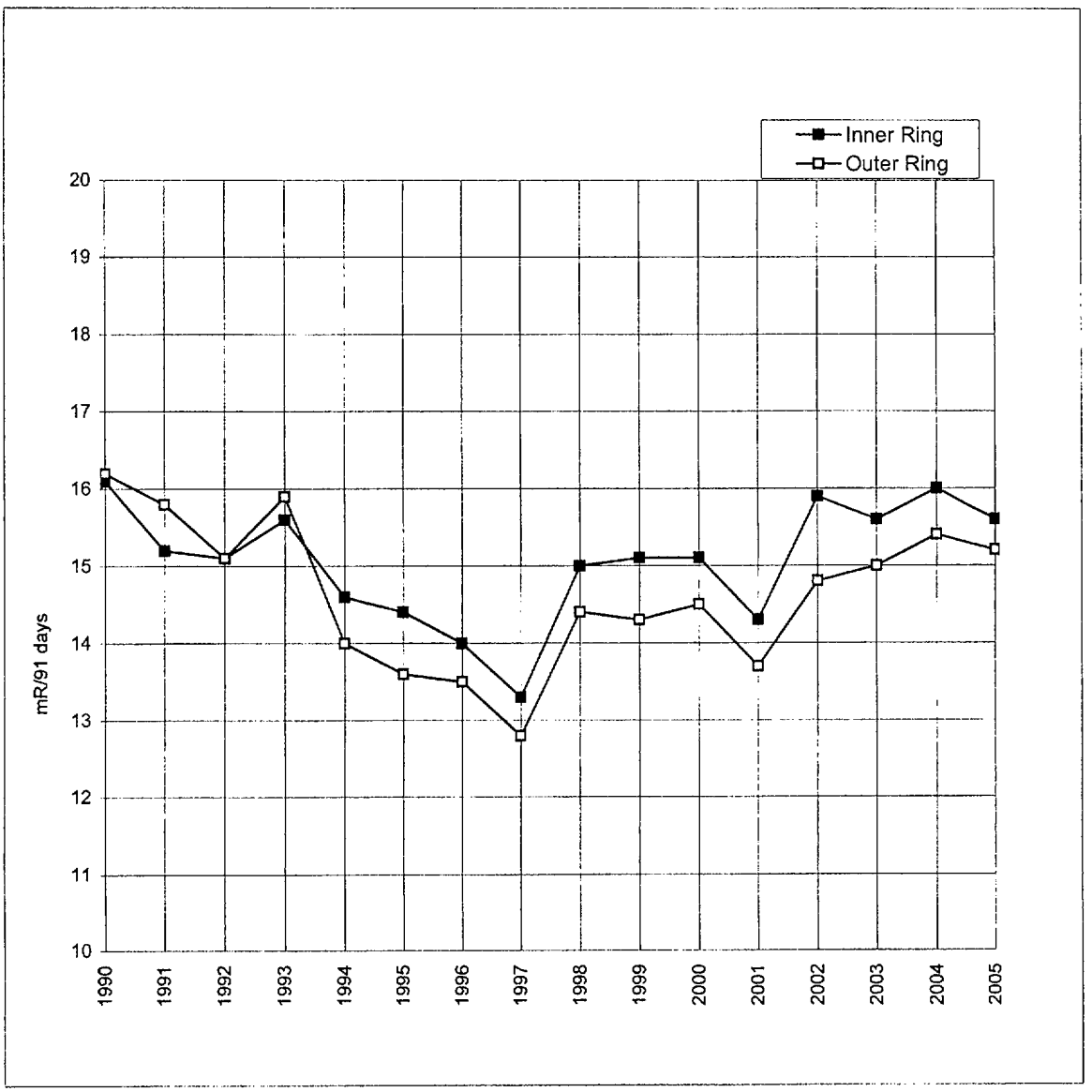
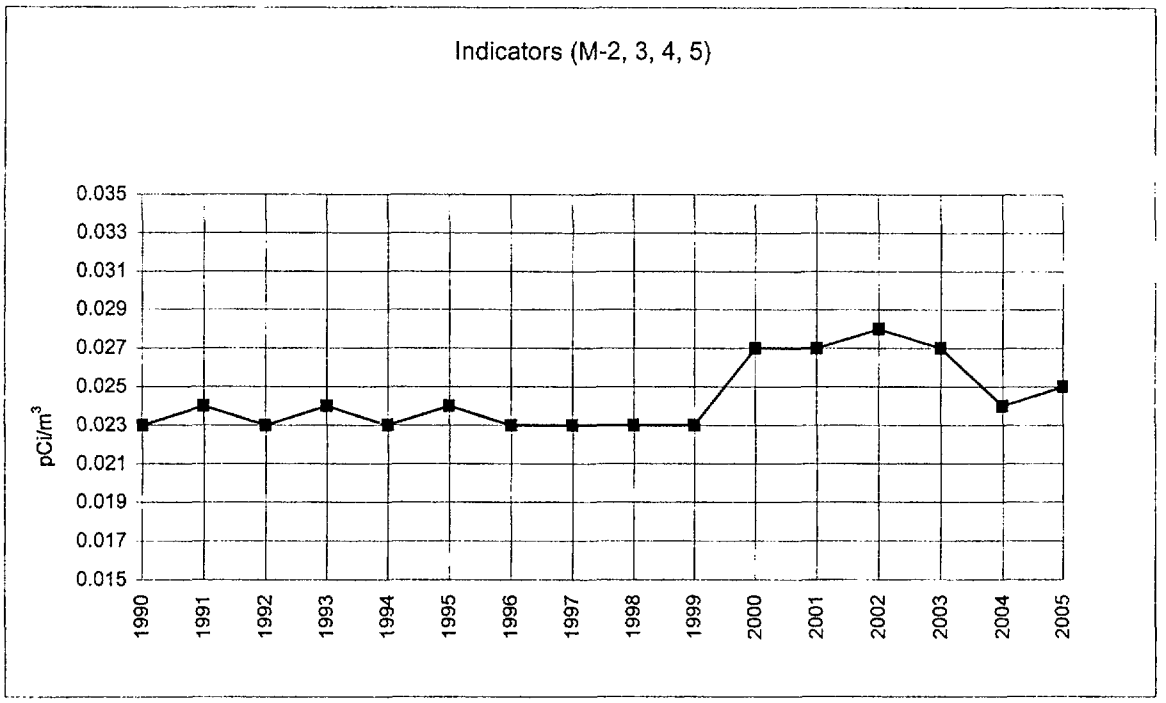


Figure 5-2. Airborne Particulates; analysis for gross beta, average mean of all indicator locations versus control location.



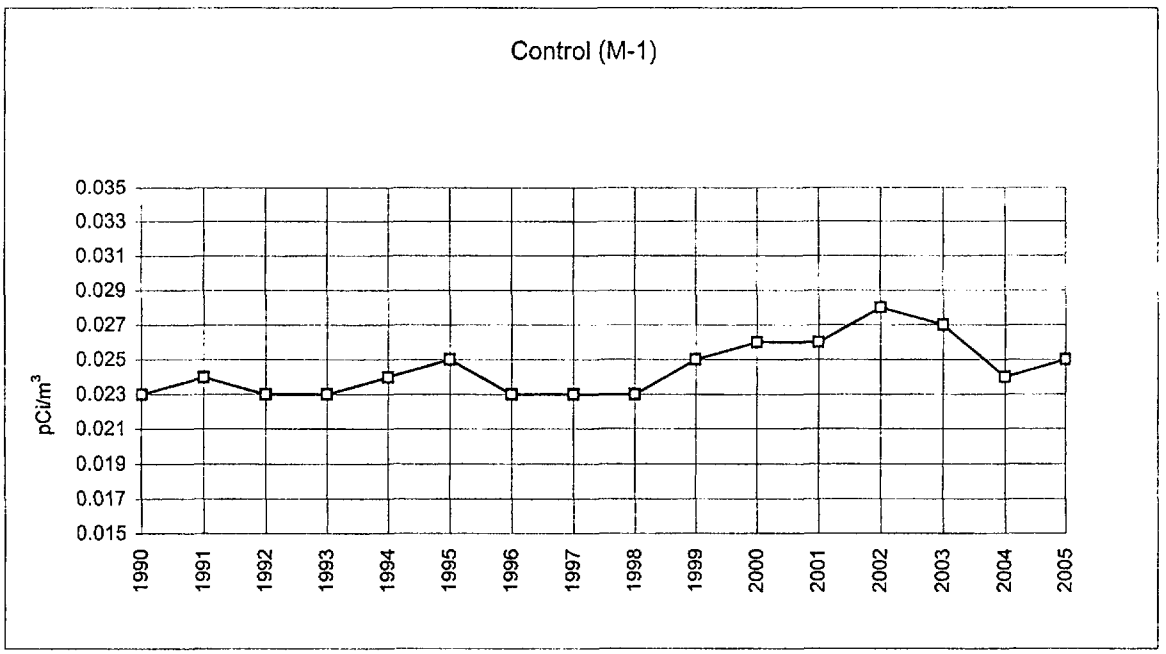


Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility	Monticello Nuclear Generating Plant	Docket No.	50-263
Location of Facility	Wright, Minnesota	Reporting Period	January-December, 2005
	(County, State)		

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]		
TLD (Inner Ring, General Area at Site Boundary) mRem/91 days)	Gamma 56	3.0	15.6 (56/56) (12.5-18.4)	M-12A, County Rd. 75, 0.5 mi @ 262°/W	17.4 (4 /4) (15.2-18.4)	(See Control below.)	0
TLD (Outer Ring, 4-5 mi. distant) mRem/91 days)	Gamma 64	3.0	15.2 (64/64) (12.3-17.7)	M-09B, Weinand Farm 4.7 mi @ 178°/S	16.5 (4 /4) (14.6-17.7)	(See Control below.)	0
TLD (Special Interest Areas) mRem/91 days)	Gamma 24	3.0	15.0 (24/24) (11.3-17.7)	M-06S, Mont. Pub. Wks. 2.6 mi @ 134°/SE	16.9 (4 /4) (15.5-17.7)	(See Control below.)	0
TLD (Control) mRem/91 days)	Gamma 16	3.0	None	M-03C, County and Jason, 11.6 mi @ 130°/SE	16.1 (4 /4) (15.5-17.3)	15.1 (16/16) (13.7-17.3)	0
Airborne Particulates (pCi/m^3)	GB 256	0.005	0.025 (204/204) (0.007-0.064)	M-5, Air Station 2.6 mi @ 134°/SE	0.026 (51 /51) (0.009-0.058)	0.025 (52/52) (0.010-0.066)	0
	GS 20						
	Be-7	0.015	0.063 (16/16) (0.037-0.100)	M-2, Air Station 0.8 mi @ 140°/SE	0.071 (4/4) (0.052-0.100)	0.064 (4/4) (0.040-0.086)	0
	Mn-54	0.0007	< LLD	-	-	< LLD	0
	Co-58	0.0008	< LLD	-	-	< LLD	0
	Co-60	0.0010	< LLD	-	-	< LLD	0
	Zn-65	0.0016	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.0012	< LLD	-	-	< LLD	0
	Ru-103	0.0011	< LLD	-	-	< LLD	0
	Ru-106	0.0079	< LLD	-	-	< LLD	0
	Cs-134	0.0009	< LLD	-	-	< LLD	0
	Cs-137	0.0008	< LLD	-	-	< LLD	0
	Ba-La-140	0.0030	< LLD	-	-	< LLD	0
	Ce-141	0.0020	< LLD	-	-	< LLD	0
	Ce-144	0.0055	< LLD	-	-	< LLD	0
Airborne Iodine (pCi/m^3)	I-131 256	0.03	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility	Monticello Nuclear Generating Plant	Docket No.	50-263
Location of Facility	Wright, Minnesota	Reporting Period	January-December, 2005
	(County, State)		

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]		
Milk (pCi/L)	I-131 49	0.5	< LLD	-	-	< LLD	0
	GS 49						
	K-40	200	1305 (30/30) (1180-1430)	M-28 Hoglund Farm	1331 (11 /11) (1235-1430)	1285 (19/19) (1174-1395)	0
	Cs-134	5	< LLD	-	-	< LLD	0
	Cs-137	5	10.1 (1/30)	M-28 Hoglund Farm	10.1 (1/11) -	< LLD	0
	Ba-La-140	5	< LLD	-	-	< LLD	0
River Water (pCi/L)	H-3 8	330	< LLD	-	-	< LLD	0
	GS 16						
	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	46	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility: Monticello Nuclear Generating Plant — Docket No.: 50-263
Location of Facility: Wright, Minnesota — Reporting Period: January-December, 2005
(County, State)

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Drinking Water (pCi/L)	GB 10	1.6	2.8 (10/12) (2.1-4.6)	M-14, Minneapolis 37.0 mi. @ 132° /SE	2.8 (10/12) (2.1-4.6)	None	0
	I-131 10	1.0	< LLD	-	-	None	0
	H-3 4	500	< LLD	-	-	None	0
	GS 10						
	Mn-54	15	< LLD	-	-	None	0
	Fe-59	30	< LLD	-	-	None	0
	Co-58	15	< LLD	-	-	None	0
	Co-60	15	< LLD	-	-	None	0
	Zn-65	30	< LLD	-	-	None	0
	Zr-Nb-95	15	< LLD	-	-	None	0
	Cs-134	10	< LLD	-	-	None	0
	Cs-137	18	< LLD	-	-	None	0
	Ba-La-140	15	< LLD	-	-	None	0
	Ce-144	51	< LLD	-	-	None	0
Well Water (pCi/L)	H-3 16	500	< LLD	-	-	< LLD	0
	GS 16						
	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	10	< LLD	-	-	< LLD	0
	Cs-137	18	< LLD	-	-	< LLD	0
	Ba-La-140	15	< LLD	-	-	< LLD	0
	Ce-144	56	< LLD	-	-	< LLD	0
Crops - Cabbage (pCi/gwet)	GS 2						
	I-131	0.031	< LLD	-	-	< LLD	0
	Cs-134	0.008	< LLD	-	-	< LLD	0
	Cs-137	0.019	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility: Monticello Nuclear Generating Plant — Docket No.: 50-263
Location of Facility: Wright, Minnesota (County, State) — Reporting Period: January-December, 2005

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	GS 4						
(pCi/g wet)	K-40	0.10	3.11 (2/2) (3.05-3.17)	2 M-09	3.11 (2/2) (3.05-3.17)	3.07 (2/2) (2.82-3.32)	0
	Mn-54	0.024	< LLD	-	-	< LLD	0
	Fe-59	0.048	< LLD	-	-	< LLD	0
	Co-58	0.031	< LLD	-	-	< LLD	0
	Co-60	0.025	< LLD	-	-	< LLD	0
	Zn-65	0.045	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.053	< LLD	-	-	< LLD	0
	Cs-134	0.017	< LLD	-	-	< LLD	0
	Cs-137	0.020	< LLD	-	-	< LLD	0
	Ba-La-140	0.15	< LLD	-	-	< LLD	0
	Ce-144	0.09	< LLD	-	-	< LLD	0
Invertebrates	GS 4						
(pCi/g wet)	Be-7	0.74	< LLD	- -	-	< LLD	0
	K-40	1.27	< LLD	- -	-	< LLD	0
	Mn-54	0.05	< LLD	-	-	< LLD	0
	Fe-59	0.16	< LLD	-	-	< LLD	0
	Co-58	0.07	< LLD	-	-	< LLD	0
	Co-60	0.06	< LLD	-	-	< LLD	0
	Zn-65	0.13	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.13	< LLD	-	-	< LLD	0
	Ru-103	0.12	< LLD	-	-	< LLD	0
	Ru-106	0.53	< LLD	-	-	< LLD	0
	Cs-134	0.06	< LLD	-	-	< LLD	0
	Cs-137	0.05	< LLD	-	-	< LLD	0
	Ba-La-140	0.51	< LLD	-	-	< LLD	0
	Ce-144	0.42	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility	Monticello Nuclear Generating Plant	Docket No.	50-263
Location of Facility	Wright, Minnesota	Reporting Period	January-December, 2005
	(County, State)		

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]		
Shoreline Sediments (pCi/g dry)	GS 6						
	Be-7	0.34	< LLD	-	-	< LLD	0
	K-40	0.10	11.46 (4/4) (9.77-12.23)	M-09, Downstream 0.2 mi @ 62°/ENE	12.14 (2/2) (12.04-12.23)	10.81 (2/2) (10.31-11.31)	0
	Mn-54	0.026	< LLD	-	-	< LLD	0
	Fe-59	0.135	< LLD	-	-	< LLD	0
	Co-58	0.033	< LLD	-	-	< LLD	0
	Co-60	0.025	< LLD	-	-	< LLD	0
	Zn-65	0.075	< LLD	-	-	< LLD	0
	Nb-95	0.073	< LLD	-	-	< LLD	0
	Zr-95	0.072	< LLD	-	-	< LLD	0
	Ru-103	0.050	< LLD	-	-	< LLD	0
	Ru-106	0.25	< LLD	-	-	< LLD	0
	Cs-134	0.036	< LLD	-	-	< LLD	0
	Cs-137	0.025	0.14 (3/4) (0.11-0.20)	M-09, Downstream 0.2 mi @ 62°/ENE	0.15 (2/2) (0.11-0.20)	0.029 (1/2) -	0
	Ba-La-140	0.37	< LLD	-	-	< LLD	0
	Ce-144	0.15	< 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, 2005 through December, 2005

Appendix A

Interlaboratory Comparison Program Results

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

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

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

The results in Table A-2 list results for thermoluminescent dosimeters (TLDs), via International Intercomparison of Environmental Dosimeters, when available, and internal laboratory testing.

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

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

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

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

Attachment A lists acceptance criteria for "spiked" samples.

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

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

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

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

[b] Laboratory limit.

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

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits	Acceptance
STW-1051	02/15/05	Sr-89	28.0 ± 1.2	29.4	20.7 - 38.1	Pass
STW-1051	02/15/05	Sr-90	25.1 ± 0.7	24.4	15.7 - 33.1	Pass
STW-1052	02/15/05	Ba-133	52.9 ± 2.8	53.4	44.2 - 62.6	Pass
STW-1052	02/15/05	Co-60	54.4 ± 0.4	56.6	47.9 - 65.3	Pass
STW-1052	02/15/05	Cs-134	67.7 ± 1.8	64.9	56.2 - 73.6	Pass
STW-1052	02/15/05	Cs-137	39.6 ± 1.8	40.2	31.5 - 48.9	Pass
STW-1052	02/15/05	Zn-65	159.7 ± 3.0	161.0	133.0 - 189.0	Pass
STW-1053	02/15/05	Gr. Alpha	55.1 ± 1.8	67.9	38.5 - 97.3	Pass
STW-1053	02/15/05	Gr. Beta	46.8 ± 1.3	51.1	38.5 - 97.3	Pass
STW-1054	02/15/05	Ra-226	13.7 ± 1.5	14.1	10.4 - 17.8	Pass
STW-1054	02/15/05	Ra-228	13.3 ± 0.6	13.7	7.8 - 19.6	Pass
STW-1054	02/15/05	Uranium	5.1 ± 0.2	5.0	0.0 - 10.2	Pass
STW-1055	05/17/05	Sr-89	45.1 ± 4.1	41.3	32.6 - 50.0	Pass
STW-1055	05/17/05	Sr-90	7.5 ± 0.9	5.9	0.0 - 14.6	Pass
STW-1056	05/17/05	Ba-133	87.1 ± 2.0	88.4	73.1 - 104.0	Pass
STW-1056	05/17/05	Co-60	38.4 ± 0.8	37.0	28.3 - 45.7	Pass
STW-1056	05/17/05	Cs-134	75.3 ± 0.7	78.6	69.9 - 87.3	Pass
STW-1056	05/17/05	Cs-137	201.0 ± 8.4	194.0	184.0 - 218.0	Pass
STW-1056	05/17/05	Zn-65	130.0 ± 6.7	118.0	97.6 - 138.0	Pass
STW-1057	05/17/05	Gr. Alpha	42.7 ± 2.9	37.0	21.0 - 53.0	Pass
STW-1057	05/17/05	Gr. Beta	34.0 ± 0.4	34.2	25.5 - 42.9	Pass
STW-1058	05/17/05	I-131	14.7 ± 0.5	15.5	10.3 - 20.7	Pass
STW-1059	05/17/05	Ra-226	6.6 ± 0.1	7.6	5.6 - 9.5	Pass
STW-1059	05/17/05	Ra-228	19.3 ± 0.7	18.9	10.7 - 27.1	Pass
STW-1059	05/17/05	Uranium	9.6 ± 0.1	10.1	4.9 - 15.3	Pass
STW-1060	05/17/05	H-3	24100.0 ± 109.0	24400.0	20200.0 - 28600.0	Pass
STW-1067	08/16/05	Sr-89	29.1 ± 3.0	28.0	19.3 - 36.7	Pass
STW-1067	08/16/05	Sr-90	36.0 ± 0.6	33.8	25.1 - 42.5	Pass
STW-1068	08/16/05	Ba-133	107.0 ± 1.7	106.0	87.7 - 124.0	Pass
STW-1068	08/16/05	Co-60	15.2 ± 0.2	13.5	4.8 - 22.2	Pass
STW-1068	08/16/05	Cs-134	89.1 ± 0.3	92.1	83.4 - 101.0	Pass
STW-1068	08/16/05	Cs-137	72.1 ± 1.0	72.7	64.0 - 81.4	Pass
STW-1068	08/16/05	Zn-65	67.4 ± 1.4	65.7	54.3 - 77.1	Pass
STW-1069	08/16/05	Gr. Alpha	44.3 ± 1.5	55.7	31.6 - 79.8	Pass
STW-1069	08/16/05	Gr. Beta	58.4 ± 2.1	61.3	44.0 - 78.6	Pass
STW-1070	08/16/05	Ra-226	16.6 ± 1.5	16.6	12.3 - 20.9	Pass
STW-1070	08/16/05	Ra-228	6.2 ± 0.3	6.2	3.5 - 8.9	Pass
STW-1070	08/16/05	Uranium	4.5 ± 0.1	4.5	0.0 - 9.7	Pass

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[c] Results are based on single determinations.

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

NOTE: For fish, Jello is used for the Spike matrix. For Vegetation, cabbage is used for the Spike matrix.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

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

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

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

3.0. Duplicate analyses

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

4.5 In rounding off, the following rules are followed:

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

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

APPENDIX C

Maximum Permissible Concentrations

of Radioactivity in Air and Water

Above Background in Unrestricted Areas

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

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

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

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

[c] A natural radionuclide.

APPENDIX D

Sampling Location Maps

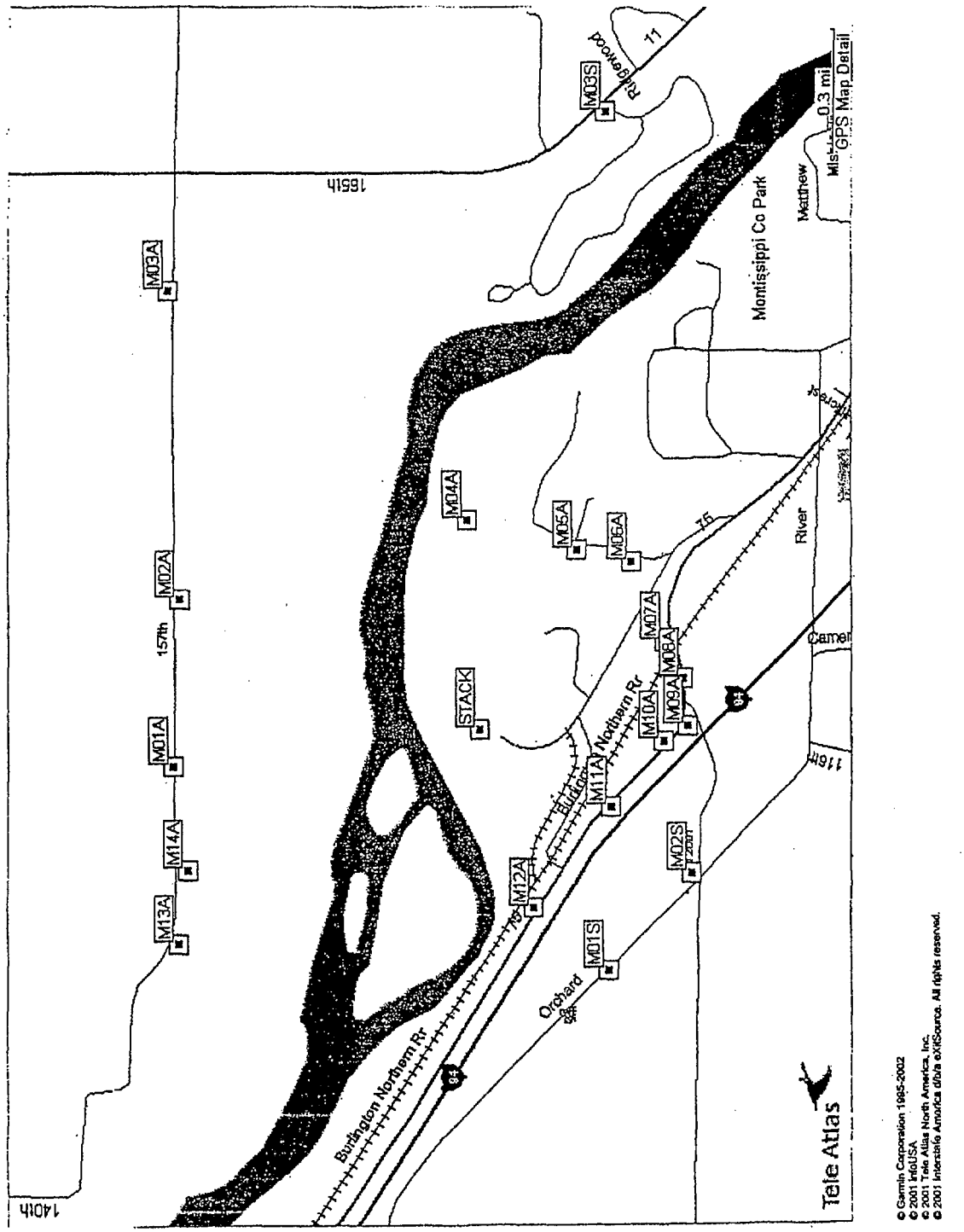

Figure D-1, Sample Collection and Analysis program: TLD locations, Inner ring (Table 5.2).

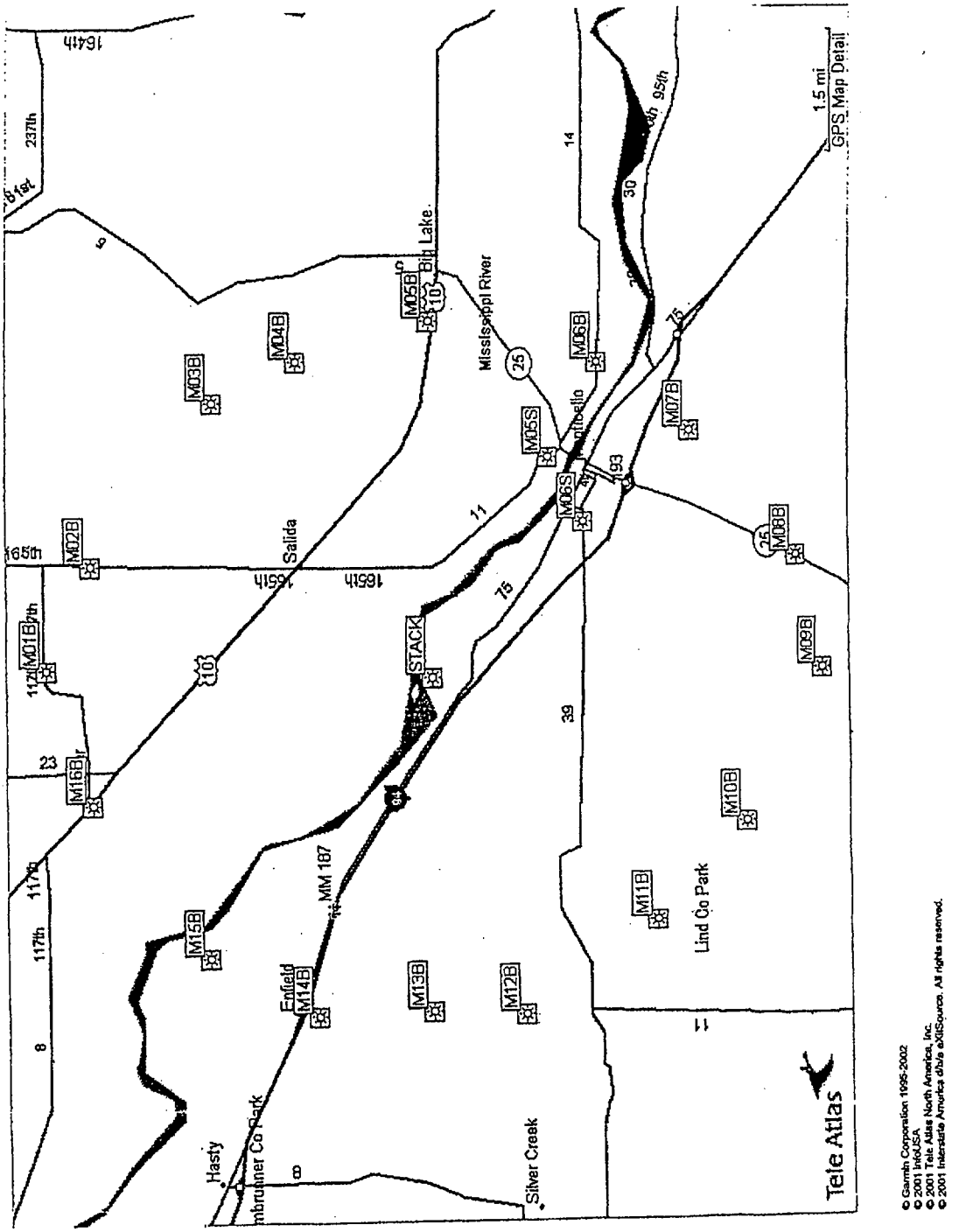

Figure D-2. Sample Collection and Analysis program: TLD locations, Outer ring (Table 5.2).

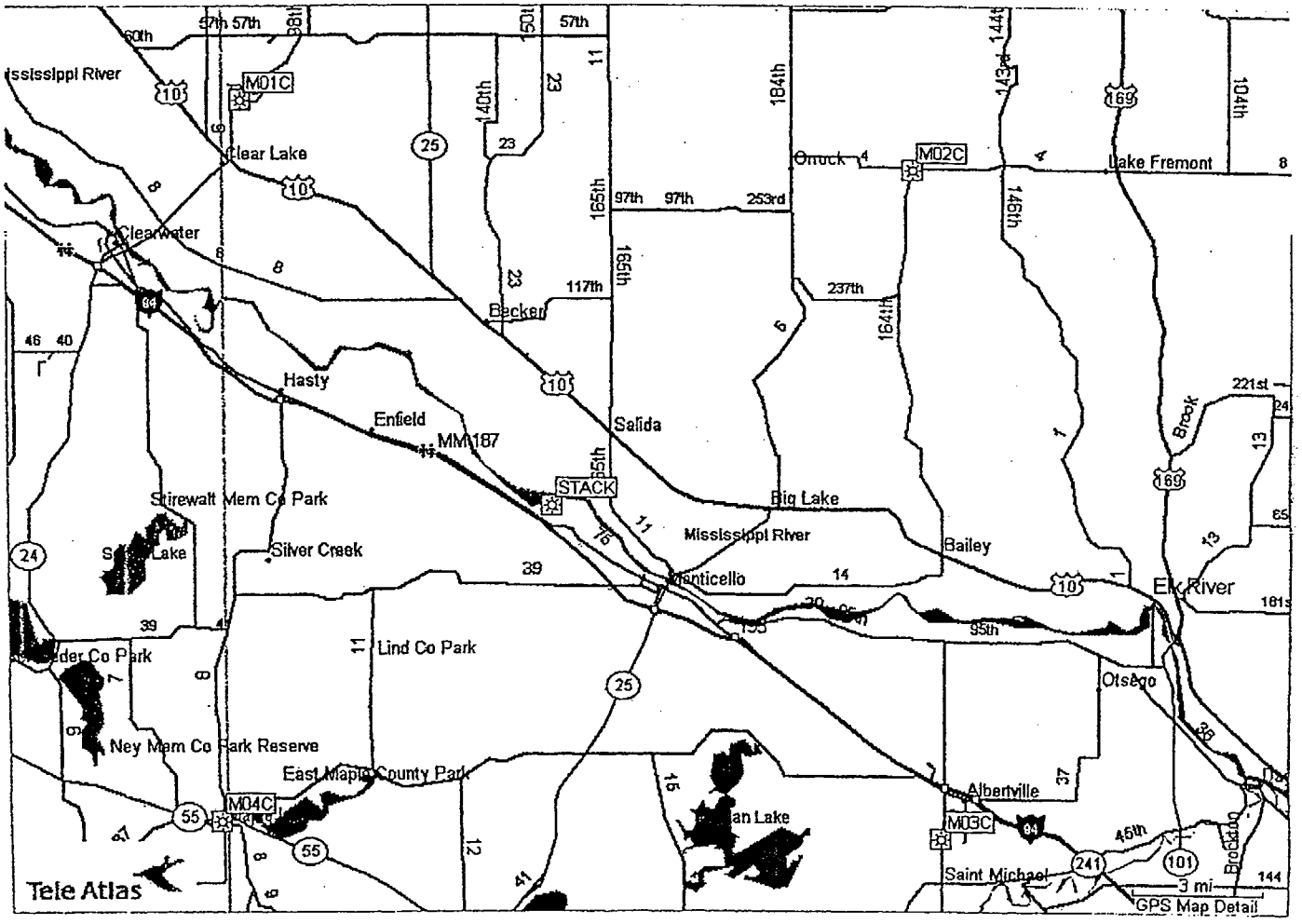

Figure D-3. Sample Collection and Analysis program: TLD locations, Controls (Table 5.2).

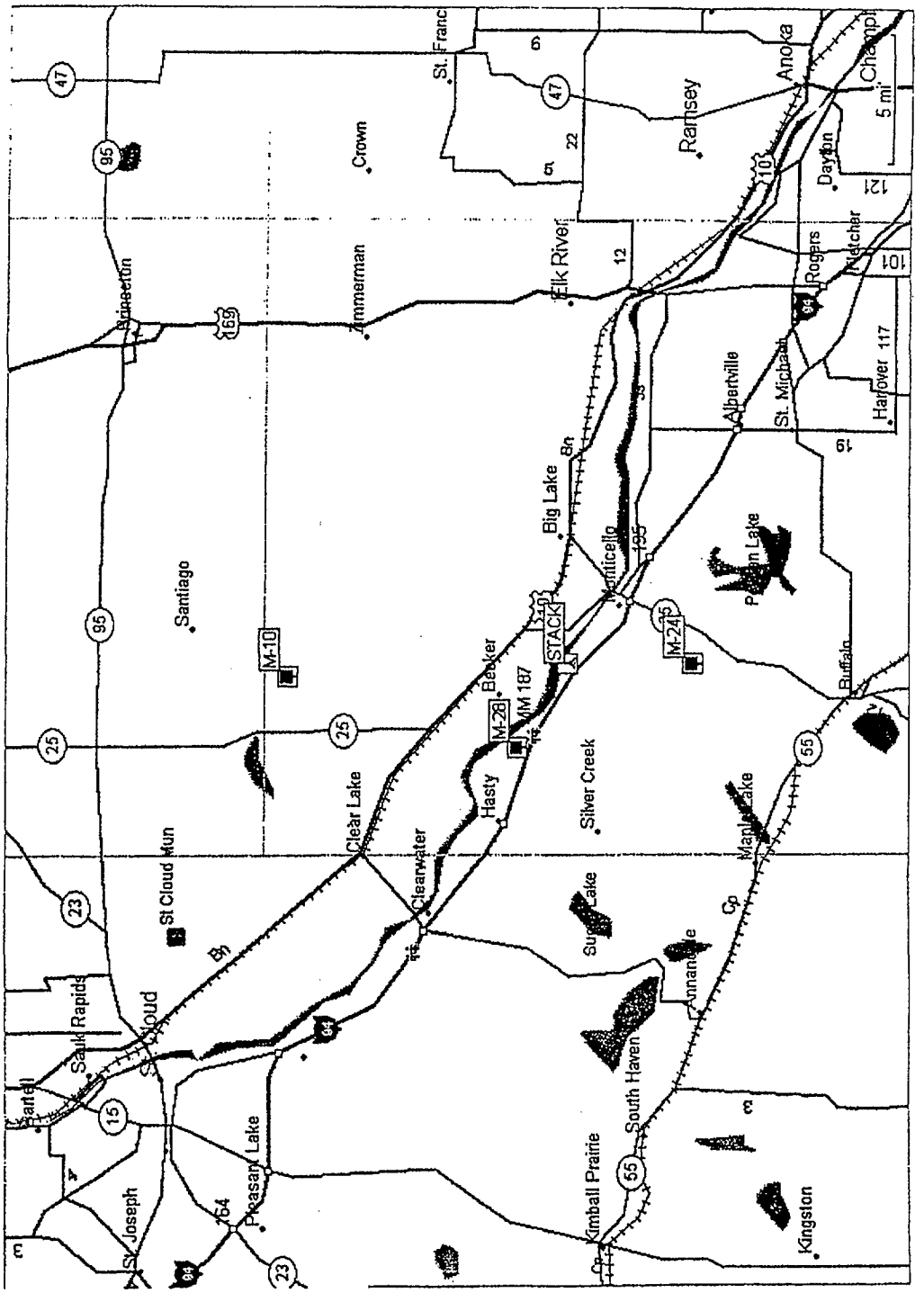

Figure D-4. Sample Collection and Analysis Program: Radiation Environmental Monitoring Program, Milk sampling locations. (Table 5.2)

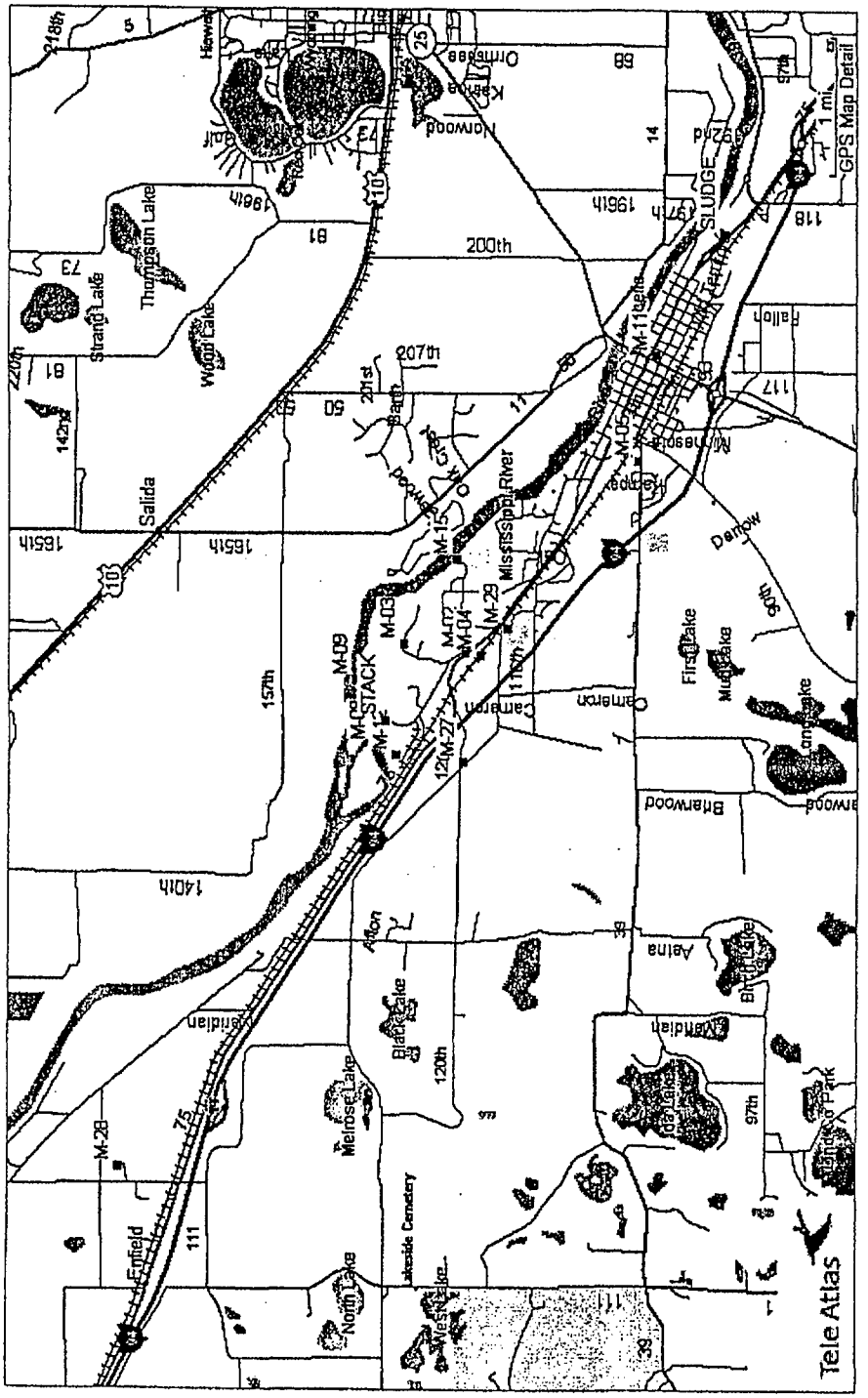

Figure D-5. Sample Collection and Analysis Program: Radiation Environmental Monitoring Program, Milk, Sludge, Ground Water and Shoreline sampling locations (Table 5-2.)