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Prairie Island Nuclear Generating Plant Units 1 and 2 Dockets 50-282, 50-306 and 72-10 License Nos. DPR-42, DPR-60 and SNM-2506

<u>Corrections to the 2007 Annual Radiological Environmental Monitoring Program</u> (REMP) Report and the 2007 Annual Radioactive Effluent Report

- References: 1. Nuclear Management Company, LLC (NMC) letter to US Nuclear Regulatory Commission (NRC), 2007 Annual Radiological Environmental Monitoring Program (REMP) Report, dated May 13, 2008 (ADAMS Accession Number ML081370083)
 - 2. NMC letter to NRC, 2007 Annual Radioactive Effluent Report and Offsite Dose Calculation Manual (ODCM), dated
 - May 13, 2008 (ADAMS Accession Number ML081370317)

In references 1 and 2, Nuclear Management Company, LLC (NMC)¹ submitted the 2007 Annual REMP and 2007 Annual Radioactive Effluent Report and ODCM for the Prairie Island Nuclear Generating Plant (PINGP). Minor errors were later identified in both annual reports, therefore Northern States Power Company, a Minnesota Corporation (NSPM) is resubmitting the two reports in their entirety, with the exception of the ODCM which was not affected by these changes. The corrections are described in detail below.

2007 Annual REMP Report

The contractor that produces the REMP report for PINGP discovered an error in Table A-3, In-House "Spike" Samples, dealing with in-house laboratory quality assurance checks. In the report, a footnote indicated that the acceptance ranges are the known sample quantities plus or minus 1 sigma. The actual ranges listed in the report are the known sample quantities plus or minus 2 sigmas. The 2 sigma values are the correct values to use. Footnote "d" on page A3-2 was corrected to state "Control limits are established from the precision values listed in Attachment A of this report, adjusted to $\pm 2 \sigma$." The two affected pages, A3-1 and A3-2, are noted in the header information as "Corrected Page".

¹ On September 22, 2008, NMC transferred its operating license authority to Northern States Power Company, Minnesota (NSPM), doing business as Xcel Energy. By letter dated September 3, 2008, NSPM assumed responsibility for actions and commitments previously submitted by NMC.

2007 Annual Radioactive Effluent Report

Two minor discrepancies were noted by PINGP staff, neither which constitute an error in the official reported dose.

1) Enclosure 1, Off-Site Radiation Dose Assessment, January 01, 2007 – December 31, 2008

This correction replaces page 2 of 6, which contained errors in the gamma and beta dose values in the Corrective Action section of a Leak in Waste Gas System. The official reported dose in Table 1, page 5 of 6, of Enclosure 1 was determined to be correct.

- 2) Enclosure 4, Attachment to the 2007 Annual Effluent Report
 - This correction replaces page 1 of 1, which contained a minor error in the Background section that reported "approximately 150 gallons of secondary steam condensate leaked to the ground outside the northeast side of the turbine building...". This page was corrected to indicate that "approximately 150 gallons of secondary steam condensate leaked to the ground outside the ground outside the <u>west</u> side of the turbine turbine building...".

The two affected pages have also been noted in the header information as "Corrected Page".

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

Mark A. Schimmel Site Vice President, Prairie Island Nuclear Generating Plant Northern States Power Company - Minnesota

Attachments (2)

cc: Regional Administrator, USNRC, Region III Project Manager, Prairie Island Nuclear Generating Plant, USNRC, NRR NRC Resident Inspector, Prairie Island Nuclear Generating Plant Desiree Smith, USNRC, Region III Director of NMSS, USNRC Department of Health, State of Minnesota PI Dakota Community Environmental Coordinator

ATTACHMENT 1

Annual Report to the United States Nuclear Regulatory Commission

Radiological Environmental Monitoring Program (REMP) Report Resubmitted with Corrected Pages

January 1, 2007 through December 31, 2007



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XCEL ENERGY CORPORATION

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

ANNUAL REPORT To the UNITED STATES NUCLEAR REGULATORY COMMISSION

Radiation Environmental Monitoring Program

January 1 to December 31, 2007

Docket No. 50-282 50-306 ISFSI Docket No.72-10 License No. DPR-42 DPR-60 SNM-2506

Prepared under Contract by

ENVIRONMENTAL, Inc. MIDWEST LABORATORY

Project No. 8010

Bronia Grob, MS. Laboratory Manager

Approved:

PREFACE

The staff of Environmental, Inc., Midwest Laboratory was responsible for the acquisition of data presented in this report. Samples were collected by members of the staff of the Prairie Island Nuclear Generating Plant, operated by Nuclear Management Company, LLC for XCEL Energy Corporation. The 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 at the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, during the period January - December, 2007. This program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the plant on its surroundings.

Tabulations 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, 2008b) available at Prairie Island Nuclear Generating Plant.

Prairie Island Nuclear Generating Plant is located on the Mississippi River in Goodhue County, Minnesota, owned by Xcel Energy Corporation and operated by Nuclear Management Company, LLC. The plant has two 575 MWe pressurized water reactors. Unit 1 achieved initial criticality on 1 December 1973. Commercial operation at full power began on 16 December 1973. Unit 2 achieved initial criticality on 17 December 1974. Commercial operation at full power began on 21 December 1974.

2.0 SUMMARY

The Radiation Environmental Monitoring Program (REMP) required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Prairie Island Nuclear Generating Plant and the Independent Spent Fuel Storage Installation (ISFSI) is described. Results for 2007 are summarized and discussed.

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

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 Prairie Island 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 (TLDs).

Sources of environmental radiation include the following:

- (1) Natural background radiation arising from cosmic rays and primordial radionuclides;
- (2) Fallout from atmospheric nuclear detonations;
- (3) Releases from nuclear power plants;
- (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 Prairie Island 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 the environmental samples collected from the plant site. The plant's monitoring program includes analyses for tritium and iodine-131. Most samples are 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 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.

3.1 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 radiation environmental monitoring program at Prairie Island 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 reactor site or ISFSI facility, as appropriate. To assure that sampling is carried out in a reproducible manner, detailed sampling procedures have been prescribed (Prairie Island Nuclear Generating Plant, 2007). Maps of fixed 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. Airborne iodine is collected by continuous pumping through charcoal filters at these same 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 (P-1), and four are indicators (P-2, P-3, P-4, and P-6).

Offsite ambient gamma radiation is monitored at thirty-four locations, using CaSO₄:Dy dosimeters with four sensitive areas at each location: ten in an inner ring in the general area of the site boundary, fifteen in the outer ring within a 4-5 mile radius, eight at special interest locations, and one control location, 11.1 miles distant from the plant. They are replaced and measured quarterly.

Ambient gamma radiation is monitored at the Independent Spent Fuel Storage Installation (ISFSI) Facility by twenty $CaSO_4$:Dy dosimeters. Twelve dosimeters are located inside of the earthen berm in direct line of sight from the storage casks and eight dosimeters are located outside of the earthen berm. They are replaced and measured quarterly.

Milk samples are collected monthly from six farms (five indicator and one control) and analyzed for iodine-131 and gamma-emitting isotopes. The milk is collected biweekly during the growing season (May - October), because the milk animals may be on pasture.

For additional monitoring of the terrestrial environment, green leafy vegetables (cabbage) are collected annually from the highest D/Q garden and a control location (P-38), and analyzed for gamma-emitting isotopes, including iodine-131. Corn is collected annually only if fields are irrigated with river water and analyzed for gamma-emitting isotopes. Well water and ground water are collected quarterly from four locations near the plant and analyzed for tritium and gamma-emitting isotopes.

River water is collected weekly at two locations, one upstream of the plant (P-5) and one downstream (P-6, Lock and Dam No.3). Monthly composites are analyzed for gamma-emitting isotopes. Quarterly composites are analyzed for tritium.

3.2 Program Description (continued)

Drinking water is collected weekly from the City of Red Wing well. 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, periphyton or invertebrates, and bottom sediments. Shoreline sediment is collected semi-annually from one 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) <u>Air Particulates / Air Iodine:</u>

A partial sample was collected from location P-1 for the week ending 08-15-07. The sampler pump failed and was replaced.

A partial sample was collected from location P-2 for the week ending 02-21-07. The sampler pump failed and was replaced.

No air particulate sample was available for location P-6 for the week ending 04-18-07. The filter was missing.

A partial sample was collected from location P-6 for the week ending 07-18-07. The sampler pump failed and was replaced.

(2) <u>Milk:</u>

The Gustafsen Dairy (P-14) sold the herd in September, 2007. No milk samples were available after September 12, 2007.

No milk was available from location P-44 for the months of January, November and December, 2007. The goats were dry for the season.

(3) <u>Thermoluminescent Dosimeters</u>:

The TLD for location P-07B was missing for the second quarter, 2007. The TLD was missing 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.

Gamma-spectroscopic analyses are performed using high-purity germanium (HPGe) detectors. Levels of iodine-131 in cabbage and natural vegetation and concentrations of airborne iodine-131 in charcoal samples were determined by gamma spectroscopy.

Tritium concentrations are determined by liquid scintillation.

Analytical Procedures used by Environmental, Inc. are on file and are available for inspection. Procedures are based on those prescribed by the Health and Safety Laboratory of the U.S. 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

The Gustafsen Dairy (P-14) sold their herd in September, 2007. Dairy operations were discontinued.

3.6 Land Use Census

In accordance with the Prairie Island Nuclear Generating Plant Offsite Dose Calculation Manual, H4, (ODCM) a land use census is conducted in order to 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. This census is conducted at least once per 12 months between the dates of May 1 and October 31. If new locations yield a calculated dose or dose equivalent (via the same exposure pathway) twenty percent greater than the required locations per the ODCM, then the new locations are 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.

This land use census insures the updating of the radiation environmental monitoring program should sampling locations change within the 5 mile radius from the plant.

The Land Use Census was completed in October, 2007. There were no changes to any of the highest D/Q locations for nearest residence, milk animal or garden sites. Although one dairy in the monitoring program has discontinued operations, the sampling program is still in compliance with the ODCM.

No downstream irrigation of corn was discovered within 5 miles of the Prairie Island Plant. Therefore, no corn samples were collected for analysis.

4.0 RESULTS AND DISCUSSION

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

The 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 atmospheric nuclear tests in 2007 The last reported test was conducted on October 16, 1980 by the People's Republic of China. There were no reported accidents involving a release to the environment at nuclear reactor facilities in 2007.

4.2 Summary of Preoperational Data

The following constitutes a summary of preoperational studies conducted at the Prairie Island Nuclear Power Plant during the years 1970 to 1973, 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, since background levels of radiation were much higher in these years due to radioactive fallout from the atmosphere. Gross beta measurements in fallout declined yearly from a level of 12,167 pCi/m² to 1,020 pCi/m², and these declining values are reflected throughout the various media tested.

In the air environment, ambient gamma radiation (TLDs) averaged 9.4 mR/4 weeks during preoperational studies. Gross beta in air particulates declined from levels of 0.38 to 0.037 pCi/m³. Average present day levels have stabilized at around 0.025 pCi/m³. Airborne radioiodine remained below detection levels.

In the terrestrial environment of 1970 to 1973, milk, agricultural crops, and soil were monitored. In milk samples, low levels of Cs-137, I-131, and Sr-90 were detected. Cs-137 levels declined from 16.5 to 8.6 pCi/L. Present day measurements for both Cs-137 and I-131 are below detection levels. Agricultural crop measurements averaged 57.7 pCi/g for gross beta and 0.47 pCi/g for Cs-137. Gross beta measured in soil averaged 52 pCi/g.

The aqueous environment was monitored by testing of river, well and lake waters, 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 eight separate locations, declined steadily from an average concentration of 1020 pCi/L to 490 pCi/L. Present day environmental levels of tritium are below detection limits. Values for gross beta, measured from 1970 to 1973, averaged 9.9 pCi/L in downstream Mississippi River water, 8.2 pCi/L for well water, and 11.0 pCi/L for lake water. Gamma emitters were below the lower limit of detection (LLD). In bottom sediments, gross beta background levels were determined at 51.0 pCi/g. Cs-137 activity during preoperational studies in 1973 measured 0.25 pCi/g upstream and 0.21 pCi/g downstream. The lower levels occasionally observed today can still be attributed to residual activity from atmospheric fallout. Gross beta in fish, measured in both flesh and skeletal samples, averaged 7.3 and 11.7 pCi/g, respectively. Gross beta background levels in aquatic vegetation, algae and periphyton samples measured 76.0 pCi/g, 46.0 pCi/g, and 13.6 pCi/g, respectively.

4.3 Program Findings

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

Ambient Radiation (TLDs)

Ambient radiation was measured in the general area of the site boundary, at the outer ring 4 - 5 mi. distant from the Plant, at special interest areas and at one control location. The means ranged from 16.8 mR/91 days at inner ring locations to 17.9 mR/91 days at outer ring locations. The mean at special interest locations was 16.9 mR/91 days and 17.7 mR/91 days at the control location. Dose rates measured at the inner and outer ring and the control locations were similar to those observed from 1992 through 2006. The results are tabulated below. No plant effect on ambient gamma radiation measurements was indicated (Figure 5-1).

	Average (Inner and	1	1	Average (Inner and	
Year	Outer Rings)	Control	Year	Outer Rings)	Control
1992	16.3	14.8	2000	17.0	17.1
1993	15.9	15.4 i	2001	16.8	17.2
1994	15.2	16.0	2002	17.4	16.9
1995	15.6	16.6	2003	16.2	16.0
1996	14.8	16.4	2004	17.6	17.6
1997	15.1	16.0	2005	16.8	16.3
1998	16.7	17.3	2006	16.6	16.6
1999	16.6	17.5	2007	17.5	17.7

Ambient gamma radiation as measured by thermoluminescent dosimetry. Average quarterly dose rates (mR/91 days).

ISFSI Facility Operations Monitoring

Ambient radiation was measured inside the ISFSI earth berm, outside the ISFSI earth berm and at two special locations between the plant ISFSI and the Prairie Island Indian Community. The mean dose rates measured 105.0 mR/91 days inside the ISFSI earth berm and 21.5 mR/91 days outside the ISFSI earth berm. Two additional casks were placed on the ISFSI pad in 2007, a total of twenty-four loaded casks remain. The higher levels inside the earth berm are expected, due to the loaded spent fuel casks being in direct line-of-sight of the TLDs.

Ambient radiation levels measured outside the earth berm show a slight increase as compared to other offsite dose rates around the plant. If the dose rates outside the earth berm are an indication of gamma skyshine from the casks, they are consistent with predictions given in the ISFSI Safety Analysis Report, Table 7A-7, "Total Skyshine Dose Rate". The cumulative average of the two special Prairie Island Indian Community TLDs measured 16.4 and 16.3 mR/91 days. Although the skyshine neutron dose rates are not directly measured, the neutron levels measured next to the casks are below the levels predicted in the ISFSI SAR Report, Table 7A-4, "TN-40 Dose Rates at Short Distances". Therefore, the skyshine dose rates at farther distances from the casks should be at or below the calculated dose rates. No spent fuel storage effect on offsite ambient gamma radiation was indicated (Fig. 5-1).

Airborne Particulates

		· · · · · · · · · · · · · · · · · · ·
Year	Average of Indicators	Control
	Concentration	n (pCi/m ³)
1992	0.023	0.021
1993	0.022	0.019
1994	0.022	0.022
1995	0.022	0.022
1996	0.023	0.020
1997	0.021	0.021
1998	0.022	0.018
1999	0.024	0.022
2000	0.025	0.025
2001	0.023	0.023
2002	0.028	0.023
2003	0.027	0.025
2004	0.025	0.026
2005	0.027	0.025
2006	0.026	0.025
2007	0.037	0.031

Average annual gross beta concentrations in airborne particulates at both indicator and control locations were higher in 2007. The results are tabulated below.

Average annual gross beta concentrations in airborne particulates.

Concentrations were slightly higher at the indicator locations versus the control location (0.037 pCi/m³ and 0.031 pCi/m³, respectively. The pattern of differences between indicator and control locations is similar to that observed from 1992 through 2006.

Gross beta measurements could be affected by construction activity, or dryer summer months, increasing dust in the air and causing heavier loading of the particulate filters. Typically, the highest averages for gross beta occur during the months of January and December and the first and fourth quarters. This pattern was not observed in 2007, the highest beta activity was seen in the spring and summer months. The effect was local, no increase was observed at the Monticello Nuclear Generating Plant, about 100 miles distant. (Xcel Energy Corp., 2008). The highest concentrations were measured at locations P-2, P-3, and P-6. At the control and indicator location P-1 and P-4, elevated activities of similar size occurred. There is no evidence of a plant effect.

The increase in gross beta activity was matched by elevations of Be-7 concentrations, detected in the quarterly composites of air particulate filters. Gamma spectroscopic analysis yielded proportionally higher results for both indicator and control locations. Beryllium-7, which is produced continuously in the upper atmosphere by cosmic radiation (Arnold and Al-Salih, 1955) was detected at an average activity of 0.096 pCi/m3 for all locations, versus an average of 0.070 pCi/m3 in 2006. 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/m³ in all samples. There was no indication of a plant effect.

lodine-131 results were below the detection limit of 0.5 pCi/L in all samples. Cs-137 results were below the LLD level of 5 pCi/L in all samples. No other gamma-emitting isotopes, except naturally-occurring potassium-40, were detected in any milk samples. This is consistent with the findings of the National Center for Radiological Health that most radiocontaminants in feed do not find their way into milk due to the selective metabolism of the cow. The common exceptions are radioisotopes of potassium, cesium, strontium, barium, and iodine (National Center for Radiological Health, 1968).

In summary, the milk data for 2007 is consistent with previous results and show no radiological effects of the plant operation.

Drinking Water

In drinking water from the City of Red Wing well, tritium activity measured below the LLD level of 500 pCi/L in all samples.

Gross beta concentrations averaged 11.6 pCi/L throughout the year, ranging from 6.9–17.5 pCi/L. These concentrations are consistent with levels observed from 1992 through 2006. The most likely contribution is the relatively high levels of naturally-occurring radium. Gamma spectroscopy indicates the presence of lead and bismuth isotopes, which are daughters of the radium decay chain. There is no indication from the 2007 data of any effect of plant operation.

Year	Gross Beta (pCi/L)
1992	7.6
1993	7.5
1994	5.8
1995	3.9
1996	6.3
1997	5.1
1998	5.4
1999	5.3
2000	10.1
2001	8.3
2002	8.7
2003	9.9
2004	9.8
2005	11.5
2006	13.4
2007	11.6

Average annual concentrations; Gross beta in drinking water.

River Water

λ

For 2007, no measurable tritium activity was detected in river water composites, above the LLD level of 500 pCi/L.

Gamma-emitting isotopes were below detection limits in all samples.

Well Water

At control well, P-43 (Peterson Farm) and the four indicator wells (P-8, Community Center, P-6, Lock and Dam No. 3, P-9, Plant Well No. 2 and P-24, Suter Farm) no tritium was detected above the LLD level of 500 pCi/L.

Gamma-emitting isotopes were below detection limits in all samples.

In summary, well water data for 2007 show no radiological effects of the plant operation.

Crops

Three samples of broadleaf vegetation, cabbage leaves, were collected in July and analyzed for gamma-emitting isotopes, including iodine-131. The I-131 level was below 0.033 pCi/g wet weight in all samples. With the exception of naturally-occurring potassium-40, all other gamma-emitting isotopes were below their respective detection limits. There was no indication of a plant effect.

Field sampling personnel conducted an annual land use survey and found no river water taken for irrigation into fields within 5 miles downstream from the Prairie Island Plant. The collection and analysis of corn samples was not required.

Fish

Fish were collected in May and October, 2007 and analyzed for gamma emitting isotopes. Only naturally-occurring potassium-40 was detected, and there was no significant difference between upstream and downstream results. There was no indication of a plant effect.

Aquatic Insects or Periphyton

Aquatic insects (invertebrates) or periphyton were collected in May and September, 2007. With the exception of naturally occurring potassium-40, all gamma-emitting isotopes were below their respective detection limits. There was no indication of a plant effect.

Bottom and Shoreline Sediments

Upstream, downstream and downstream recreational area shoreline sediments were sampled in May and September, 2007 and analyzed for gamma-emitting isotopes. With the exception of naturally occurring potassium-40, all gamma-emitting isotopes were below their respective detection limits. There was no indication of a plant effect.

5.0 FIGURES AND TABLES

Figure 5-1. Offsite Ambient Radiation (TLDs); average of inner and outer ring indicator locations versus control location.





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



PRAIRIE ISLAND

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

			Collection	Analysis
		Location	Type and	Type and
Medium	No.	Codes (and Type) [®]	Frequency	Frequency
Anthieve and inting (TI Dia)	54	D044 D404	C/O	Ambient damma
Ambient radiation (ILD'S)	54	P-01A - P-10A	C∕Q	Ampient Bannna
		P-01B - P-15B		
		P-015 - P-085		
		P-011A - P-081A		
		P-0118 - P-0818		
		P-011X- P-041X, P-01C		
Airborne Particulates	5	P-1(C), P-2,	C/W	GB, GS (QC of
		P-3, P-4, P-6		each location)
Airborne Iodine	5	P-1(0) P-2 P-3 P-4 P-6	C/W	L131
Andome ioune	5	F-1(0), F-2, F-3, F-4, F-0	0, 11	1 202
Milk	5	P-14, P-18, P-37, P-42, P-44,	G/M ^d	I-131, GS
		P-43 (C)		
River water	2	P-5(C), P-6	G/W	GS(MC), H-3(QC)
	4	D 44	C (M	GB(MC) 131(MC)
Drinking water	1	r-11	G/ W	GS (MC), H-3 (QC)
Well water	5	P-6, P-8, P-9, P-24,	G/Q	H-3, GS
		P-43 (C)		
Edible cultivated crons -	2	D.38(C) D.34	G/A	65 (1-131)
leafy green vegetables	2	F-30(0), F-2 4	G/A	
Tisk (see see sins adding montion)	2	D 40(0) D 42	C/SA	65
Fish (one species, earble portion)	2	P-19(U), P-13	u/ 3A	65
Periphyton or invertebrates	2	P-40(C), P-6	G/SA	GS
Bottom sediment	2	P-20(C), P-6	G/SA	GS
Shoreline sediment	1	P-12	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).

PRAIRIE ISLAND

Table 5.2. Sampling locations, Prairie Island Nuclear Generating Plant.

Code	Type ^a	Collection Site	Sample Type ^b	Distance and Direction from Reactor
P-1	с	Air Station P-1	AP, AI	11.8 mi @ 316°/NNW
P-2		Air Station P-2	AP, AI	0.5 mi @ 294°/WNW
P-3		Air Station P-3	AP, AI	0.8 mi @ 313°/NW
P-4		Air Station P-4	AP, AI	0.4 mi @ 359°/N
P-5	С	Upstream of Plant	RW	1.8 ml @ 11°/N
P-6		Lock and Dam #3 & Air	AP, AI, RW	
		Station P-6	WW, BS, BO ^c	1.6 mi @ 129°/SE
P-8		Community Center	WW	1.0 mi @ 321°/WNW
P-9		Plant Well #2	ww	0.3 mi @ 306°/NW
P-11		Red Wing Service Center	DW	3.3 mi @ 158°/SSE
P-12		Downstream of Plant	SS	3.0 mi @ 116°/ESE
P-13		Downstream of Plant	F	3.5 mi @ 113°/ESE
P-14		Gustafson Farm	M	2.3 mi @ 173°/S
P-18		Christiansen Farm	M	3.8 mi @ 88°/E
P-19	C	Upstream of Plant	F°	1.3 mi @ 0°/N
P-20	С	Upstream of Plant	BS	0.9 mi @ 45°/NE
P-24		Suter Residence	VE, WW	0.6 mi @ 158°/SSE
P-37		Welsch Farm	М	4.1 mi @ 87°/E
P-38	С	Cain Residence	VE	14.2 mi @ 359°/N
P-40	С	Upstream of Plant	BO°	0.4 mi @ 0⁰/N
P-42		Rother Farm	M	4.3 mi. @ 264°/W
P-43	С	Peterson Farm	M, WW	13.9 mi. @ 355°/N
P-44		Yoemans Farm	M	2.0 mi. @ 214°/SW
General	Area of t	ne Site Boundary		
P-01A		Property Line	TLD	0.4 mi @ 359°/N
P-02A		Property Line	TLD	0.3 mi @ 10°/N
P-03A		Property Line	TLD	0.5 mi @ 183°/S
P-04A		Property Line	TLD	0.4 mi @ 204°/SWW
P-05A		Property Line	TLD	0.4 mi @ 225°/SW
P-06A		Property Line	TLD	0.4 mi @ 249°/WSW
P-07A		Property Line	TLD	0.4 mi @ 268°/W
P-08A		Property Line	TLD	0.4 mi @ 291°/WNW
P-09A		Property Line	TLD	0.7 mi @ 317°/NW
P-10A		Property Line	TLD	0.5 mi @ 333°/NNW

Table 5.	2. Sampl	ing locations, Prairie Island Nuclear G	enerating Plant, (contl	nued).
Code	Type®	Collection Site	Sample Type ^b	Distance and Direction from Reactor
Approxin	nately 4 t	o 5 miles Distant from the Plant		
P-01B		Thomas Killian Residence	TLD	4.7 mi @ 355°/N
P-02B		Roy Kinneman Residence	TLD	4.8 mi @ 17°/NNE
P-03B		Wayne Anderson Farm	TLD	4.9 mi @ 46°/NE
P-04B		Nelson Drive (Road)	TLD	4.2 mi @ 61°/ENE
P-05B		County Road E and Coulee	TLD	4.2 mi @ 102°/ESE
P-06B		William Hauschibit Residence	TLD	4.4 mi @ 112°/ESE
P-07B		Red Wing Public Works	TLD	4.7 mi @ 140°/SE
P-08B		David Wnuk Residence	TLD	4.1 mi @ 165°/SSE
2-09B		Highway 19 South	TLD	4.2 ml @ 187°/S
P-10B		Cannondale Farm	TLD	4.9 mi @ 200°/SSW
P-118		Wallace Weberg Farm	TLD	4.5 mi @ 221°/SW
P-12B		Ray Gergen Farm	TLD	4.6 mi @ 251°/WSW
P-13B		Thomas O'Rourke Farm	TLD	4.4 mi @ 270°/W
P-14B		David J. Anderson Farm	TLD	4.9 mi @ 306°/NW
P-15B		Holst Farms	TLD	3.8 mi @ 345°/NNW
Special Ir	nterest Lo	cations		
-015		Federal Lock & Dam #3	TLD	1.6 mi @ 129°/SE
P-025		Charles Suter Residence	TLD	0.5 mi @ 155°/SSE
2-03S		Carl Gustafson Farm	TLD	2.2 mi @ 173°/S
2-04S		Richard Burt Residence	TLD	2.0 mi @ 202°/SSW
-055		Kinney Store	TLD	2.0 mi @ 270°/W
-065		Earl Flynn Farm	TLD	2.5 mi @ 299°/WNW
-075		Indian Community	TLD	0.7 mi @ 271°/W
·-08S		Indian Community	TLD	0.7 mi @ 287°/NWW
·-01C	С	Robert Kinneman Farm	TLD	11.1 mi @ 331°/NNW

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Approximate Type of **Distance and Direction** Code **Collection Site** Sample from ISFSI Center. Type[®] **ISFSI Area Inside Earth Berm** 190' @ 45°/NE TLD P-01IA **ISFSI Nuisance Fence** 360' @ 82°/E P-021A **ISFSI Nuisance Ferice** TLD P-03IA **ISFSI Nuisance Fence** TLD 370' @ 100°/E 200' @ 134°/SE TLD P-04IA ISFSI Nuisance Fence 180' @ 219°/SW **ISFSI Nuisance Fence** TLD P-05IA P-06IA **ISFSI Nuisance Fence** TLD 320' @ 258°/WSW 320' @ 281°/WNW P-07IA **ISFSI Nuisance Fence** TLD 190'@318°/NW P-08IA **ISFSI Nuisance Fence** TLD P-01IX **ISFSI Nuisance Fence** TLD 140'@180°/S **ISFSI Nuisance Fence** TLD 310' @ 270°/W P-02IX **ISFSI Nuisance Fence** 140'@0°/N P-03IX TLD 360' @ 90°/E **ISFSI Nuisance Fence** P-04IX TLD **ISFSI Area Outside Earth Berm** 340' @ 3°/N P-01IB **ISFSI Berm Area** TLD P-02IB **ISFSI Berm Area** TLD 380' @ 28°/NNE P-03IB **ISFSI Berm Area** TLD 560' @ 85°/E 590' @ 165°/SSE P-04IB **ISFSI Berm Area** TLD P-05IB **ISFSI Berm Area** TLD 690'@186°/S 720' @ 201°/SSW P-06IB **ISFSI Berm Area** TLD P-07IB **ISFSI Berm Area** TLD 610'@271°/W P-08IB **ISFSI Berm Area** TLD 360' @ 332°/NNW

PRAIRIE ISLAND

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

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

^b Sample Codes:			
AP	Airborne particulates	F	Fish
AI	Airborne Iodine	м	Milk
BS	Bottom (river) sediments	SS	Shoreline Sediments
BO	Bottom organisms	SW	Surface Water
	(periphyton or macroinvertebrates)	VE	Vegetation/vegetables
DW	Drinking water	ww	Well water

⁶ Distance and direction data for fish and bottom organisms are approximate since availability of sample specimen may vary at any one location.

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

Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Plans for Preventing Recurrence
AP/AI	Beta, I-131	P-02	2/21/2007	Sampler pump failure.	Sampler pump was replaced with a calibrated spare.
AP	Beta,	P-06	4/18/2007	Filter not installed.	None required.
TLD	Ambient Gamma	P-07B	2nd. Qtr. 2007	TLD missing in field.	None required.
AP/AI	Beta, I-131	P-06	7/18/2007	Only 86 hours run-time logged.	Sampler pump was replaced with a calibrated spare.
AP/AI	Beta, I-131	P-01	8/15/2007	Only 66 hours run-time logged.	Sampler pump was replaced with a calibrated spare.
Mi	Gamma, I-131	P-14	Sept. 12 - Dec. 31, 2007	Dairy discontinued operations,	None, requirements of the ODCM are still met.
MI	Gamma, I-131	P-44	Jan., Nov., Dec., 2007	Goats were dry.	The goat milk is available during the grazing season.

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

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility		Prairie Island Nuclear Power Station		Docket No.	50-282, 50-306			
Location of Facility		ty	Goodhu	e, Minnesota	Reporting Period		January-December, 2007	
				(Count	y, State)			
	1		Τ	Indicator	Location with H	lighest	Control	Number
Sample	Type a	nd	1	Locations	Annual Me	an	Locations	Non-
Туре	Numbe	r of	LLD	Mean (F) ^c		Mean (F) ^c	Mean (F) ^c	Routine
(Units)	Analys	esª		Range ^c	Location ^d	Range ^c	Range ^c	Results ^e
			1					
TLD (Inner Ring,	Gamma	40	3.0	16.8 (40/40)	P-06A	18.2 (4/4)	(See Control	0
Area at Site				(13.5-19.0)	0.4 mi @ 249° /WSW	(17.5-19.0)	below.)	
Boundary)								
mR/91 days)								
TLD (Outer Ring,	Gamma	59	3.0	17.9 (59/59)	P-02B, Roy Kinneman,	19.8 (4/4)	(See Control	0
4-5 mi. distant)	1			(14.5-20.9)	4.8 mi @ 17° /NNE	(18.9-20.9)	below.)	
mR/91 days)								
TLD (Special	Gamma	32	3.0	16.9 (32/32)	P-03S, Gustafson Farm,	19.4 (4/4)	(See Control	0
Interest Areas)				(14.1-20.9)	2.2 mi @ 173° /S	(18.4-20.4)	below.)	
mR/91 days)								
	[[
TLD (Control)	Gamma	4	3.0	None	P-01C, R. Kinneman,	17.7 (4/4)	17.7 (4/4)	0
mR/91 days)					11.1 mi @ 331° /NNW	(16.2-19.5)	(16.2-19.5)	
Airborne	GB	259	0.005	0.037 (207/207)	P-03, Air Station	0.041 (52 /52)	0.031 (52/52)	0
Particulates				(0.005-0.081)	0.8 mi @ 313° /NW	(0.019-0.081)	(0.015-0.069)	
(pCi/m ³)					-			
	GS	20						
	Be-7		0.015	0.102 (16/16)	P-03, Air Station	0.114 (4/4)	0.073 (4/4)	0
				(0.046-0.182)	0.8 mi @ 313° /NW	(0.066-0.179)	(0.052-0.099)	
					-			
	Mn-54		0.0007	< LLD	-	-	< LLD	0
	Co-58		0.0007	< LLD	-	-	< LLD	0
	Co-60		0.0009	< LLD	-	-	< LLD	0
	Zn-65		0.0008	< LLD	-	-	< LLD	0
	Zr-Nb-	95	0.0010	< LLD	-	-	< LLD	0
	Ru-10	3	0.0008	< LLD	-	-	< LLD	0
	Ru-10	6	0.0066	< LLD	•	-	< LLD	0
	Cs-134	4	0.0006	< LLD	-	-	< LLD	0
	Cs-13	7	0.0008	< LLD	•	-	< LLD	0
	Ba-La-	140	0.0038	< LLD	-	-	< LLD	0
	Ce-14	1	0.0017	< LLD	-	-	< LLD	0
ĺ	Ce-14	4	0.0043	< LLD	-	-	< LLD	0
							 	
Airborne lodine	I-131	259	0.03	< LLD	-	-	< LLD	0
(pCi/m ³)								

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility Location of Facility

Goodhue, Minnesota (County, State)

Prairie Island Nuclear Power Station

Docket No.50-282, 50-306Reporting PeriodJanuary-December, 2007

	ļ				Indicator	Location with Highest		Control	Number
	Sample	Type and			Locations	Annual Me	Annual Mean		Non-
	Туре	Num	nber of	LLD [®]	Mean (F) ^c		Mean (F) ^c	Mean (F) ^c	Routine
	(Units)	Ana	lyses ^a		Range ^c	Location ^d	Range ^c	Range ^c	Results ^e
I	Milk								
	(pCi/L)	1-131	100	0.5	< LLD	-	-	< LLD	0
l			1						
l		GS	100						
I		K	40	200	1468 (82/82)	P-44, Yoemans Farm	1819 (15 /15)	1441 (18/18)	0
ļ		ļ			(1190-2152)	2.0 mi @ 214° /SW	(1231-2152)	(1351-1571)	
		Cs	-134	5	< LLD	-	-	< LLD	0
		Cs	-137	5	< LLD	-	-	< LLD	0
Į		Ba	-La-140	5	< LLD	-	-	< LLD	0
ļ									
	River Water	Н-3	8	500	< LLD	_	-	< LLD	0
Ì	(pCi/L)								-
		GS	24						
		Mn	-54	10	< LLD	-	-	< LLD	0
		Fe	-59	30	< LLD	•	-	< LLD	0
		Co	-58	10	< LLD	-	-	< LLD	0
	-	Co	-60	10	< LLD	-	-	< LLD	0
		Zn-	-65	30	< LLD	-	-	< LLD	0
		Zr-	Nb-95	15	< LLD	-	-	< LLD	0
		Cs	-134	10	< LLD	-	-	< LLD	0
		Cs	-137	10	< LLD	-	•	< LLD	0
		Ba-	-La-140	15	< LLD	-	-	< LLD	0
		Ce	-144	43	< LLD	-	-	< LLD	0

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility Location of Facility Prairie Island Nuclear Power Station Goodhue, Minnesota

Docket No. Reporting Period January-December, 2007

50-282, 50-306

Indicator Location with Highest Control Number Sample Type and Locations Annual Mean Locations Non-LLD⁵ Mean (F)^c Number of Mean (F)^c Mean (F)^c Routine Туре Results^e Analyses^a Location^d Range^c Range^c Range^c (Units) **Drinking Water** 0 GB 12 P-11, Red Wing S.C. 11.6 (12/12) 1.0 11.6 (12/12) None (6.9-17.5) (pCi/L) 3.3 mi @ 158° /SSE (6.9-17.5) 1-131 12 1.0 < LLD None 0 H-3 4 500 < LLD None 0 GS 12 Mn-54 10 < LLD None 0 Fe-59 < LLD 0 30 None Co-58 10 < LLD None 0 Co-60 < LLD 0 10 None 0 Zn-65 30 < LLD None 0 Zr-Nb-95 < LLD 15 None Cs-134 < LLD 0 10 None Cs-137 < LLD 0 10 None 0 Ba-La-140 15 < LLD None Ce-144 51 < LLD None 0 . Well Water H-3 20 500 < LLD < LLD 0 • -(pCi/L) GS 20 0 Mn-54 10 < LLD < LLD Fe-59 30 < LLD < LLD 0 _ Co-58 10 < LLD < LLD 0 _ Co-60 < LLD < LLD 10 0 Zn-65 < LLD < LLD 0 30 Zr-Nb-95 15 < LLD < LLD 0 Cs-134 < LLD < LLD 0 10 Cs-137 < LLD 0 10 < LLD Ba-La-140 15 < LLD < LLD 0 Ce-144 42 < LLD < LLD 0 Crops - Cabbage I-131 0.033 < LLD < LLD 0 3 . -(pCi/gwet)

(County, State)

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility Location of Facility

acility	Prairie Island Nuclear Power Station	Docket No.	50-282, 50-306
of Facility	Goodhue, Minnesota	Reporting Period	January-December, 2007

(County, State)

			Indicator	Location with Highest		Control	Number
Sample	Type and		Locations	Annual Mean		Locations	Non-
Туре	Number of	LLD [®]	Mean (F) ^c		Mean (F) ^c	Mean (F) ^c	Routine
(Units)	Analyses ^a		Range ^c	Location ^d	Range ^c	Range ^c	Results ^e
Fish	GS 4					,	
(pCi/g wet)	K-40	0.10	3.17 (2/2)	P-19, Upstream	3.44 (2/2)	3.44 (2/2)	0
			(2.85-3.49)	1.3 mi @ 0°/N	(3.40-3.47)	(3.40-3.47)	
	Mn-54	0.014	< LLD	-	-	< LLD	0
	Fe-59	0.091	< LLD	-		< LLD	0
	Co-58	0.022	< LLD	-	-	< LLD	0
]	Co-60	0.023	< LLD	-	-	< LLD	0
{	Zn-65	0.021	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.029	< LLD	-	-	< LLD	0
	Cs-134	0.020	< LLD	-	-	< LLD	0
	Cs-137	0.024	< LLD	-	-	< LLD	0
	Ba-La-140	0.12	< LLD	-	-	< LLD	0
Invertebrates	GS 4						
(pCi/g wet)	Be-7	0.69	< LLD	-		< LLD	0
	K-40	0.74	< LLD	-	-	< LLD	0
						-	
	Mn-54	0.035	< LLD	-		< LLD	0
	Co-58	0.060	< LLD	-	-	< LLD	0
	Co-60	0.036	< LLD	•	•	< LLD	0
	Zn-65	0.062	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.18	< LLD	•	-	< LLD	0
	Ru-103	0.13	< LLD	-	-	< LLD	0
	Ru-106	0.31	< LLD	-	-	< LLD	0
	Cs-134	0.032	< LLD	-	~	< LLD	0
	Cs-137	0.030	< LLD	-	-	< LLD	0
	Ba-La-140	2.36	< LLD	-		<pre>LLD</pre>	0
	Ce-141	0.30	< LLD	-	-	< LLD	0
	Ce-144	0.19	< LLD	*	-	< LLD	0
						1	1

Table 5.4 Radiological Environmental Monitoring Program Summary

Name of Facility	Prairie Island Nuclear Power Station	Docket No.	50-282, 50-306
Location of Facility	Goodhue, Minnesota	Reporting Period	January-December, 2007
	(County, State)		

			Indicator	Location with Highest		Control	Number
Sample	Type and		Locations	Annual Mean		Locations	Non-
Туре	Number of	LLD⁰	Mean (F) ^c		Mean (F) ^c	Mean (F) ^c	Routine
(Units)	Analyses ^a		Range ^c	Location ^d	Range ^c	Range ^c	Results ^e
Bottom and	GS 6						
Shoreline	Be-7	0.33	< LLD	-	-	< LLD	0
Sediments		1					
(pCi/g dry)	K-40	0.10	7.83 (4/4)	P-20, Upstream	9.11 (2/2)	9.11 (2/2)	0
			(6.93-8.85)	0.9 mi. @ 45° /NE	(9.00-9.21)	(9.00-9.21)	
[Mn-54	0.028	< LLD	-	-	< LLD	0
	Co-58	0.034	< LLD	-	-	< LLD	0
	Co-60	0.021	< LLD	-	-	< LLD	0
	Zn-65	0.068	< LLD	-	-	< LLD ·	0
	Zr-Nb-95	0.067	< LLD	-	-	< LLD	0
	Ru-103	0.040	< LLD	-	-	< LLD	0
	Ru-106	0.14	< LLD	-	-	< LLD	0
	Cs-134	0.029	< LLD	-	-	< LLD	0
	Cs-137	0.022	< LLD	-	-	< LLD	0
	Ba-La-140	0.39	< LLD	-	-	< LLD	0
	Ce-141	0.13	< LLD	-	•	< LLD	0
	Ce-144	0.17	< 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).

^o 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 through December, 2007

Appendix A

Interlaboratory Comparison Program Results

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

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

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

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

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

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

Table A-5 lists REMP specific analytical results from the in-house "duplicate" program for the past twelve months Acceptance is based on the difference of the results being less than the sum of the errors. Complete analytical data for duplicate analyses is available upon request.

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

Results in Table A-7 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

Attachment A lists acceptance criteria for "spiked" samples.

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

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES*

		One standard deviation
Analysis	Leve	for single determination
Gamma Emitters	5 to 100 pCi/liter or kg	50 pCi/liter
	> 100 pCi/liter or kg	5% of known value
Strontium-89 ⁶	5 to 50 pCi/liter or kg	5.0 pCi/liter
	> 50 pCi/liter or kg	10% of known value
	, 2	
"Strontium-90"	2 to 30 pCi/liter or kg	5.0 pCi/liter
	> 30 pCi/liter or kg	10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Cross alpha		
Gloss alpha	$\geq 20 \text{ pCi/liter}$	5.0 pC/mei
1		
Gross beta	≤ 100 pCi/liter	5.0 pCi/liter
	> 100 pCi/liter	5% of known value
Tritium	≤ 4,000 pCi/liter	±1σ =
		169.85 x (known) ^{0.0933}
	> 4,000 pCi/liter	10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	> 0.1 pCi/liter gram or sample	10% of known value
	2 0.1 permer, gram, or sample	
lodine-131,	≤ 55 pCi/liter	6.0 pCi/liter
lodine-129 ^b	> 55 pCi/liter	10% of known value
	•	
Uranium-238,	≤ 35 pCi/liter	6.0 pCi/liter
Nickel-63 [⊳]	> 35 pCi/liter	15% of known value
Technetium-99 ^b		
Iron-55°	50 to 100 pCi/liter	10 pCi/liter
	> 100 pCi/liter	10% of known value
Others ^b		20% of known value
Cuiora -		2070 OF KHOWH VAIDE

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

^b Laboratory limit.

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

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)⁶.

^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.

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

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

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

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CORRECTED PAGE

		Concentration (pCi/L) ^a							
Lab Code ^b	Date	Analysis	Laboratory results	Known	Control				
			2s, n=1 ^c	Activity	Limits ^d	Acceptance			
W-30707	3/7/2007	Gr Alnha	19 51 + 0 40	20.08	10.04 - 30.12	Pass			
W-30707	3/7/2007	Gr. Beta	67.45 ± 0.49	65.73	55.73 - 75.73	Pass			
SPAP-1566	3/23/2007	Cs-134	25.35 + 1.31	27.82	17.82 - 37.82	Pass			
SPAP-1566	3/23/2007	Cs-137	107.52 + 3.02	116.48	104.83 - 128.13	Pass			
SPW-1568	3/23/2007	Н-3	65595.00 + 672.00	71118.00	56894.40 - 85341.60	Pass			
SPW-1678	3/28/2007	Tc-99	28.44 ± 1.12	32.35	20.35 - 44.35	Pass			
SPW-1595	4/5/2007	Cs-134	54.48 + 2.12	54,99	44.99 - 64.99	Pass			
SPW-1595	4/5/2007	Cs-137	59.03 + 2.94	58 19	48 19 - 68 19	Pass			
SPW_1595	4/5/2007	1-131(G)	83 11 + 3 51	82.07	72 07 - 92 07	Pass			
SDW/-15054	4/5/2007	1-131	78 40 + 1 10	82.07	65 66 - 98 48	Pass			
SPW-15958	4/5/2007	1-131	78.97 + 1.10	82.07	65 66 - 98 48	Pass			
SPMI_1507	4/5/2007	Ce-134	54.03 + 2.15	54 99	44 99 - 64 99	Pass			
SPMI-1597	4/5/2007	Cs-137	59.81 + 4.75	58 19	48 19 - 68 19	Pass			
SDMI-1597	4/5/2007	L131(G)	83.07 + 4.07	82.07	72 07 - 92 07	Page			
SPMI-1597	4/5/2007	1-131(G)	70 53 + 1 03	82.07	65 66 - 98 48	Pass			
SPMI-1597A	4/5/2007	1-131	83.51 + 1.05	82.07	65 66 - 98 48	Pass			
SPCH-2830	5/17/2007	1-131(G)	78 70 + 7 36	70.40	60.40 - 80.40	Pass			
SP CI -2009	5/19/2007	C_{n-134}	55 /3 ± 1 68	52.85	42.85 - 62.85	Pass			
SF W-2047	5/18/2007	Ce 137	50.45 ± 7.00	58.03	48.03 - 68.03	Pass			
SP W-2047	5/18/2007	L121	60 14 ± 0 89	70.87	56 70 - 85 0 <i>4</i>	Pass			
SFW-2047	5/18/2007	1-131 1 121/(G)	63.05 ± 2.60	70.07	60 87 - 80 87	Pass			
SFW-2047	5/10/2007	6r 90	104 03 ± 6 64	121.00	07.52 - 146.28	Pass			
SPVV-2041	5/10/2007	SI-09	104.93 ± 0.04	121.90	36.86 - 55.20	Pass			
ST VV-2047	5/10/2007	SI-90	40.72 ± 1.97 51.27 ± 1.65	40.00 52.95	12 85 62 85	Pass			
SPIMI-2049	5/16/2007	Co 127	51.37 ± 1.03	52.00	42.00 - 02.00	Pass			
SFWI-2049	5/10/2007	1 1 2 1	67.07 ± 0.99	70.03	40.00 - 00.00 56 70 95 04	Pass			
SPIVII-2049	5/10/2007	1-131	07.97 ± 0.00	70.87	50.70 - 65.04 60.97 - 90.97	Pass			
SPWI-2049	5/16/2007	1-131(G) C= 00	02.44 ± 0.14	10.07	07.52 146.29	Pass			
SPIVII-2049	5/10/2007	SI-09	102.04 ± 0.03	121,90	36.96 - 55.20	Pass			
SPINI-2049	5/10/2007	51-90	44.00 ± 2.37	40.00	11/17 20 17125 80	Fass			
SDW 2011	5/22/2007	н ₋ з	65023.00 ± 670.00	70485.00	56388.00 - 84582.00	Pass			
SEN0-2911	5/22/2007	Gr. Rota	55 27 ± 9 51	52.65	12 12 - 72 71	Pass			
SPAF-2913	5/22/2007		33.27 ± 0.01	32.00	42.12 - 13.11	Pass			
SFAF-2915	5/22/2007	Co 127	22.00 ± 1.12	116.06	10.42 - 30.42	Pass			
SFAF-2915	5/22/2007	Co 124	0.52 ± 0.02	0.53	0.22 0.74	Pass			
SFF-2922	5/22/2007	Cs-134	0.52 ± 0.03	0.00	1 20 2 25	Page			
STT-2822	5/22/2007	US-137	2.00 I U.U/ 2222 10 ± 10 22	2125 00	1281 54 2000 26	F dSS Doop			
SE 11-3223	0/24/2007	Gr Alaba	2200. TU I TU.02 20 03 ± 0 42	2130.90	10 04 - 20 12	F dSS Doop			
W 60507	6/5/2007	Gr. Aiplia	20.33 I 0.42	20.00	10.04 - 30.12 55 72 75 72	F 855			
	7/10/2007		00.00 I 0.40 05 50 ± 4 44	00.13	00.10 + 10.10 00.05 AA 95	F dSS			
3777-4321 9011/ 5176	1/10/2007 9/17/2007	10-99 Ni 62	20.00 I 1.11 1025 18 ± 0.62	32.30	20.00 - 44.00	rass Base			
3FVV-3470	0/17/2007	Cr Alaba	1920.10 I 9.02	2130,80	10 04 - 2990.20	F 855 Doop			
W-92107	9/21/2007	Gr. Roto	61 /8 ± 0 /7	20.00	10.04 - 30.12 55 73 75 72	Pass			
VV-5210/	312112001	GI. Dela	U1.40 I U.4/	00.73	33.73 - 73.73	r 855			

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

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Concentration (pCi/L) ^a								
Lab Code ^b	Date	Analysis	Laboratory results 2s, n≃1 ^c	Known Activity	Control Limits ^d	Acceptance		
SPW-6880	10/10/2007	Tc-99	30.97 ± 1.21	32.35	20.35 - 44.35	Pass		
W-111007	11/10/2007	Gr. Alpha	22.43 ± 0.42	20.08	10.04 - 30.12	Pass		
W-111007	11/10/2007	Gr. Beta	64.49 ± 0.48	65.73	55.73 - 75.73	Pass		
SPAP-7742	11/13/2007	Cs-134	21.18 ± 1.29	22.41	12.41 - 32.41	Pass		
SPAP-7742	11/13/2007	Cs-137	113.61 ± 3.16	114.76	103.28 - 126.24	Pass		
SPAP-7744	11/13/2007	Gr. Beta	53.41 ± 0.13	52.03	41.62 - 72.84	Pass		
SPMI-7746	11/13/2007	Cs-134	42.20 ± 1.48	44.83	34.83 - 54.83	Pass		
SPMI-7746	11/13/2007	Cs-137	56.05 ± 2.83	57.40	47.40 - 67.40	Pass		
SPMI-7746	11/13/2007	Sr-90	41.02 ± 1.61	45.54	36.43 - 54.65	Pass		
SPW-7748	11/13/2007	Cs-134	43.11 ± 1.52	44.80	34.80 - 54.80	Pass		
SPW-7748	11/13/2007	Cs-137	59.28 ± 3.50	57.40	47.40 - 67.40	Pass		
SPW-7748	11/13/2007	Sr-90	37.23 ± 1.51	45.54	36.43 - 54.65	Pass		
SPW-7750	11/13/2007	C-14	4479.20 ± 15.67	4742.00	2845.20 - 6638.80	Pass		
SPW-7752	11/13/2007	Fe-55	12935.10 ± 357.00	12640.50	10112.40 - 15168.60	Pass		
SPW-7758	11/13/2007	H-3	65405.00 ± 712.50	68618.00	54894.40 - 82341.60	Pass		
SPF-7760	11/13/2007	Cs-134	0.45 ± 0.02	0.45	0.27 - 0.63	Pass		
SPF-7760	11/13/2007	Cs-137	2.45 ± 0.07	2.29	1.37 - 3.21	Pass		
SPW-8034	11/13/2007	Ni-63	2194.06 ± 10.77	2129.03	1277.42 - 2980.64	Pass		

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

^b Laboratory codes as follows: W (water), MI (milk), AP (air filter), SO (soil), VE (vegetation),

,

CH (charcoal canister), F (fish).

^c Results are based on single determinations.

^d Control limits are established from the precision values listed in Attachment A of this report, adjusted to $\pm 2\sigma$.

^e Sample recount: 12557 ± 335.

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

A3-2

			_		Concentration (pCi/	L) ^a
Lab Code	Sample	Date	Analysis ^b	Laborato	ry results (4.66a)	Acceptance
	Туре			LLD	Activity ^c	Criteria (4.66 σ)
W-30707	water	3/7/2007	Gr. Alpha	0.40	0.01 ± 0.28	2
W-30707	water	3/7/2007	Gr. Beta	0.75	0.06 ± 0.53	4
SPAP-1567	Air Filter	3/23/2007	Cs-134	0.79		100
SPW-1567	Air Filter	3/23/2007	Cs-137	1.01		100
SPW-1568	water	3/23/2007	H-3	176.10	-26.16 ± 91.62	200
SPW-1596	water	4/5/2007	Cs-134	3.28		[~] 10
SPW-1596	water	4/5/2007	Cs-137	3.45		10
SPW-1596	water	4/5/2007	I-131	0.27	0.02 ± 0.18	0.5
SPW-1596	water	4/5/2007	I-131(G)	2.91		20
SPMI-1598	Milk	4/5/2007	Cs-134	3.30		10
SPMI-1598	Milk	4/5/2007	Cs-137	5.08		10
SPMI-1598	Milk	4/5/2007	1-131	0.26	-0.10 ± 0.17	0.5
SPMI-1598	Milk	4/5/2007	I-131(G)	4.10		20
SPCH-2839	Charcoal Canister	5/17/2007	I-131(G)	2.24		9.6
SPW-2848	water	5/17/2007	Cs-134	3.14		10
SPW-2848	water	5/17/2007	Cs-137	1.37		10
SPW-2848	water	5/17/2007	I-131(G)	5.34		20
SPMI-2850	Milk	5/17/2007	Cs-134	3.32		10
SPMI-2850	Milk	5/17/2007	Cs-137	2.60		10
SPMI-2850	Milk	5/17/2007	I-131(G)	4.77		20
SPW-2848	water	5/18/2007	1-131	0.34	-0.06 ± 0.19	0.5
SPW-2848	water	5/18/2007	Sr-89	0.81	-0.02 ± 0.65	5
SPW-2848	water	5/18/2007	Sr-90	0.53	0.01 ± 0.25	1
SPMI-2850	Milk	5/18/2007	1-131	0.45	0.20 ± 0.26	0.5
SPMI-2850	Milk	5/18/2007	Sr-89	0.96	-0.73 ± 1.02	5
SPMI-2850 d	Milk	5/18/2007	Sr-90	0.58	0.96 ± 0.38	1
SPAP-2914	Air Filter	5/22/2007	Gr. Beta	0.004	-0.002 ± 0.002	0.01
SPAP-2916	Air Filter	5/22/2007	Cs-134	2.84	0.000 # 0.000	100
SPAP-2916	Air Filter	5/22/2007	Cs-137	2.24		100
SPF-2923	Fish	5/22/2007	Cs-134	8.71		100
SPF-2923	Fish	5/22/2007	Cs-137	8.35		100
SPW-3224	water	5/24/2007	Ni-63	1.61	-0.30 ± 0.84	20
W-60507	water	6/5/2007	Gr. Alpha	0.43	-0.01 ± 0.30	2
W-60507	water	6/5/2007	Gr. Beta	0.77	0.01 ± 0.54	4
SPW-4328	water	7/18/2007	Tc-99	6.41	-3.12 ± 3.84	10
SPW-5477	water	8/17/2007	Ni-63	1.48	4.38 ± 1.01	20
W-92107	water	9/21/2007	Gr. Alpha	0.41	0.09 ± 0.29	2
N-92107	water	9/21/2007	Gr. Beta	0.75	-0.26 ± 0.51	4

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

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A4-1

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

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

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

 $^{\flat}$ I-131(G); iodine-131 as analyzed by gamma spectroscopy.

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

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

				Concentration (pCi/L)	8	
				- <u></u>	Averaged	
Lab Code	Date	Analysis	First Result	Second Result	Result	Acceptance
E-20, 21	1/2/2007	Gr. Beta	1.76 ± 0.07	1.70 ± 0.06	1.73 ± 0.05	Pass
E-20, 21	1/2/2007	K-40	1.49 ± 0.24	1.57 ± 0.27	1.53 ± 0.18	Pass
CF-41, 42	1/2/2007	Gr. Beta	18.02 ± 0.41	18.81 ± 0.42	18.42 ± 0.29	Pass
CF-41, 42	1/2/2007	K-40	11.68 ± 1.12	12.67 ± 0.97	12.18 ± 0.74	Pass
CF-41, 42	1/2/2007	Sr-90	0.039 ± 0.011	0.026 ± 0.010	0.033 ± 0.007	Pass
P-9516, 9517	1/3/2007	H-3	270.78 ± 91.74	301.18 ± 92.99	285.98 ± 65.31	Pass
LW-9579, 9580	1/4/2007	Gr. Beta	0.91 ± 0.31	0.93 ± 0.30	0.92 ± 0.22	Pass
DW-70085, 70086	1/9/2007	Gr. Alpha	7.95 ± 1.20	7.92 ± 1.42	7.94 ± 0.93	Pass
DW-70037, 70038	1/11/2007	Gr. Alpha	55.47 ± 3.99	52.87 ± 4.02	54.17 ± 2.83	Pass
DW-70054, 70055	1/18/2007	Gr. Alpha	2.68 ± 0.88	1.88 ± 0.78	2.28 ± 0.59	Pass
DW-70122, 70123	1/18/2007	Gr. Alpha	4.30 ± 1.14	6.25 ± 1.16	5.28 ± 0.81	Pass
DW-70122, 70123	1/18/2007	Gr. Beta	4.22 ± 0.70	5.33 ± 0.75	4.78 ± 0.51	Pass
DW-70098, 70099	1/25/2007	Gr. Alpha	3.27 ± 0.90	1.97 ± 0.92	2.62 ± 0.64	Pass
DW-70110, 70111	1/25/2007	Gr. Aipha	2.19 ± 0.92	1.69 ± 0.79	1.94 ± 0.61	Pass
SWU-676, 677	1/30/2007	Gr. Beta	1.77 ± 0.39	2.11 ± 0.39	1.94 ± 0.28	Pass
DW-70148, 70149	1/30/2007	Gr. Alpha	4.65 ± 1.37	5.20 ± 1.81	4.93 ± 1.14	Pass
SW-600, 601	2/1/2007	K-40	1.24 ± 0.12	1.20 ± 0.12	1.22 ± 0.08	Pass
SW-601, 602	2/1/2007	Gr. Beta	0.89 ± 0.37	1.02 ± 0.25	0.96 ± 0.22	Pass
DW-1138, 1139	2/9/2007	H-3	2707.00 ± 161.00	2700.00 ± 161.00	2703.50 ± 113.84	Pass
MI-721, 722	2/13/2007	K-40	1330.40 ± 117.60	1316:40 ± 116.50	1323.40 ± 82.77	Pass
SW-847, 848	2/13/2007	Gr. Alpha	3.82 ± 1.67	2.61 ± 1.24	3.22 ± 1.04	Pass
SW-847, 848	2/13/2007	Gr. Beta	7.33 ± 1.37	5.89 ± 0.90	6.61 ± 0.82	Pass
DW-70175, 70176	2/14/2007	Gr. Alpha	11.72 ± 1.68	8.84 ± 1.32	10.28 ± 1.07	Pass
DW-70187, 70188	2/14/2007	Gr. Alpha	6.79 + 1.18	6.47 + 1.08	6.63 ± 0.80	Pass
SWU-1162, 1163	2/27/2007	Gr. Beta	3.63 ± 0.69	261 ± 0.44	3.12 ± 0.41	Pass
DW-70205, 70206	2/28/2007	Gr. Alpha	0.88 ± 0.80	1.31 ± 0.79	$1 10 \pm 0.56$	Pass
PW-1117, 1118	3/1/2007	Gr Alpha	379 + 191	3.62 ± 2.09	371 + 142	Pass
PW-1117 1118	3/1/2007	Gr Beta	7.12 ± 1.01	7 20 + 1 39	7 16 + 0 99	Pass
W-2122, 2123	3/5/2007	Gr Ainha	6.10 ± 4.16	3.80 ± 4.30	4 95 + 2 99	Pass
W-2122, 2123	3/5/2007	Gr Beta	10.65 ± 2.15	13.11 + 2.42	4.00 ± 2.00	Pass
W-2085, 2086	3/6/2007	Gr Aloba	251 ± 2.10	1 10 + 2 78	1 81 + 1 80	Pass
W-2085 2086	3/6/2007	Gr Beta	2.07 ± 2.20	9.50 + 2.01	10.26 ± 1.37	Pass
DW-70232 70233	3/8/2007	Gr Alpha	4 75 + 1 28	5 08 + 1 31	537 ± 0.92	Pass
WW_1477 1478	3/12/2007	Gr. Reta	6.41 ± 1.48	4.10 ± 1.25	5 26 + 0.97	Pass
WW/_1408 1400	3/15/2007	Gr. Bota	0.93 ± 0.31	-9.70 ± 0.23	0.20 ± 0.07	Pass
WW-1450, 1455	3/10/2007	Gr. Alaba	0.03 ± 0.31	0.97 ± 0.00	0.30 ± 0.22	Pass
W-2140, 2141	3/19/2007	Gr. Apria	$2.31. \pm 1.37$	1.33 ± 1.04	1.02 ± 1.14	Pass
DW/ 1626 1627	3/21/2007	UI. Deta	4.20 I 1.00	5100 ± 1.02	4.92 ± 0.71	Pass
ML1647 1649	3/21/2007	(1+0 K AO	1440 00 + 400 00	1420 20 + 426 00	JUO 1. JU I 149.21	rdss Door
NA-1047, 1040	312112001	N-4U Or Alaba	1440.00 ± 120.20	1439.30 ± 120.00	10 50 ± 0 93	Pass
W-2150 2151	312112001	Gr. Alpha	11.10 ± 1.10 2.56 ± 2.20	3.30 ± 1.10	10.00 I 0.00 3 /3 - 1 /2	Page
W-2150 2151	3/26/2007	Gr Beta	0.00 I 2.20 0.26 ± 1.00	3.30 ± 1.01	0.70 ± 1.92	Pass
1W_1041 1042	3/31/2007	Gr Beta	5.20 I 1.00 1 35 ± 0 43	1.17 ± 1.50 1.26 ± 0.11	3.12 ± 1.01 1 36 + 0 30	Pace
LVV-1941, 1942	513112001	GI. Dela	1.30 ± 0.43	1.30 ± 0.41	1.30 I 0.30	F d 88

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			Concentration (pCi/L) ^a					
				Averaged				
Lab Code	Date	Analysis	First Result	Second Result	Result	Acceptance		
ML-1824 1825	A/2/2007	K-40	1316 10 + 110 60	1220 80 + 110 50	1272 05 + 78 17	Pace		
MI-1824, 1825	4/2/2007	Sr-90	1 20 + 0 50	1 10 + 0.36	1272.05 ± 70.17 1.15 ± 0.31	Pass		
AP-2170, 2171	4/2/2007	Be-7	0.08 + 0.01	0.08 ± 0.01	0.08 ± 0.01	Pass		
WW-1850, 1851	4/3/2007	H-3	-5.83 ± 102.29	150.05 ± 80.14	72.11 ± 64.97	Pass		
AP-2198, 2199	4/3/2007	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01	Pass		
AP-2370, 2371	4/3/2007	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass		
DW-70300, 70301	4/4/2007	Gr. Alpha	3.78 ± 0.89	3.66 ± 0.96	3.72 ± 0.65	Pass		
DW-70300, 70301	4/4/2007	Gr. Beta	2.93 ± 0.61	2.91 ± 0.64	2.92 ± 0.44	Pass		
DW-70335, 70336	4/5/2007	Gr. Alpha	24.37 ± 2.89	22.72 ± 2.91	23.55 ± 2.05	Pass		
DW-70335, 70336	4/5/2007	Gr. Beta	20.26 ± 1.37	18.33 ± 1.34	19.30 ± 0.96	Pass		
SW-1898, 1899	4/10/2007	Gr. Alpha	3.86 ± 1.40	4.78 ± 1.51	4.32 ± 1.03	Pass		
SW-1898, 1899	4/10/2007	Gr. Beta	6.31 ± 1.36	7.03 ± 1.42	6.67 ± 0.98	Pass		
SW-1898, 1899	4/10/2007	H-3	241.99 ± 93.35	318.10 ± 96.48	280.04 ± 67.12	Pass		
DW-70346, 70347	4/11/2007	Gr. Alpha	1.83 ± 1.08	2.54 ± 1.04	2.19 ± 0.75	Pass		
DW-70346, 70347	4/11/2007	Gr. Beta	4.62 ± 0.72	4.01 ± 0.71	4.32 ± 0.51	Pass		
DW-70376, 70377	4/11/2007	Gr. Alpha	1.81 ± 0.80	1.66 ± 0.86	1.74 ± 0.59	Pass		
DW-70376, 70377	4/11/2007	Gr. Beta	1.84 ± 0.62	2.24 ± 0.61	2.04 ± 0.44	Pass		
DW-70311, 70312	4/12/2007	Gr. Alpha	10.82 ± 1.50	13.20 ± 1.56	12.01 ± 1.08	Pass		
WW-2349, 2350	4/17/2007	Gr. Alpha	0.71 ± 0.56	0.62 ± 0.52	0.66 ± 0.38	Pass		
WW-2461, 2462	4/25/2007	H-3	190.30 ± 100.31	115.95 ± 97.65	153.13 ± 70.00	Pass		
LW-2437, 2438	4/26/2007	Gr. Beta	2.71 ± 0.50	2.15 ± 0.45	2.43 ± 0.34	Pass		
LW-2917, 2918	4/30/2007	Gr. Beta	1.97 ± 0.79	2.78 ± 0.81	2.38 ± 0.57	Pass		
50-2583, 2584	5/1/2007	Be-/	544.99 ± 247.70	601.13 ± 192.20	5/3.00 ± 150.70.	Pass		
50-2583, 2584	5/1/2007	CS-137	119.22 ± 36.61	8/.40 ± 23.9/	103.34 ± 21.88	Pass		
SU-2583, 2584	5/1/2007	K-4U	17825.00 ± 749.90	$1/6/2.00 \pm 724.30$	$1/748.50 \pm 521.29$	Pass		
SU-2583, 2584	5/1/2007	Gr. Alpha	11.49 ± 3.96	8.04 ± 3.88	9.77 ± 2.77	Pass		
SO-2003, 2004	5/1/2007	Gr. Beta	31.02 ± 3.74	20.10 ± 3.40	20.00 ± 2.00	Pass		
S-2620 2621	5/2/2007	21-90 H_3	0.000 ± 0.024	0.000 ± 0.025	0.077 ± 0.017 201 15 + 81 02	Pass		
MI-2610, 2611	5/3/2007	K-40	1549 20 + 184 20	1388 80 + 128 20	1469.00 + 112.21	Pass		
W-4469, 4470	5/7/2007	Gr. Beta	10.60 + 1.90	11.10 ± 1.80	10.85 ± 1.31	Pass		
SS-2697, 2698	5/8/2007	Cs-137	0.06 ± 0.02	0.05 ± 0.03	0.05 ± 0.02	Pass		
SS-2697, 2698	5/8/2007	K-40	8.03 ± 0.57	7.36 ± 0.68	7.70 ± 0.44	Pass		
MI-2790, 2791	5/14/2007	K-40	1694.30 ± 126.20	1627.60 ± 128.80	1660.95 ± 90.16	Pass		
W-4505, 4506	5/14/2007	Gr. Beta	3.30 ± 1.70	3.90 ± 1.50	3.60 ± 1.13	Pass		
DW-3219, 3220	5/26/2007	1-131	0.62 ± 0.32	0.69 ± 0.31	0.66 ± 0.22	Pass		
SO-3416, 3417	5/31/2007	Cs-137	0.15 ± 0.03	0.15 ± 0.03	0.15 ± 0.02	Pass		
SO-3416, 3417	5/31/2007	Gr. Beta	22.88 ± 2.33	22.46 ± 2.37	22.67 ± 1.66	Pass		
SO-3416, 3417	5/31/2007	K-40	12.26 ± 0.80	12.36 ± 0.65	12.31 ± 0.52	Pass		
F-3561, 3562	5/31/2007	K-40	3.06 ± 0.39	3.37 ± 0.45	3.21 ± 0.30	Pass		
SL-3311, 3312	6/4/2007	Be-7	0.61 ± 0.29	0.55 ± 0.25	0.58 ± 0.19	Pass		
SL-3311, 3312	6/4/2007	K-40	5.78 ± 0.67	4.87 ± 0.25	5.33 ± 0.36	Pass		

				Concentration (pCi/L)	Ð	
					Averaged	
Lab Code	Date	Analysis	First Result	Second Result	Result	Acceptance
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SL-3992, 3993	6/4/2007	Be-7	0.75 ± 0.19	0.74 ± 0.32	0.75 ± 0.19	Pass
SL-3992, 3993	6/4/2007	Gr. Beta	13.61 ± 1.12	14.06 ± 1.08	13.84 ±0.78	Pass
SL-3992, 3993	6/4/2007	K-40	2.43 ± 0.36	2.29 ± 0.40	2.36 ± 0.27	Pass
W-5087, 5088	6/11/2007	Gr. Beta	8.70 ± 1.90	7.70 ± 1.90	8.20 ± 1.34	Pass
SW-3710, 3711	6/14/2007	H-3	9571.51 ± 287.22	9879.21 ± 291.42	9725.36 ± 204.59	Pass
W-4062, 4063	6/28/2007	Gr. Alpha	0.76 ± 0.63	0.32 ± 0.66	0.54 ± 0.45	Pass
W-4062, 4063	6/28/2007	Gr. Beta	0.97 ± 0.53	0.58 ± 0.57	0.78 ± 0.39	Pass
AP-4448, 4449	6/28/2007	Be-7	0.10 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
SG-3735, 3736	6/30/2007	Be-7	0.84 ± 0.12	0.82 ± 0.18	0.83 ± 0.11	Pass
SG-3735, 3736	6/30/2007	Cs-137	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
SG-3735, 3736	6/30/2007	Gr. Beta	29.51 ± 2.22	30.81 ± 2.22	30.16 ± 1.57	Pass
SG-3735, 3736	6/30/2007	K-40	9.41 ± 0.31	8.90 ± 0.48	9.16 ± 0.29	Pass
LW-4175, 4176	6/30/2007	Gr. Beta	2.18 ± 0.60	1.93 ± 0.68	2.06 ± 0.45	Pass
SG-5422, 5423	7/2/2007	Gr. Alpha	10.31 ± 1.98	10.57 ± 1.99	10.44 ± 1.40	Pass
SG-5422, 5423	7/2/2007	Gr. Beta	18.59 ± 1.46	20.97 ± 1.49	19.78 ± 1.04	Pass
AP-4656, 4657	7/3/2007	Be-7	0.09 ± 0.02	0.10 ± 0.02	0.10 ± 0.01	Pass
AP-4763, 4764	7/3/2007	Be-7	0.11 ± 0.02	0.10 ± 0.02	0.11 ± 0.01	Pass
SG-5430, 5431	7/11/2007	Be-7	10.17 ± 0.02	10.06 + 0.51	10.12 ± 0.35	Pass
SG-5430, 5431	7/11/2007	Cs-137	0.050 ± 0.010	0.059 ± 0.011	0.055 ± 0.007	Pass
SG-5430 5431	7/11/2007	Gr Aloba	17 86 + 2 78	1574 ± 270	16 80 + 1 94	Pace
SG-5430 5431	7/11/2007	Gr. Beta	26.10 ± 1.70	25.04 ± 1.86	25.62 + 1.27	Pass
SG-5430 5431	7/11/2007	K-40	7 60 ± 0 30	7 65 ± 0.29	767 ± 0.21	Page
W/W/_A208_A200	7/12/2007	Gr. Boto	1.09 ± 0.30	7.05 ± 0.20	1.07 ± 0.21	Pass
DW 70612 70612	7/22/2007	Gr. Alaba	1.74 ± 0.74	2.22 ± 0.00	1.90 I 0.00	Pass
MIN/ A018 A010	7/25/2007	Gr. Alpria	4.04 I 1.11	4.19 I U.97	4.3/ IV./4	Pass
MI 4740 4742	7/25/2007	H-3	240.43 ± 111.12	210.00 ± 110.27	220.00 I /0.2/	Pass
VE 4020 4040	PI1/20/2007	N-40	1620.30 ± 134.10	1602.90 ± 199.50	1011.00 ± 120.19	Pass
VE-4939, 4940	0/1/2007	De-1	0.39 ± 0.21	0.45 ± 0.20	0.42 ± 0.15	Pass
VE-4939, 4940	0/1/2007	Gr. Beta	5.50 ± 0.14	5.70 ± 0.13	5.63 ± 0.10	Pass
VE-4939, 4940	6/1/2007 0/0/2007	R-40	3.30 ± 0.45	3.30 ± 0.21	3.30 ± 0.25	Pass
SG-6274, 6275	8/6/2007	Gr. Alpha	16.68 ± 3.29	19.26 ± 3.39	17.97 ± 2.36	Pass
SG-6274, 6275	8/0/2007	Gr. Beta	40.93 ± 2.74	42.42 ± 2.00	41.68 ± 1.91	Pass
SW-5218, 5219	8///2007	1-131	1.31 ± 0.24	1.42 ± 0.24	1.37 ± 0.17	Pass
SG-6284, 6285	8/8/2007	Cs-137	0.043 ± 0.006	0.051 ± 0.007	0.047 ± 0.005	Pass
56-6284, 6285	8/8/2007	Gr. Alpha	9.38 ± 2.93	13.61 ± 3.38	11.50 ± 2.24	Pass
56-6284, 6285	8/8/2007	Gr. Beta	33.46 ± 2.84	32.87 ± 2.93	33.17 ± 2.04	Pass
SG-6284, 6285	8/8/2007	K-40	16.15 ± 0.24	16.23 ± 0.25	16.19 ± 0.17	Pass
WW-5310, 5311	8/9/2007	H-3	644.00 ± 106.00	831.00 ± 113.00	737.50 ± 17.47	Pass
577-5393, 5394	8/14/2007	Gr. Beta	2.32 ± 1.31	1.71 ± 1.27	2.02 ± 0.92	Pass
577-5393, 5394	8/14/2007	H-3	190.06 ± 86.80	69.05 ± 80.88	129.55 ± 59.32	Pass
w-5468, 5469	8/15/2007	H-3	262.58 ± 108.43	346.53 ± 111.42	304.55 ± 77.74	Pass

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Lab Code	Date	Analysis	First Result	Second Result	Result	Acceptance
VE-5553, 5554	8/22/2007	K-40	1.89 ± 0.33	1.89 ± 0.22	1.89 ± 0.20	Pass
WW-5643, 5644	8/22/2007	H-3	259.00 ± 110.00	266.00 ± 110.00	262.50 ± 77.78	Pass
SWU-5799, 5800	8/28/2007	Gr. Beta	2.64 ± 1.18	3.62 ± 1.06	3.13 ± 0.79	Pass
DW-70752, 70753	8/31/2007	Gr. Alpha	14.41 ± 1.48	12.90 ± 1.50	13.66 ± 1.05	Pass
VE-5917, 5918	9/4/2007	Be-7	0.94 ± 0.17	0.83 ± 0.20	0.89 ± 0.13	Pass
VE-5917, 5918	9/4/2007	K-40	3.73 ± 0.37	3.58 ± 0.36	3.66 ± 0.26	Pass
VE-5917, 5918	9/4/2007	Gr. Beta	2.71 ± 0.10	2.69 ± 0.10	2.70 ± 0.07	Pass
MI-6009, 6010	9/11/2007	K-40	1348.90 ± 113.40	1388.10 ± 116.40	1368.50 ± 81.25	Pass
MI-6030, 6031	9/12/2007	K-40	1242.70 ± 118.00	1475.60 ± 119.60	1359.15 ± 84.01	Pass
MI-6030, 6031	9/12/2007	Sr-90	1.00 ± 0.38	0.90 ± 0.34	0.95 ± 0.26	Pass
DW-70718, 70719	9/12/2007	Gr. Alpha	23.04 ± 3.71	23.22 ± 3.61	23.13 ± 2.59	Pass
DW-70718, 70719	9/12/2007	Gr. Beta	16.13 ± 1.59	17.36 ± 1.69	16.75 ± 1.16	Pass
SO-6156, 6157	9/14/2007	H-3	181.99 ± 90.67	232.19 ± 92.95	207.09 ± 64.92	Pass
SO-6484, 6485	9/17/2007	Cs-137	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	Pass
SO-6484, 6485	9/17/2007	Gr. Beta	24.20 ± 2.60	23.30 ± 2.30	23.75 ± 1.74	Pass
SO-6484, 6485	9/17/2007	K-40	11.52 ± 1.16	10.89 ± 1.10	11.20 ± 0.80	Pass
WW-6469, 6470	9/21/2007	Gr. Beta	27.19 ± 2.51	24.23 ± 2.29	25.71 ± 1.70	Pass
E-6647, 6648	10/1/2007	Gr. Beta	1.82 ± 0.10	1.93 ± 0.11	1.88 ± 0.07	Pass
E-6647, 6648	10/1/2007	K-40	1.48 ± 0.24	1.31 ± 0.23	1.40 ± 0.17	Pass
WW-6656, 6657	10/1/2007	Gr. Beta	2.80 ± 0.97	1.95 ± 0.87	2.38 ± 0.65	Pass
TD-7080, 7081	10/2/2007	H-3	332.00 ± 229.00	383.00 ± 191.00	357.50 ± 149.10	Pass
SG-6891, 6892	10/3/2007	Gr. Alpha	12.93 ± 2.12	13.52 ± 2.07	13.23 ± 1.48	Pass
SG-6891, 6892	10/3/2007	Gr. Beta	18.08 ± 1.41	18.27 ± 1.36	18.18 ± 0.98	Pass
AP-7191, 7192	10/3/2007	Be-7	0.09 ± 0.01	0.09 ± 0.01	0.09 ± 0.01	Pass
WW-6786, 6787	10/8/2007	H-3	13333 ± 322	13532 ± 324	13433 ± 228	Pass
WW-6786, 6787	10/8/2007	H-3	13188 ± 322	13556 ± 326	13372 ± 229	Pass
VE-6828, 6829	10/8/2007	Gr. Alpha	0.06 ± 0.04	0.06 ± 0.05	0.06 ± 0.03	Pass
VE-6828, 6829	10/8/2007	Gr. Beta	5.55 ± 0.21	5.20 ± 0.22	5.38 ± 0.10	Pass
VE-6828, 6829	10/8/2007	K-40	5.45 ± 0.43	5.20 ± 0.49	5.32 ± 0.33	Pass
55-08/0, 08/1	10/9/2007	Gr. Beta	18.10 ± 2.08	21.71 ± 2.19	19.90 ± 1.51	Pass
55-00/U, 00/ I	10/9/2007	K-4U	10.19 ± 0.66	9.72 ± 0.68	9.95 ± 0.47	Pass
LVV-7307,7300	10/11/2007	Gr. Beta	1.40 ± 0.00	1.44 ± 0.54	1.42 ± 0.39	Pass
MI 6022 6024	10/16/2007	N-40 S= 00	1300.00 ± 104.70	1331.20 ± 100.70	1050.90 ± 14.14	Pass
MI 7050 7060	10/17/2007	S1-90	1.73 ± 0.52	2.17 ± 0.57	1.90 I 0.09	Pass
E 7012 7014	10/17/2007	N-40 ผว	1424.60 ± 100.00	7.24 ± 0.22	1430.70 ± 10.01	Pass
E 7010 7011	10/24/2007	H-3	0.03 ± 0.22	7.24 ± 0.22	7.03 ± 0.10	Pass
17-1210, 1214	10/24/2007	N-40 ⊔ 2	3.13 ± 0.31	3.10 I 0.40	3.10 ± 0.30	Pass
NW_70856 70857	10/24/2007	Gr Alaba	340.71 I 90.43	10 71 ± 1 2/	10.87 ± 1.07	F doo
SO-7508 7500	10/24/2007	Ce.137	1.00 ± 1.00	0.20 ± 0.05	0.20 + 0.02	Pace
SO-7508, 7509	10/26/2007	Gr Beta	34 43 + 2 72	37.25 ± 3.07	35.84 + 2.05	Paee
SO-7508, 7509	10/26/2007	K-40	16.84 ± 0.84	17.43 ± 1.05	17.14 ± 0.67	Pass
/ 000, / 000	.0.20/2001		10.07 2 0.07	11.00 2 1.00	9 7 7 7 min 1791273	. 400

				Concentration (pCi/L) ⁸			
					Averaged		
Lab Code	Date	Analysis	First Result	Second Result	Result	Acceptance	
SS-7529, 7530	10/29/2007	Cs-137	0.12 ± 0.03	0.12 ± 0.02	0.12 ± 0.02	Pass	
SS-7529, 7530	10/29/2007	K-40	11.85 ± 0.68	11.75 ± 0.58	11.80 ± 0.45	Pass	
SW-7589, 7590	10/30/2007	Gr. Beta	1.75 ± 0.29	1.24 ± 0.26	1.50 ± 0.19	Pass	
SWU-7733, 7734	10/30/2007	Gr. Beta	1.66 ± 1.01	2.43 ± 1.13	2.05 ± 0.76	Pass	
MI-7618, 7619	10/31/2007	K-40	1376.80 ± 114.30	1426.70 ± 128.80	1401.75 ± 86.10	Pass	
VE-7666, 7667	11/5/2007	Gr. Alpha	0.07 ± 0.04	0.16 ± 0.05	0.11 ± 0.03	Pass	
VE-7666, 7667	11/5/2007	Gr. Beta	6.03 ± 0.15	6.13 ± 0.15	6.08 ± 0.10	Pass	
VE-7666, 7667	11/5/2007	K-40	5.82 ± 0.36	5.74 ± 0.36	5.78 ± 0.25	Pass	
DW-7853, 7854	11/9/2007	i-131 ·	1.61 ± 0.40	1.08 ± 0.39	1.35 ± 0.28	Pass	
MI-7874, 7875	11/14/2007	K-40	1407.70 ± 101.30	1362.60 ± 114.50	1385.15 ± 76.44	Pass	
WW-8142, 8143	11/28/2007	Gr. Beta	9.51 ± 2.21	7.86 ± 2.01	8.68 ± 1.49	Pass	
DW-8094, 8095	11/29/2007	Gr. Beta	1.60 ± 0.58	1.25 ± 0.54	1.43 ± 0.40	Pass	
F-8328, 8329	12/11/2007	Gr. Beta	3.97 ± 0.08	4.00 ± 0.08	3.99 ± 0.05	Pass	
WW-8378, 8379	12/11/2007	H-3	296.00 ± 103.00	407.00 ± 107.00	351.50 ± 74.26	Pass	

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

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

Lab Codo ^c	Data	A		Known	Control	
Lab Code	Date	Analysis	Laboratory result	Activity	Limits "	Acceptance
STW-1110	01/01/07	Gr Aloha	0.45 + 0.09	0.33	0.00 0.65	Boos
STW-1110	01/01/07	Gr. Beta	0.45 ± 0.06	0.33	0.00 - 0.05	Pass
3144-1110	01/01/07	OF. Dela	0.90 ± 0.14	0.85	0.43 - 1.28	Pass
STW-1111 °	01/01/07	Am-241	2.80 ± 0.21	1.71	1.20 - 2.22	Fail
STW-1111	01/01/07	Co-57	151.60 ± 10.00	143.70	100.60 - 186.80	Pass
STW-1111	01/01/07	Cs-134	79.20 ± 8.00	83.50	58.50 - 108.60	Pass
STW-1111	01/01/07	Cs-137	168.70 ± 12.10	163.00	114.10 - 211.90	Pass
STW-1111	01/01/07	Fe-55	130.30 ± 19.90	129.30	90.50 - 168.10	Pass
STW-1111	01/01/07	H-3	262.20 ± 9.10	283.00	198.10 - 367.90	Pass
STW-1111	01/01/07	Mn-54	130.60 ± 11.50	123.80	86.70 - 160.90	Pass
STW-1111	01/01/07	Ni-63	127.80 ± 3.60	130.40	91.30 - 169.50	Pass
STW-1111	01/01/07	Ni-63	127.80 ± 3.60	130.40	91.30 - 169.50	Pass
STW-1111	01/01/07	Pu-238	2.03 ± 0.17	2.25	1.58 - 2.93	Pass
STW-1111	01/01/07	Pu-239/40	2.27 ± 0.17	2.22	1.55 - 2.89	Pass
STW-1111	01/01/07	Sr-90	9.60 ± 1.40	8.87	6.21 - 11.53	Pass
STW-1144	01/01/07	Tc-99	8.80 ± 1.50	88.00	7.40 - 13.70	Pass
STW-1111	01/01/07	U-233/4	2.44 ± 0.21	2.49	1.74 - 3.24	Pass
STW-1111	01/01/07	U-238	2.44 ± 0.21	2.48	1.74 - 3.22	Pass
STW-1111	01/01/07	Zn-65	123.70 ± 17.00	114.80	80.40 - 149.20	Pass
STSO-1112 '	01/01/07	Am-241	46.40 + 9.00	34 80	24 40 - 45 20	Fail
STSO-1112	01/01/07	Co-57	501.20 ± 2.90	471.20	329.80 - 612.60	Pass
STSO-1142	01/01/07	Co-60	285.90 ± 2.10	274.70	192.30 - 357.10	Pass
STSO-1112	01/01/07	Cs-134	325.90 ± 7.40	327.40	229.20 - 425.60	Pass
STSO-1112	01/01/07	Cs-137	855 70 + 4 60	799 70	559 80 - 1039 60	Pass
STSO-1112	01/01/07	Mn-54	750.90 ± 4.70	685.20	479.60 - 890.80	Pass
TAP-1113	01/01/07	Gr Alpha	0.27 + 0.04	0.60	0.00 1.20	Deep
TAP-1113	01/01/07	Gr Beta	0.27 ± 0.04	0.00	0.00 - 1.20	Fass
	0 110 1101	01. 0014	0.07 1 0.00	, U.44	0.22 - 0.00	F d 5 5
TAP-1114	01/01/07	Am-241	0.10 ± 0.03	0.10	0.07 - 0.13	Pass
TAP-1114	01/01/07	Co-57	3.51 ± 0.07	2.89	2.02 - 3.75	Pass
TAP-1114	01/01/07	Co-60	2.98 ± 0.10	2.91	2.03 - 3.78	Pass
TAP-1114	01/01/07	Cs-134	4.02 ± 0.16	4.20	2 94 - 5.45	Pass
TAP-1114	01/01/07	Cs-137	2.75 ± 0.12	2 57	1 80 - 3 34	Pass
TAP-1114	01/01/07	Mn-54	3.94 ± 0.12	3 52	2 46 - 4 57	Pace
TAP-1114	01/01/07	Pu-238	0.07 + 0.01	0.02 /	0.05 - 0.09	Pace
TAP-1114	01/01/07	Pu-239/40	0.08 + 0.01	0.07	0.00 - 0.00	Pace
TAP-1114	01/01/07	Sr-90	0.58 + 0.18	0.00	0.00 - 0.11	i ass Dace
TAP-1114	01/01/07	U-233/4	0.09 ± 0.01	0.01	0.07 - 0.13	Pace
TAP-1114	01/01/07	U-238	0.00 ± 0.01	· 0.10	0.07 - 0.13	Pace
	2		0.05 1 0.01	0.10	0.07 - 0.13	rass

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

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

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

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

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

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

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

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

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

	Concentration (pCi/L)										
Lab Code [▶]	Date Analysis		Laboratory	ERA	Control						
			Result ^c	Result ^a	Limits	Acceptance					
	0040/07	Ca Alaba	2464 (256	25.9	12 4 - 39	Pass					
STAP-1116	03/19/07	Gr. Alpha	34.04 I 2.30	20.6	12.4 - 55	Pass					
STAP-1116	03/19/07	Gr. Beta	93.41 1 3.20	79.0	40,0 * 110	1 400					
STAP-1117	03/19/07	Am-241	56.04 ± 3.90	57.5	33.1 - 80	Pass					
STAP-1117	03/19/07	Co-60	1610.00 ± 8.40	1300.0	1010.0 - 1620	Pass					
STAP-1117	03/19/07	Cs-134	1340.40 ± 48.84	1120.0	732.0 - 1380	Pass					
STAP-1117 °	03/1 9/ 07	Cs-137	345.30 ± 8.20	255.0	192.0 - 336	Fail					
STAP-1117 1	03/19/07	Fe-55	< 134.0	0.0		Pass					
STAP-1117 ¹	03/19/07	Mn-54	< 5.0	0.0		Pass					
STAP-1117	03/19/07	Pu-238	43.32 ± 2.28	37.4	25.7 - 49	Pass					
STAP-1117	-03/19/07	Pu-239/40	35.23 ± 2.24	31.6	22.9 - 41	Pass					
STAP-1117	03/19/07	Sr-90	156.10 ± 6.60	156.0	66.6 - 246	Pass					
STAP-1117	03/19/07	U-233/4	42.22 ± 1.84	47.8	30.1 - 71	Pass					
STAP-1117	03/19/07	U-238	42.00 ± 1.84	47.4	30.2 - 68	Pass					
STAP-1117	03/19/07	Uranium	85.79 ± 3.60	97.3	49.5 - 155	Pass					
STAP-1117	03/19/07	Zn-65	363.80 ± 11.90	245.0	208.0 - 412	Pass					
	00110107		0007 77 . 04 00	0700.0	1700 0 - 2020	Dass					
STSO-1118	03/19/07	Ac-228	3097.77 ± 94.96	2790.0	F490.0 - 3930	Pass					
STSO-1118	03/19/07	Am-241	1000.70 ± 150.10	927.0	546.0 - 1200	Pass					
SISO-1118	03/19/07	BI-212	2467.87 ± 114.33	2500.0	656.0 - 5750 5240.0 - 0820	Daes					
STSO-1118	03/19/07	Co-60	7847.40 ± 86.60	7330.0	5340.0 - 9620 4950 0 - 9020	Pass					
STSO-1118	03/19/07	Cs-134	/910.60 ± 356.88	7560.0	4650.0 - 9070	Pass					
STSO-1118	03/19/07	Cs-137	4635.00 ± 99.10	4300.0	3290.0 - 5560	Pass					
STSO-1118	03/19/07	K-40	12201.60 ± 423.20	11100.0	8050.0 - 15000	Pass					
STSO-1118 '	03/19/07	Mn-54	< 34.0	0.0		Pass					
STSO-1118	03/19/07	Pb-212	2046.80 ± 127.20	1730.0	1120.0 - 2430	Pass					
STSO-1118	03/19/07	Pb-214	4142.80 ± 110.40	3330.0	1980.0 - 4980	Pass					
STSO-1118	03/19/07	Pu-238	1099.20 ± 73.10	857.0	490.0 - 1200	Pass					
STSO-1118	03/19/07	Pu-239/40	1586.10 ± 82.00	1360.0	928.0 - 1810	Pass					
STSO-1118	03/19/07	Sr-90	6163.30 ± 791.60	7500.0	2610.0 - 12400	Pass					
STSO-1118	03/19/07	Th-234	4329.40 ± 569.10	3590.0	2190.0 - 4560	Pass					
STSO-1118	03/19/07	U-233/4	3236.70 ± 106.00	3620.0	2280.0 - 4520	Pass					
STSO-1118	03/19/07	U-238	3425.20 ± 134.00	3590.0	2190.0 - 4560	Pass					
STSO-1118	03/19/07	Uranium	6787.80 ± 240.00	7380.0	4210.0 - 9930	Pass					
STSO-1118	03/19/07	Uranium	6787.80 ± 240.00	7380.0	4210.0 - 9930	Pass					
STSO-1118 ¹	03/19/07	Zn-65	0.00 ± 0.00	0.0	0.0 - 0	Pass					

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)^e.

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

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)^e.

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

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

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

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

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

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

APPENDIX B

DATA REPORTING CONVENTIONS

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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 ± s

x = value of the measurement;

where:

s = 2σ 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 resu	Its; $x_1 \pm s_1$ 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	<u>Reported result:</u> < L, where L = lower of L_1 and L_2
3.3.	Individual results:	x ± s. < L	Reported result: $x \pm s$ if $x \ge L$; < 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:

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

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

- 4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.
- 4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.
- 4.5 In rounding off, the following rules are followed:
 - 4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained number s are kept unchanged. As an example, 11.443 is rounded off to 11.44.
 - 4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off to 11.45.

APPENDIX C

Maximum Permissible Concentrations of Radioactivity in Air and Water Above Background in Unrestricted Areas
 Table C-1.
 Maximum permissible concentrations of radioactivity in air and water above natural background in unrestricted areas^a.

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

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

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

A natural radionuclide.

APPENDIX D

Sampling Location Maps

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APPENDIX E

6

Special Well and

Surface Water Samples

1.0 INTRODUCTION

This appendix to the Radiation Environmental Monitoring Program Annual Report to the United States Nuclear Regulatory Commission summarizes and interprets results of the special well and surface water samples taken at the Prairie Island Nuclear Generating Plant, Red Wing, Minnesota, during the period January - December, 2007. This supplemental special sampling program was established in December of 1989 when higher than expected levels of tritium were detected in a nearby residence well sample.

Tabulations of the special sampling program individual analyses made during the year are included in this appendix. A summary table of tritium analyses is also included in this appendix.

2.0 SUMMARY

This special sampling program was established following the detection of tritium in a residence well water sample south of the PINGP during 1989. This program is described and the results for 2007 are summarized and discussed.

Program findings for 2007 detect low levels of tritium in nearby residence wells and ground water surface samples at or near the expected natural background levels with the exception of sample well P-10. The 2007 sample results (except for P-10) ranged from <19 pCi/L to 513 pCi/L and sample well P-10 ranged from 390 pCi/L to 2258 pCi/L. All tritium results are far below the Environmental Protection Agency's drinking water standard of 20,000 pCi/L and present no harm to any members of the public.

3.0 Special Tritium Sampling Program

3.1 Program Design and Data Interpretation

The purpose of this sampling program is to assess the impact of any tritium leaching into the environment (ground water system) from the PINGP. For this purpose, special water samples are collected and analyzed for tritium content.

3.2 Program Description

The sampling and analysis schedule for the special water sampling program is summarized in Table 4.1 and briefly reviewed below. Table 4.2 defines the additional sample locations and codes for the special water sampling program.

Special well and surface water samples were collected quarterly at one location and monthly at five locations, and annually at thirty-two locations. The Peterson (P-43) and Hanson (SW-1) farm wells are used as control locations for these special samples.

To detect low levels of tritium at or below natural background levels, analyses of the samples have been contracted to a laboratory (University of Waterloo Laboratories) capable of detecting tritium concentrations down to 19 pCi/L. Waterloo Laboratories report tritium analyses results in Tritium Units (1 TU = 3.2 pCi/L). The tritium results in this report are indicated in pCi/L.

3.3 Program Execution

The special water sampling was executed as described in the preceding section.

3.4 Program Modifications

Changes to the program in 2007 include:

- the addition of monitoring wells MW-7 and MW-8 in the vicinity of well P-10 to assess the higher levels previously noted in P-10
- the addition of the New Administration Building well
- the addition of the Plant Screenhouse well
- the addition of a stormwater runoff sample
- sampling was not performed at station P-3 because it was inaccessible
- sampling was not performed at the STA house (SW-2) because it was dry

3.5 Results and Discussion

Results obtained show tritium in well water and ground water samples at or near expected natural background levels except the P-10, MW-7, and MW-8 sample wells. Table 4.4 provides the complete data table of results for each period and sampling location.

Results and Discussion (continued)

The tritium level annual averages have shown a downward trend since the special sampling begun in 1989.

Except for sample wells P-10, MW-7, and MW-8, the 2007 sample results are within the range of expected background tritium levels in shallow ground water and surface water due to tritium concentrations measured in precipitation. Sampling points in North America have shown tritium concentrations in precipitation ranging from 5 pCi/L to 157 pCi/L (Environmental Isotope Data No. 10; World Survey of Isotope Concentration in Precipitation (1988-1991)).

The higher level results at the Suter residence and Birch Lake in 1989 were possibly due to seepage from the PINGP discharge canal water into the ground water. This is thought to occur due to the elevation difference between the Vermillion River and the discharge canal. The Suter residence is located between the discharge canal and Birch Lake, which connects to the Vermillion River. The PINGP discharge canal piping was lengthened during 1991, so that liquid discharges from the plant are released near the end of the discharge canal, diffused and discharged to the Mississippi River. In 1992, the underground liquid discharge pipe from the plant to the discharge canal piping was replaced with a double walled leak detectable piping system. This year's sample results continue to indicate that these modifications have eliminated the suspected radioactive effluent flow into the local ground water.

The elevated tritium levels in sample wells P-10, MW-7, and MW-8 in 2007 may be due to prior leakage from the PINGP liquid radwaste discharge pipe or discharge of turbine building sump water into the landlocked area. The liquid radwaste discharge pipe was replaced in 1992 and the discharge to the landlocked area has been minimized by administrative controls.

Table E-4.1. Sample collection and analysis program, Special well and surface water samples, Prairie Island Nuclear Generating Plant, 2007.

Medium	No.	Location codes and type	Collection type and frequency	Analysis type ^c
Well water, Annual	28	P-8, REMP P-6, PIIC-02, PIIC-22, PIIC-26, P- 2, P-3, P-4, P-5, P-6, P-7, P-11, PZ-1, PZ-2, PZ-3, PZ-4, PZ-5, PZ-7, PZ-8, MW-4, MW-5, MW-6, P-9, P-26, P-30, SW-2, SW-3, SW-4, SW-5	G/A	Н-3
Well water, quarterly	1	P-24D	G/Q	H-3
Well water, monthly	water, monthly 5 P-43(C), SW-1(C), MW-7, MW-8, P-10		G/M ^d	H-3
Surface water 6		S-1, S-2, S-3, S-4, S-5, S-6 G/A		H-3

^a Location codes are defined in table D-4.2. Control Stations are indicated by (C). All other stations are indicators. Stations MW-7, MW-8, SW-4, SW-5, and S-6 were added in 2007.

^b Collection type is codes as follows: G/ = grab. Collection frequency is coded as follows: M = monthly; Q = quarterly; A = annually.

Υ.

^c Analysis type is coded as follows: H-3 = tritium.

^d Wells MW-7 and MW-8 were added in September 2007 and monthly sampling was begun in October 2007.

Code	Collection site	Type of sample ^b	Distance and Direction from reactor
	DI Communitational	1	
	Pi Community Weil		1.0 ml. @ 3217/VNVV
REMP P-0			1.6 ml. @ 1297SE
PIIC-02	2077 Other Day Road		1.4 mi. @ 3157NW
PIIC-22	1773 Buffalo Slough Rd	<u> </u>	1 mi. @ 3157/NW
PIIC-26	1//1 Buffalo Slough Rd		1 mi. @ 315°/NW
P-240	Suter residence	WW	0.6 mi. @ 1587SSE
P-43	Peterson Farm (Control)	<u></u>	13.9 mi. @ 355°/N
	Hanson Farm (Control)		2.2 mi. @ 315°/NW
P-2	Sample well	WW	See map
P-3	Sample well	WW	See map
P-4	Sample well		See map
P-5	Sample well		See map
P-6	Sample well	ww	See map
<u> / P-7</u>	Sample well	WW	See map
P-10	Sample well	WW	See map
P-11	Sample well	WW	See map
PZ-1	Sample well	WW	See map
PZ-2	Sample well	WW	See map
PZ-4	Sample well	WW	See map
PZ-5	Sample well	WW	See map
PZ-7	Sample well	WW	See map
PZ-8	Sample well	WW	See map
MW-4	Sample well	ww	See map
MW-5	Sample well	WW	See map
MW-6	Sample well	WW	See map
MW-7	Sample well	WW	See map
MW-8	Sample well	WW	See map
P-26	PITC well	WW	0.4 mi. @ 258°/WSW
P-30	Environ lab well	WW	0.2 mi. @ 32°/NNE
SW-2	STA House	WW	See map
SW-3	Cooling Tower pump	WW	See map
SW-4	New Admin Blda	WW	0.05 mi. @ 315°/NW
SW-5	Plant Screenhouse well	WW	0.05 mi. @ 0°/N
P-9	Plant well # 2	WW	0.3 mi, @ 306°/NW
S-1	Mississippi River upstream	SW	See map
S-2	Recirculation/Intake canal	SW	See map
S-3	Cooling water canal	SW	See map
S-4	Discharge Canal (end)	SW	See map
S-5	Discharge Canal (midwav)	SW	See map
S-6	Stormwater Runoff	SW	0.05 mi. @ 0°/N

Table E-4.2. Sampling locations for special well and surface water samples, Prairie Island Nuclear Generating Plant, 2007.

^a Sample codes: WW = Well water; SW = Surface Water.

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Table E-4.3 Radiatic

Radiation Environmental Monitoring Program Summary: Special well and surface water samples.

	Name of Facility		ame of Facility Prairie Island Nuclear Power Station				50-282, 50-306		
	Location o	f Facility	Good	hue, Minnesota (County, State)		Reporting Period January - December 2			
Sample Type (Units)	Type and Number of Analyses			Indicator Locations	Location w Annua	vith Highest Il Mean	Control Locations	Number Non-	
			.LD ^b	Mean (F) [°] Range	Location	Mean (F) Range	Mean (F) Range	Routine Results	
Offsite Well Water .(pCi/L)	Н-3	36	19	45 (9/12) (23-65)	PIIC-22	PIIC-22 65 (1/1) (65)		0	
Onsite Well Water (pCi/L)	н-з	63	19	367 (36/39) (24-2258)	P-10	P-10 908 (12/12) (390-2258)		15	
Onsite Surface Water (pCi/L)	H-3	30 1	9	94 (5/6) (35-285)	S-6	285 (1/1) (285)	29 (3/24) (25-32)	0	

^a H-3 = tritium

LLD = Nominal lower limit of detection based on 4.66 sigma error for background sample. Value shown is lowest for the period.

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

Locations are specified: (1) by name, and code (Table 2) and (2) by distance, direction and sector relative to reactor site.

Non-routine results are those which exceed ten times the control station value.

and the second sec													
	SAMPLE DATES	JAN 2007	FEB 2007	MAR 2007	APR 2007	MAY 2007	JUN 2007	JUL 2007	AUG 2007	SEP 2007	OCT 2007	NOV 2007	DEC 2007
CODE	SAMPLE LOCATIONS	pCi/L	_pCi/L										
	ONSITE WELLS												
P-2	Sample well		}			[}	66		{	Ì	1	
P-4	Sample well		<u> </u>	<u> </u>	<u> </u>		<u> </u>	< 19		1			
P-5	Sample well		<u> </u>				<u> </u>	109		1			
 P-6	Sample well	1	<u> </u>	<u> </u>	1		1	45					
P-7	Sample well	1	<u> </u>	<u> </u>			1	95					
P-10	Sample well	1289	390	453	967	835	784	482	544	486	1724	2258	678
P-11	Sample well	1	}]		1		65					
PZ-1	Sample well	1	<u> </u>	<u> </u>	<u> </u>			< 19					
PZ-2	Sample well	1	1	1				71					
PZ-4	Sample well	<u></u>	1	1				40			ļ	l	
PZ-5	Sample well	1	1	1				47		ļ	L	<u>}</u>	<u> </u>
PZ-7	Sample well	1						52	L	<u> </u>	<u> </u>		<u> </u>
PZ-8	Sample well						ļ	54	· ·	<u></u>		<u> </u>	<u> </u>
MW-4	Sample well					ļ	ļ	46	ļ		<u> </u>	<u> </u>	+
MW-5	Sample well				<u> </u>	ļ	<u> </u>	35		<u> </u>	<u> </u>	+	+
MW-6	Sample well			1			<u> </u>	44	J	1		+	54
MW-7	Sample well			<u></u>	L		<u> </u>		<u> </u>	341	+	13	54
MW-8	Sample well			<u></u>		<u> </u>	l	<u> </u>		43		325	513
P-26	PITC well			1	<u> </u>	<u> </u>	╂_───	31	<u> </u>	+		┼	╆
P-30	Env. lab well			<u></u>	1		<u> </u>	< 19	+	+	┨╼───	+	+
SW-3	Cooling Tower pump			<u> </u>	ļ		<u> </u>	37	+	+		+	+
P-9	Plant well # 2			<u> </u>	· [<u> </u>	_ <u></u>	- 24	┼			+	+
SW-4	New Admin			1		- 	- 	65	·				+
SW-5	Pin Scmhs			1	1		1	32			<u> </u>		

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Table E-4.4 Radiological Environmental Monitoring Program, Complete Data Table, 2007, continued.
Table E-4.4 Radiological Environmental Monitoring Program, Complete Data Table, 2007, continued.

							the state of the s					A CONTRACT OF A	and the second se
	SAMPLE DATES	JAN 2007	FEB 2007	MAR 2007	APR 2007	MAY 2007	JUN 2007	JUL 2007	AUG 2007	SEP 2007	OCT 2007	NOV 2007	DEC 2007
CODE	SAMPLE LOCATIONS	pCi/L	pCi/L	pCi/L	pCi/L_	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L
	ONSITE SURFACE W/	ATER							÷				
S-1	Mississippi River upstream							57					
S-2	Recirculation/Intake canal						 	56					
S-3	Cooling water canal							< 19					
S-4	Discharge Canal (end)							36					
S-5	Discharge Canal (midway)							35					
S-6	Stormwater runoff									285			
	OFFSITE WELLS												
P-8	PI Community Well							< 19	 				
REMP P-6	Lock & Dam #3 well							< 19	\				}
PIIC-02	2077 Other Day Rd.		Ì			<u> </u>		< 19					
PIIC-22	1773 Buffalo Slough Rd.		<u> </u>			<u> </u>	ļ	65			l	<u> </u>	
PIIC-26	1771 Buffalo Slough Rd.					ļ	 	62	ļ	ļ	ļ	<u> </u>	ļ
P-24D	Suter residence	63	47	\ \ \	35	25	ļ	23	46	<u> </u>	36	<u> </u>	
P-43	Peterson Farm (Control)	< 19	25	< 19	< 19	< 19	< 19	< 19	29	< 19	< 19	< 19	< 19
	Hanson Farm (Control)	32	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19	< 19





E-11

ATTACHMENT 2

2007 Annual Radioactive Effluent Report Resubmitted with Corrected Pages

January 01, 2007 – December 31, 2007

Enclosure 1 – Off-site Radiation Dose Assessment

Enclosure 2 – Annual Radioactive Effluent Report, Supplemental Information,

Enclosure 3 – Effluent and Waste Disposal Annual Report, Solid Waste and Irradiated Fuel Shipments

Enclosure 4 – Attachment to the 2007 Effluent Report

ENCLOSURE 1

OFF-SITE RADIATION DOSE ASSESSMENT

January 01, 2007 – December 31, 2007

6 pages follow

PRAIRIE ISLAND NUCLEAR GENERATING PLANT OFF-SITE RADIATION DOSE ASSESSMENT FOR

January through December 2007

An Assessment of the radiation dose due to releases from Prairie Island Nuclear Generating Plant during 2007 was performed in accordance with the Offsite Dose Calculation Manual as required by Technical Specifications. Computed doses were well below the 40 CFR Part 190 Standards and 10 CFR Part 50 Appendix I Guidelines.

Off-site dose calculation formulas and meteorological data from the Off-site Dose Calculation Manual were used in making this assessment. Source terms were obtained from the Annual Radioactive Effluent and Waste Disposal Report prepared for NRC review for the year of 2007.

Off-site Doses from Gaseous Release

Computed doses due to gaseous releases are reported in Table 1. Critical receptor location and pathways for organ doses are reported in Table 2. Gaseous release doses are a small percentage of Appendix I Guidelines.

Off-site Doses from Liquid Release

Computed doses due to liquid releases are reported in Table 1. Critical receptor information is reported in Table 2. Liquid release doses, both whole body and organ, are a small percentage of Appendix I Guidelines.

Doses to Individuals Due to Activities Inside the Site Boundary

Occasionally sportsmen enter the Prairie Island site for recreational activities. These individuals are not expected to spend more than a few hours per year within the site boundary. Commercial and recreational river traffic exists through this area.

For purposes of estimating the dose due to recreational and river water transportation activities within the site boundary, it is assumed that the limiting dose within the site boundary would be received by an individual who spends a total of seven days per year on the river just off-shore from the plant buildings (ESE at 0.2 miles). The gamma dose from noble gas releases and the whole body and organ doses from the inhalation pathway due to Iodine 131, Iodine-133, tritium and long-lived particulates were calculated for this location and occupancy time. These doses are reported in Table 1.

Critical Receptor location and pathways for organ doses are reported in Table 2.

CORRECTED PAGE

ABNORMAL RELEASES

There were a total of two (2) abnormal releases for 2007. The 2007 abnormal releases are summarized below:

1. Leak in Waste Gas System

On 10/16/07 during data review, operations noted a negative trend in total volume for the routine Waste Gas System inventory. Further investigation determined that a Waste Gas Decay Tank Release had not occurred for an atypical length of time. Ventilation monitor trend plots and weekly gas grabs were reviewed and indicated no activity. It was determined that a very small leak had been present for as much as 6 months. Engineering determined that approximately 3,000 cubic feet of waste gas was lost.

Cause: Leakage was identified at the Gas Analyzer Panel pump. The Gas Analyzer was isolated until repairs could be performed. Leakage stopped. From this location all release would have exited through Unit One Auxiliary Building Ventilation.

Corrective

Action:

129 Waste Gas Decay Tank (WGDT), the inservice tank, was sampled for nuclide mix. The identified mix was used in the release calculations but, activity levels were determined to be unrepresentatively low, due to the extended time period of release.

Activity levels of the identified mix were extrapolated to the level of the sample taken for a last WGDT release performed prior to the leak:

Nuclide	uCi Released	Gamma	Beta
		Dose (mrad)	Dose (mrad)
Ar-41	1.08E+02	1.08E-06	3.80E-07
Kr-85	9.50E+04	1.77E-06	1.98E-04
Kr-85M	7.62E+01	1.00E-07	1.61E-07
Xe-133	2.44E+03	9.23E-07	2.75E-06
Xe-135	1.32E+03	2.72E-06	3.48E-06
TOTAL		6.59E-06	2.05E-04

H3 1.26E+03 uCi 2.16E-06 m/rem

Activity was applied to abnormal release file RAC0193, as a Unit One Auxiliary Building Release. Release duration was conservatively set at 1 week and total dose was applied to the month of October, the 4th Quarter.

Event was captured in the site's Action Request System: CAP-01115005. Repairs were accomplished and the Gas Analyzer was returned to service.

Result:

The dose from the activity released represented a small percentage of the total dose and was a very small percentage of limits. The dose did not impose upon the health and safety of the public.

The event was reported to the NRC Region 3 Radiation Protection (RP) Inspector, at the time of the event.

2. Leaking 11 Steam Generator Relief

On 6/17/07, while performing a surveillance procedure on 11 Steam Generator Safety Relief, CV-31084 did not completely reseat. Discharge piping temperatures increased. The isolation was shut and the valve was stroked in an attempt to reset. It was determined that CV-31084 did reseat as evidenced by decreasing downstream temperatures.

CV-31084 did not fully reseat during performance of surveillance procedure. When the Cause: valve was unisolated, following performance of the SP, it leaked.

Corrective

Action:

CV-31084 was reisolated and stroked. Leakage ended. Work Request #25903 was issued.

Engineering provided a volume released. Based on this volume it was determined that a one second release with the valve full open would conservatively represent the release volume.

The Steam Generators were sampled and a release file was created to document the release.

The dose consequences were determined to be:

H3 1.53E+01 uCi 2.6E-09 mrem

Activity was applied to abnormal release file RAB0060, as an 11 Steam Generator Steam Release.

Event was captured in the site's Action Request System: CAP-01097198.

Result: The dose from the activity released represented a small percentage of the total dose and was a very small percentage of limits. The dose did not impose upon the health and safety of the public.

> The event was reported to the NRC Region 3 Radiation Protection (RP) Inspector, at the time of the event.

40CFR190 COMPLIANCE

The calculated dose from the release of radioactive materials in liquid or gaseous effluents <u>did not</u> exceed twice the limits of 10CFR50, Appendix I, therefore compliance with 40CFR190 <u>is not</u> required to be assessed, in this report.

SAMPLING, ANALYSIS AND LLD REQUIREMENTS

The minimum sampling frequency, minimum analysis frequency and lower limit of detection (LLD) requirements, as specified in ODCM Tables 2.1 and 3.1 were not exceeded in 2007.

MONITORING INSTRUMENTATION

There <u>were no</u> occurrences when less than the minimum required radioactive liquid and/or gaseous effluent monitoring instrumentation channels were operable as required by ODCM Tables 2.2 and 3.2.

Doses to Individuals Due to Effluent Releases from the Independent Spent Fuel Storage Facility (ISFSI)

Two (2) fuel casks were loaded and placed in the storage facility during the 2007 calendar year. The total number of casks in the ISFSI is twenty-four (24). There has been no release of radioactive effluents from the ISFSI.

CURRENT ODCM REVISION

The Offsite Dose Calculation Manual <u>was</u> revised in 2007. The current revision is 21. The revision date is July 25, 2007. A copy is submitted with this year's report.

PROCESS CONTROL PROGRAM

There <u>were no</u> changes made to the Process Control Program in 2007. Current manual is revision 8, August 25, 1999.

Table 1

OFF-SITE RADIATION DOSE ASSESSMENT - PRAIRIE ISLAND

PERIOD: JANUARY through DECEMBER 2007

	10 C Guideline	FR Part 50 Appendix s for a 2-unit site	e 1 9 per year
Gaseous Releases			
Maximum Site Boundry Gamma Air Dose (mrad)	6.57E-06	20	
Maximum Site Boundry Beta Air Dose (mrad)	2.05E-04	40	
Maximum Off-site Dose to any organ (mrem)*	3.26E-02	30	
Offshore Location Gamma Dose (mrad) Total Body (mrem)* Organ (mrad)*	4.86E-07 1.28E-03 1.28E-03	30	
Liquid Releases			
Maximum Off-site Dose Total Body (mrem)	1.72E-03	6	
Maximum Off-site Dose Organ - GI TRACT (mrem)	2.50E-03	20	
Limiting Organ Dose Organ - TOTAL BODY (mrem)	1.72E-03	6	

* Long-Lived Particulate, I-131, I-133 and Tritium

Table 2

OFF-SITE RADIATION DOSE ASSESSMENT - PRAIRIE ISLAND SUPPLEMENTAL INFORMATION

PERIOD: JANUARY through DECEMBER 2007

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Gaseous Releases

Maximum Site Boundary Dose Location (From Building Vents)

	Sector		WNW
	Distance	(miles)	0.4
Offshore Loca Within Site Bo	tion bundary		
	Sector		ESE
	Distance	(miles)	0.2
	Pathway		Inhalation
Maximum Off	-site		
	Sector		SSE
	Distance (mile	es)	0.6
	Pathways		Plume,
	-		Ground,
			Inhalation,
			Vegetables
	Age Group		Child

Liquid Releases

Maximum Off-site Dose Location Downstream

Pathway

Fish

ENCLOSURE 2

ANNUAL RADIOACTIVE EFFLUENT REPORT SUPPLEMENTAL INFORMATION

January 01, 2007 – December 31, 2007

2007 Annual Radioactive Effluent Report REV. 0 Page 1 of 9 Retention: Lifetime

ANNUAL RADIOACTIVE EFFLUENT REPORT

01-JAN-07 THROUGH 31-DEC-07

SUPPLEMENTAL INFORMATION

Prairie Island Nuclear Generating Plant

Licensee: Northern States Power Company

License Numbers: DPR-42 & DPR-60

A. Regulatory Limits

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1. Liquid Effluents:

a. The dose or dose commitment to an individual from radioactive materials in liquid effluents released from the site shall be limited to:

for the quarter	:	 	3.0 10.0	mrem mrem	to to	the any	total organ	body	
for the year			6.0 20.0	mrem mrem	to to	the any	total organ	body	

1.8

2. Gaseous Effluents:

a. The dose rate due to radioactive materials released in gaseous effluents from the site shall be limited to:

noble gases	≤ 500 mrem/year ≤3000 mrem/year	total body skin
I-131, I-133, H-3, LLP	≤1500 mrem/year	to any organ

b. The dose due to radioactive gaseous effluents released from the site shall be limited to:

noble gases

12.1

≤10 mrad/quarter gamma
≤20 mrad/quarter beta
≤20 mrad/year gamma
≤40 mrad/year beta

. .

I-131, I-133, H-3, LLP ≤ 15 mrem/quarter to any organ ≤ 30 mrem/year to any organ

B. Water Effluent Concentration

- Fission and activation gases in gaseous releases:
 10 CFR 20, Appendix B, Table 2, Column 1
- 2. Iodine and particulates with half lives greater than 8 days in gaseous releases:

10 CFR 20, Appendix B, Table 2, Column 1

3. Liquid effluents for radionuclides other than dissolved or entrained gases:

10 CFR 20, Appendix B, Table 2, Column 2

4. Liquid effluent dissolved and entrained gases:

2.0E-04 uCi/ml Total Activity

C. Average Energy

. Land Not applicable to Prairie Island regulatory limits.

D. Measurements and approximations of total activity

1.	Fission and activation gases in gaseous releases:	Total Nuclide	Gem Gem	±25%
2.	Iodines in gaseous releases:	Total Nuclide	Gem Gem	±25%
3.	Particulates in gaseous releases:	Total Nuclide	Gem Gem	±25%
4.	Liquid effluents	Total Nuclide	Gem Gem	±25%

E. Manual Revisions

1. Offsite Dose Calculations Manual latest Revision number: $\frac{21}{Revision date}$: $\frac{7/25/07}{25/07}$

2007 ANNUAL RADIOACTIVE EFFLUENT REPORT REV. 0

PAGE 3

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1.0 BATCH RELEASES (LIQUID)

1.1 NUMBER OF BATCH RELEASES

1.2 TOTAL TIME PERIOD (HRS)

1.3 MAXIMUM TIME PERIOD (HRS)

1.4 AVERAGE TIME PERIOD (HRS)

1.5 MINIMUM TIME PERIOD (HRS)

1.6 AVERAGE MISSISSIPPI RIVER FLOW (CFS)

2.0 BATCH RELEASES (AIRBORNE)

2.1 NUMBER OF BATCH RELEASES

2.2 TOTAL TIME PERIOD (HRS)

2.3 MAXIMUM TIME PERIOD (HRS)

2.4 AVERAGE TIME PERIOD (HRS)

2.5 MINIMUM TIME PERIOD (HRS)

3.0 ABNORMAL RELEASES (LIQUID)

3.1 NUMBER OF BATCH RELEASES 3.2 TOTAL ACTIVITY RELEASED (CI) 3.3 TOTAL TRITIUM RELEASED (CI)

4.0 ABNORMAL RELEASES (AIRBORNE)

and and a second se

4.1 NUMBER OF BATCH RELEASES

4.2 TOTAL ACTIVITY RELEASED (CI)

))	·	an a
QTR: 01	QTR: 02	QTR: 03	QTR: 04
4.10E+01	3.80E+01	2.00E+01	5.20E+01
7.36E+01	6.63E+01	3.66E+01	9.18E+01
2.92E+00	2.30E+00	2.25E+00	2.228+00
1.80E+00	1.74E+00	1.83E+00	1.77E+00
1.48E+00	9.83E-01	1.52E+00	1.48E+00
1.21E+04	2.90E+04	7.24E+03	1.86E+04

QTR: 01 . QTR: 02 QTR: 03 QTR: 04 1.108+01 0.00E+00 0.00E+00 8.002+00 1.42E+02 0.00E+00 0.00E+00 3.182+01 0.008+00 0.00E+00 1.146+01 2.48E+01 1.29E+01 0.00E+00 0.002+00 3.985+00 0.00E+00 3.33E-04 0.008+00 1.438-01

QTR: 01	QTR: 02	QTR: 03	QTR: 04
0.008+00	0.00E+00	0.00E+00	0.005+00
0.002+00	0.00E+00	0.00E+00	0.00E+00
0.002+00	0.00E+00	0.00B+00	0.00E+00

QTR: 01	QTR: 02	QTR: 03	QTR: 04
0.00E+00	1.00E+00	0.00E+00	1.00E+00
0.00E+00	1.53E-05	0.00E+00	1.00E- 1

2007 ANNUAL RADIOACTIVE EFFLUENT REPORT REV. 0 TABLE 1A GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

5.0	FISSION AND ACTIVATION GASBS							
	5.1	TOTAL RELEASE (CI)						
	5.2	AVERAGE RELEASE RATE (UCI/SEC)						
	5.3	GAMMA DOSE (MRAD)						
	5.4	BETA DOSE (MRAD)						
	5.5	PERCENT OF GAMMA TECH SPEC (%)						
	5.6	PERCENT OF BETA TECH SPEC (%)						

6.0	IODINES
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۰ ، <u>۰</u> ، ۰ ۲	6.1	TOTAL I-131 (CI)	and the second sec
	6.2	AVERAGE RELEASE RATE	(UCI/SEC)
		and the second	A 1 1

7.0 PARTICULATES

7.1 TOTAL RELEASE (CI)

7.2 AVERAGE RELEASE RATE (UCI/SEC)

8.0 TRITIUM

8.1 TOTAL RELEASE (CI)

8.2 AVERAGE RELEASE RATE (UCI/SEC)

9.0	TOTAL IODINE, PARTICULATE AND TRITIUM (UCI/SEC)
10.0	DOSE FROM IODINE, LLP, AND TRITIUM (MREM)
11.0	PERCENT OF TECH SPEC (%)
12.0	GROSS ALPHA (CI)

QTR: 01	QTR: 02	QTR: 03	QTR: 04
0.008+00	0.09E+00	0.00E+00	9.89E-02
0.002+00	0.002+00	0.00E+00	1.26B-02
0.002+00	0.00E+00	0.002+00	6.578-06
0.008+00	0.00E+00	0.00E+00	2.058-04
0.00E+00	0.00E+00	0.005+00	6.57E-05
0.00E+00	0.00E+00	0.00E+00	1.03E-03
			the second

0.00E+00	0.00E+00	0.002+00	0.008+00
0.00E+00	0.00E+00	0.002+00	0.008+00

2.1

4.17E-06	0.00E+00	0.00E+00	0.00E+00
5.31E-07	0.00E+00	0.002+00	0.00B+00

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3.33E+00	3.35E+00	2.73E+00	2.38E+00
4.23E-01	4.26E-01	3.475-01	3.02E-01

4.23E-01	4.26E-01	3.47E-01	3.02E-01
1.42E-02	9.228-03	4.888-03	4.25B-03
9.50E-02	6.15E-02	3.258-02	2.83E-02
0.00E+00	0.00E+00	0.002+00	0.008+00

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2007 ANNUAL RADIOACTIVE EFFLUENT REPORT REV. 0 TABLE 1C

GASBOUS EFFLUENTS - GROUND LEVEL RELEASES (CI)

13.0 FISSION AND ACTIVATION GASES

			CONTINUOUS MODE				BATCH MODE			
	NUCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 03	QTR: 04	QTR: 01	QTR: 02	QTR: 03	QTR: 04
на с 1 4 до 1	AR-41	CI				1.08E-04				
na in ann Naturn _a r	KR-85	CI				9.50E-02				
en an en en tar	KR-85M	CI				7.62E-05				
	XE-133	CI				2.44E-03				
	XE-135	CI				1.32E-03				
	TOTALS	CI	0.00E+00	0.00E+00	0.00E+00	9.89E-02	0.00E+00	0.008+00	0.008+00	0.00E+00

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14.0 IODINES

CONTINUOUS MODE

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BATCH MODE

N	UCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 03	QTR: 04	QTR: 01	QTR: 02	QTR: 03	QTR: 04
·										
т	OTALS	CI	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.008+00	0.00E+00

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2007 ANNUAL RADIOACTIVE EFFLUENT REPORT REV. 0 TABLE 1C

GASBOUS BFFLUENTS - GROUND LEVEL RELEASES (CONTINUED)

15.0 PARTICULATES

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CONTINUOUS MODE					BATCH	MODE			
NUCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 03	QTR: 04	QTR: 01	QTR: 02	QTR: 03	QTR: 04
							······	······································	·
CS-137	CI					4.178-06			
TOTALS	CI	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.178-06	0.00B+00	0.00E+00	0.008+00

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2007 ANNUAL RADIOACTIVE BFFLUENT REPORT REV. 0 TABLE 1A LIQUID RFFLUENTS - SUMMATION OF ALL RELEASES

16.0 VOLUME OF WASTE PRIOR TO DILUTION (LITERS) 17.0 VOLUME OF DILUTION WATER (LITERS)

18.0 FISSION AND ACTIVATION PRODUCTS

18.1 TOTAL RELEASES W/O H-3, RADGAS, ALPHA (CI) 18.2 AVERAGE DILUTION CONCENTRATION (UCI/ML)

19.0 TRITIUM

19.1 TOTAL RELEASE (CI)

19.2 AVERAGE DILUTION CONCENTRATION (UCI/ML)

20.0 DISSOLVED AND ENTRAINED GASES

20.1 TOTAL RELEASE (CI) 20.2 AVERAGE DILUTION CONCENTRATION (UCI/ML)

21.0 GROSS ALPHA (CI)

22.0 TOTAL TRITIUM, FISSION & ACTIVATION PRODUCTS (UCI/ML)

23.0 TOTAL BODY DOSE (MREM)

24.0 CRITICAL ORGAN

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24.1 DOSE (MREM) 24.2 ORGAN

25.0 PERCENT OF TECHNICAL SPECIFICATIONS LIMIT (%)

26.0 PERCENT OF CRITICAL ORGAN TECH SPEC LIMIT (%)

QTR: 01	QTR:- 02	QTR: 03	QTR: 04
<u> </u>			
1.81E+07	2.95E+07	2.17E+07	2.32E+07
		······································	
1.84E+11	1.05E+11	2.57E+11	2.22E+11

and a second second

4.84E-02	1.24E-02	4.08E-03	4.90E-02
2.63E-10	1.18E-10	1.59E-11	2.20E-10

t			
1.47E+02	2.53E+02	8.42E+01	2.36E+02
8.01E-07	2.41E-06	3.28E-07	1.06E-06
			, , , , , , , , , , , , , , , , , , , ,

4.00E-05	0.00E+00	8.73E-04
3.80E-13	0.00E+00	3.93E-12
	4	
0.008+00	0.00E+00	0.00B+00
· · · · · · · · · · · · · · · · · · ·		•••••
2.41E-06	3.28E-07	1.06E-06
5.77E-04	1.89E-04	5.35E-04
	4.00E-05 3.80E-13 0.00E+00 2.41E-06 5.77E-04	4.00E-05 0.00E+00 3.80E-13 0.00E+00 0.00E+00 0.00E+00 2.41E-06 3.28E-07 5.77E-04 1.89E-04

4.16E-04	5.77E-04	1.89E-04	5.35E-04	
TOT BODY	TOT BODY	TOT BODY	TOT BODY	

1.39E-02	1.92E-02	6.31E-03	1.78E-02
1.39E-02	1.92E-02	6.31E-03	1.78E-02

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2007 ANNUAL RADIOACTIVE EFFLUENT REPORT REV. 0 TABLE 2A

LIQUID BFFLUENTS - SUMMATION OF ALL RELEASES (CI)

27.0 INDIVIDUAL LIQUID BFFLUENT

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		CONTINUOUS MODE				BATCH MODE			
NUCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 03	QTR: 04	QTR: 01	QTR: 02	QTR: 03	QTR: 04
AG-108M	CI					4.17E-07			
AG-110M	CI					8.01E-03	4.16E-03	1.50E-03	1.88E-0
BA-139	CI			;		7.58E-06		1.04E-05	
CE-139	CI		· · · · ·			1.30E-06		1.94B-06	
C0-57	CI		176-13			1.532-06			1.00E-0
CO-58	CI			· ·		4.37E-03	1.55E-03	1.218-04	2.32E-0
CO-60*	CI		····	:		1.70E-03	4.85E-04	1.468-04	4.25E-0
CR-51	CI		t see a	1		1.87E-03	7.98E-05	1.285-05	1.89E-
CS-137	CI	1.34E-05	1. AM -						6.18E-
FE-55	CI	┥ <u>┝</u>				1.27E-02	3.85E-03	1.44E-03	4.75E-
FE-59	CI					3.03E-04	2.408-05		
LA-140	CI		<u> </u>			8.30E-06			Normal And And
MN-54	CI			 		6.78E-05	4.62E-06		1.85E-
NA-24	CI		1						9.29E-
NB-95	CI	-{·}				7.14E-05			-
NB-97	CI					7.56E-06	7.60E-06	1.02E-05	1.39E-
SB-124	CI			1		2.228-03	7.88E-06	3.13E-05	9.70E-
SB-125	CI			. .		1.31E-02	5.87E-04	7.728-04	4.05E-
SN-113	CI	1				7.37E-05	5.91E-06		
SR-85	CI								3.23E
SR-92	CI					9.67E-05	4.57E-05	2.328-05	2.15E
TE-123M	CI					5.268-04	6.53E-05		
TE-125M	CI					3.06E-03	1.52E-03		
TE-132	CI								2.19E
mt-201	CI	╾┧┝╾┷╌╍╼╼╼		1		1.05E-05			

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2007 ANNUAL RADIOACTIVE EFFLUENT REPORT REV. 0 TABLE 2A

LIQUID BFFLUENTS - SUMMATION OF ALL RELEASES (CONTINUED)

27.0 INDIVIDUAL LIQUID EFFLUENT

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				CONTINUOUS MODE		BATCH				
	NUCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 03	QTR: 04	QTR: 01	QTR: 02	QTR: 03	QTR: 04
,	ZR-95	CI					1.74E-04		-	
	ZR-97	CI					3.64E-06	5.96E-06	2.20E-06	4.60E-06
	TOTALS	CI	1.34E-05	0.00E+00	0.00E+00	0.00E+00	4.84E-02	1.24E-02	4.08E-03	4.90E-02

28.0 DISSOLVED AND ENTRAINED GASES

			CONTINUOUS MODE		BATCH MODE				
NUCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 03	QTR: 04	QTR: 01	QTR: 02	QTR+ 03	QTR: 04
KR-85	CI								7.468-04
XE-133	CI					3.51E-06	3.71E-05		1.27E-04
XE-135	CI						2.88E-06		
TOTALS	CI	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-06	4.00E-05	0.00E+00	8.73E-04

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ENCLOSURE 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

January 01, 2007 – December 31, 2007

PINGP 753, Rev. 7 Page 1 of 7 Retention: Life

PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: <u>01/01/07-12/31/07</u> License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)

1. Solid Waste Total Volumes and Total Curie Quantities:

	TYPE OF WASTE	UNITS	PERIOD TOTALS (0.00 E00)	EST. TOTAL ERROR; % (0.00 E00)	CONTAINER DISPOSAL VOL (ft ³) (LIST)
Α.	Resins	m ³	<u>1.02E+01</u>	en and hunder of them and an analysis of the second second second second second second second second second se	179.4
		ft ³	<u>3.59E+02</u>		
		Ci	5.59E-01	2.50E+01	
Β.	Dry-Compacted	m³			
		ft ³	·		
_					
C.	Non-Compacted	m	<u>2.90E+02</u>	,	1280
		ft°	<u>1.02E+04</u>		,
~			8.08E-01	2.50E+01	
D.	Fliter Media	m ²	<u> </u>		
		π^{2}	<u> </u>		
C	Other (furnish description)	m^3	7.255+01		1200
J. Cor	whiped DAW/Charcoal/Grit	• 111 #3	<u>7.20E+01</u>		1200
00			<u>2.302703</u> 6 35E 02	2 50 - + 01	
		CI	0.001-02		

NOTE:

The solid waste information provided in this report is the volume and activity of the low-level waste leaving the Prairie Island site. No allowance is made for off-site volume reduction prior to disposal. PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: 01-01-07/12-31-07 License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL) [continued]

2. Principal Radionuclide Composition by Type of Waste: (Bold letter designation from Page 1)

TYPE		Percent % Abundance
	Nuclide	<u>(0.00E0)</u>
С	*Fe-55	6.35E+01
	Co-58	8.85E+00
	Co-60	8.07E+00
	*Ni-63	1.19E+01
	Zr-95	2.01E+00
	Nb-95	1.59E+00

1% cutoff

	•	
S	*Fe-55	2.77E+01
	Co-58	4.40E+00
	Co-60	4.96E+00
	Nb-95	1.16E+00
	Zr-95	1.03E+00
	*C-14	7.85E+00
	*Ni-63	1.58E+01
	*H-3	3.50E+01

1% cutoff

* = Inferred - Not Measured on Site

PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: <u>01-01-07/12-31-07</u> License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL) [continued]

2. Principal Radionuclide Composition by Type of Waste (Continuation): (Bold letter designation from Page 1)

TYPE		Percent %
		Abundance
	Nuclide	<u>(0.00E0)</u>
	*H-3	1.18E+00
	*Fe-55	3.48E+01
	*Ni-63	3.53E+01
	Co-60	1.33E+01
	Co-58	1.14E+00
	Cs-137	3.83E+00
	C-14	3.51E+00
	Sb-125	5.61E+00

1% cutoff

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* = Inferred - Not Measured on Site

PINGP 753, Rev. 7 Page 4 of 7

PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: <u>01-01-07/12-31-07</u> License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL) [continued]

3. Solid Waste Disposition:

Number of Shipments

5 2 <u>Mode</u> StudsvikLogistics Hittman Transport Services <u>Destination</u> StudsvikRACE, LLC Studsvik Processing Facility, LLC

PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: <u>01-01-07/12-31-07</u> License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL) [continued]

4. Shipping Container and Solidification Method:

No.	Disposal Volume (Ft ³ /m ³)	Activity (Ci)	Type of Waste	Container Code	Solidif. Code
07-004	2560/72.5	0.390	С	L	N/A
07-005	2560/72.5	0.141	С	L	N/A
07-006	2560/72.5	0.226	С	L	N/A
07-011	179.4/5.1	0.296	А	L	N/A
07-012	179.4/5.1	0.263	А	L	N/A
07-018	2560/72.5	0.065	С	L	N/A
07-019	2560/72.5	0.049	С	L	N/A

TOTAL S	7	13200/373	1.43		
	CONTA (Shipme	INER CODES: nt type)	L A B Q	= = =	LSA Type A Type B Highway Route Controlled Quantity
	SOLIDIF	ICATION CODE	ES: C	=	Cement
	TYPES (OF WASTES:	A B C D S		Resins Dry Compacted Non-Compacted Filter Media Other

PINGP 753, Rev. 7 Page 6 of 7

PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: <u>01-01-07/12-31-07</u> License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

Number of Shipments

Mode

Destination

0

PINGP 753, Rev. 7 Page 7 of 7

> PRAIRIE ISLAND NUCLEAR GENERATING PLANT NORTHERN STATES POWER

Period: <u>01-01-07/12-31-07</u> License No. DPR-42/60

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

C. PROCESS CONTROL PROGRAM CHANGES

TITLE: Process Control for Solidification/Dewatering of Radioactive Waste from Liquid Systems

Current Revision Number: 8

Effective Date: 8/25/1999



If the effective date of the PCP is within the period covered by this report, then a description and justification of the changes to the PCP is required (T.S.6.5.D) (IT.S.5.5.4). Attach the sidelined pages to this report.

Changes/Justification:

N/A

ENCLOSURE 4

ATTACHMENT TO THE 2007 EFFLUENT REPORT

Description and Dose Assessment of Quarter 1 of 2007 Leak Communicated per ODCM (H4, Section 8.4) Industry Initiative on Groundwater Protection

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1 page follows

ATTACHMENT TO THE 2007 ANNUAL EFFLUENT REPORT

Amended Liquid Pathway Dose Calculation Quarter 1, 2007

Summary

This calculation did not change the total liquid dose to the critical receptor for the first quarter of 2007.

Background

On March 21, 2007, approximately 150 gallons of secondary steam condensate leaked to the ground outside the west side of the turbine building during transfer of turbine building sump water to the landlocked canal. This water had a tritium concentration of 5,150 pCi/L. The transfer of water was secured and no further leakage to the environment occurred. This release occurred from a monitored release path.

ODCM Considerations

Since the release occurred via a monitored release path, the dose calculations were performed per the ODCM. The released effluent did not flow to the normal landlocked location but was absorbed into the ground closer to the turbine building. At this location, the water has farther to travel to the receptor and is subject to greater dispersion than the normal release location. The ODCM dose calculations over-estimate the dose from this release. Corrective actions have been taken to prevent a similar spill in the future.

Dose Calculation Assumptions

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The dose calculation was performed per the ODCM for the annual effluent report. This dose over-estimates the dose under the conditions of this release. No revision to the ODCM dose calculation is warranted.

Discussion

The critical receptor is located 0.6 miles to the SSE of the Prairie Island site. The leaked water would have to travel in the groundwater under the recycle canal and discharge canal to reach the critical receptor. This assumed water flow maximizes the dose because the normal groundwater flow is towards the Vermillion River which would not carry the tritium toward the critical receptor.