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OPPD
Omaha Public Power District

444 South 16th Street Mall
Omaha NE 68102-2247

April 12, 2002
LIC-02-0045

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

Reference: Docket No. 50-285

SUBJECT: 2001 Fort Calhoun Station (FCS) Radiological Effluent Release Report and Radiological Environmental Operating Report

Pursuant to FCS Unit No. 1 Technical Specifications (TS) 5.9.4.a and 5.9.4.b, the Omaha Public Power District (OPPD) provides the enclosed two reports. The first report is the Annual Radiological Effluent Release Report for January 1, 2001, through December 31, 2001. This report is submitted in accordance with TS Section 5.9.4.a and is presented in the format outlined in Regulatory Guide 1.21, Revision 1. The report provides the results of quarterly dose calculations performed in accordance with the Offsite Dose Calculation Manual (ODCM).

The second report is the Annual Radiological Environmental Operating Report for January 1, 2001, through December 31, 2001. This report is submitted in accordance with TS Section 5.9.4.b and is consistent with the objectives specified in Section 5 of the ODCM.

Please contact R. G. Haug at 402-533-7156 if you have any questions.

Sincerely,

R. T. Ridenoure
Division Manager
Nuclear Operations

RTR/RRL/rrl
Enclosures

c: E. W. Merschoff, NRC Regional Administrator, Region IV
A. B. Wang, NRC Project Manager (w/o Enclosures)
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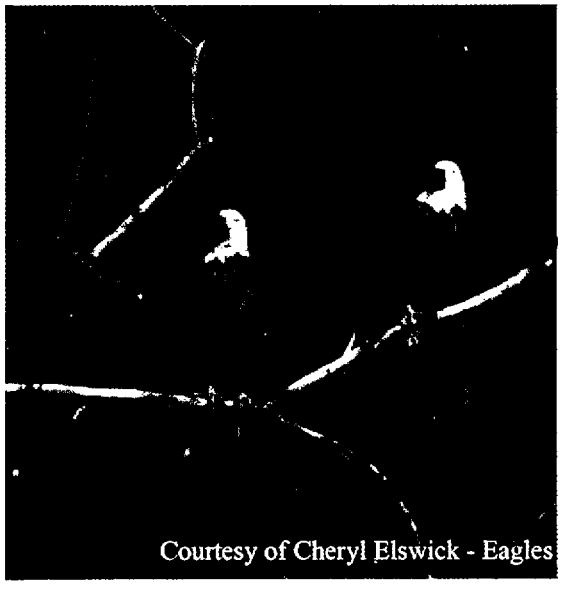
Omaha Public Power District Fort Calhoun Radiological Environmental Report 2001


Mike Uhland


Tony Constanzo - Snow & Blue Geese


Marilyn Hawes - Native Orchids


Tony Costanzo - Mallard Hen


Courtesy of Cheryl Elswick - Eagles

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION

RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

TECHNICAL SPECIFICATION 5.9.4b

January 01, 2001 – December 31, 2001

Annual Radiological Environmental Operating Report

This report is submitted in accordance with Section 5.9.4b of the Technical Specifications of Fort Calhoun Station Unit No. 1, Facility Operating License DPR-40 for the period January 01, 2001 through December 31, 2001.

In addition, this report provides any observations and anomalies that occurred during the monitoring period.

Reviewed by:

Supervisor-System Chemistry

Approved by:

Richard P Haug

Manager-Chemistry

Annual Radiological Environmental Operating Report

In accordance with Technical Specification 5.9.4b, herein is the Fort Calhoun Station (FCS) Annual Radiological Environmental Operating Report for year 2001. The data provided is consistent with the objectives as specified in Section 5.2.2 of the Offsite Dose Calculation Manual (ODCM), "Annual Radiological Environmental Operating Report". The report is presented as follows:

1) An introductory discussion of the implementation of the Radiological Environmental Monitoring Program (REMP), including program observations and environmental impact relevant to the operation of FCS.

2) The sample class, sample collection frequency, number of sample locations, and the number of samples collected this reporting period for each parameter is delineated in Table 1.0.

3) A statistical evaluation of REMP data is summarized in Table 2.0, in accordance with Regulatory Guide 4.8, Table 1. For each type of sample media and analysis, Table 2.0 presents data separately for all **indicator** locations, all **control** (background) locations, and the location having the highest annual mean result. For each of these classes, Table 2.0 specifies the following:

   a. The total number of analyses.

   b. The fraction of analyses yielding detectable results (i.e., results above the highest Lower Limit of Detection (LLD) for this period.

   c. The maximum, minimum, and average results.

   d. Locations with the highest mean are specified along with their distance and direction from the center of plant containment.

4) Table 3.0 is a listing of missed samples and explanations.

5) Review of Environmental Inc. Quality Assurance Program

6) Appendix A describes the Interlaboratory Comparison Program

7) Appendix B describes the vendor Data Reporting Conventions utilized.

8) Appendix C reports the information required when primary coolant specific activity has exceeded the limits of Technical Specification 2.1.3.

INTRODUCTION

Radiological Environmental Monitoring Program (REMP) – 2001

The Fort Calhoun Station (FCS), owned and operated by Omaha Public Power District, conducts a stringent environmental radiological monitoring program. This program was initiated prior to plant operation in 1973 and continues to be performed as a requirement of the facility-operating license. Pre-operational and operational environmental monitoring data generated have been recorded and will be archived for the duration of the plant's existence. This submittal contains the results of the Radiological Environmental Monitoring Program (REMP) and the operatives required for the FCS Annual Radiological Environmental Operating Report for year 2001.

The primary function of the REMP is to ensure the overall safety of the general public by monitoring plant liquid and gaseous discharges to the environment. The data accumulated is utilized to assess the overall impact of plant operation on the environment and to determine whether adjustments to plant operations or the REMP are needed.

Program objectives are accomplished by monitoring the potential radiation exposure pathways to the public including adsorption, inhalation, ingestion, and direct exposure. Both grab samples and composite samples are collected and analyzed to represent these exposure pathways including air, water, milk, vegetation, fish, sediment, and food crops. Direct exposure is monitored by utilizing thermoluminescent dosimeters (TLDs) that are installed in the field at several locations, including air monitoring stations. Samples are collected at both control (background) and indicator locations, which are selected based on radiological, meteorological, and geographical factors that are obtained from the Annual Effluent Release Report and the Environmental Land Use Survey.

Most monitoring is conducted within a five-mile radius circle centered on plant containment. However, some samples, typically control samples, are collected outside of five miles. This circle is divided into sixteen equal sectors of 22.5 degrees each. Each sector is assigned an identification letter "A" through "R" (note: letters "I" and "O" are not used as they may be mistaken for the numbers one and zero). Sector "A" is centered on North or zero degrees. Sectors are also given directional labels such as west-southwest ("WSW"). Sample locations are assigned a station number and their distance and direction from plant containment are listed in the Offsite Dose Calculation Manual (ODCM). Sample locations are also marked on sector maps maintained by the Environmental Group.

In interpreting the data, results due to plant operation are distinguished from those due to other sources by comparing control sample results (upwind, upstream, or distant) to indicator sample results (downstream, downwind, or nearby) for each type of sample collected. The program uses analysis

techniques that are sufficiently sensitive to detect radiation levels far below those that are considered hazardous to humans. A station attributable effect could be indicated if the sample results at an indicator location are significantly larger than those at the control location. The difference would have to be greater than that which could be accounted for by typical fluctuations in radiation from other sources. In year 2001, the activity present in some of the routinely sampled media was determined to be from plant sources, although any plant affects on the environment were considered negligible.

Results of completed analyses, as required by the FCS Offsite Dose Calculation Manual (ODCM), are presented in the attached statistical tables in accordance with Table 1 of Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants." The plant chemistry and environmental staff conducted the environmental sampling required by the REMP. A contract vendor (Environmental Inc., Northbrook, Illinois) performed sample analyses, preparation of monthly progress reports, and the statistical evaluation of sample analyses.

Results for this reporting period were generally within expected ranges and compared favorably to historical trends. The following observations were documented during the monitoring period:

1) **AMBIENT GAMMA RADIATION-TLD**

All environmental dosimeters were recovered and analyzed. A data comparison for years 2000 and 2001 indicated no overall increase in gamma radiation to the unrestricted area. The mean dose (mr/week) for all indicator locations for year 2001 was actually slightly lower than that for year 2000. Data was well within the expected range and no negative trend was identified. As a result, no observable environmental impact is indicated that would require changes or modifications to plant systems or operation.

2) **MILK / VEGETATION**

Milk samples were available within the five-mile monitoring area for most of the grazing season (May to October). However, during the first part of the grazing season milk was not available at the indicator location. Therefore, vegetation (pasture grass) was collected in lieu of milk at both the indicator and the control locations until milk was available. Results for I-131 and other gamma emitting isotopes were all <LLD for both milk and vegetation. No adverse environmental effects were observed. One duplicate pasture grass sample (May 17, 2001) was inadvertently combined with the original sample from the same location by the vendor and analyzed as a composite sample, however, the results were <LLD. A reanalysis could not be performed because the vendor had disposed of the sample. A condition report was initiated to acknowledge the occurrence. It was determined that because the results of the sample

analysis were <LLD, there was no adverse environmental affect observed. No plant systems or operational modifications are required as a result of these findings.

3) **FISH**

Comparison of 2000 and 2001 analyses indicate no adverse trend. All indicator and control fish sample analyses were <LLD as expected. During shipping to the vendor for analysis, one ice chest containing fish samples appeared to have been vandalized while enroute. However, the fish samples were ultimately recovered by the courier and delivered to the vendor intact for analysis. A condition report was initiated to acknowledge this occurrence. No plant systems or operational modifications are required as a result of these findings.

4) **FOOD CROPS**

Garden vegetable samples were collected at the offsite indicator location (resident receptor) determined to have the highest potential for exposure as a result of plant operation. Vegetables were also collected at a control location outside of the five-mile monitoring area. Analyses were all <LLD. Year 2001 data compared favorably with year 2000 data, as expected. No negative trend was identified. Therefore, no plant system or operational modifications will be implemented as a result of these findings.

5) **SEDIMENT**

Bottom sediment sample analyses were all <LLD for both indicator and control locations for 2001. This compared favorably with results from 2000. No plant systems or operational modifications will be required.

6) **AIR MONITORING**

Comparison of 2000 and 2001 air monitoring data indicates that results are consistent with data from previous years. There were no incidents of downtime or missed samples during 2001. One monitor experienced a brief timer malfunction when the timer was found to be intermittently running slow. Actual time elapsed was used to calculate results for that sample. A condition report was initiated to document this occurrence. No modifications are required as a result of this occurrence.

7) **WATER**

Fourth quarter water results (tritium composite) were greater than analytical lower limit of detection (300 pCi/L). A condition report was initiated to acknowledge these results, which required plant staff to conduct a chemistry evaluation of effluent release data for the period in

which the activity was found. The following evaluation will look at plant effluents as a possible source and doses attributed to those positive samples versus theoretical dose calculated from chemistry software. Downstream location OSW-B-I tritium was determined by the vendor (Environmental Inc.) to be 487 pCi/L for the fourth quarter. The vendor reanalyzed the sample, which confirmed original results. Additionally, each monthly composite sample for the fourth quarter was analyzed separately with the following results: October - 557 pCi/L, November - 583 pCi/L, and December - 60 pCi/L. During the December sampling period (December 5-26, 2001) no monitor tanks were released. Environmental samples were performed during monitor tank releases during October and November. A calculation of tritium concentration at site discharge during these monitor tank releases was performed. Using the low mixing value listed in the ODCM, the Missouri River was extremely low during the sampling period. The concentration at site discharge for Monitor Tank (MT) Release 2001156 was 1336 pCi/L and for MT 2001165 was 1127 pCi/L. Creating a composite for October and November using these calculated values and the sample volumes obtained from the environmental samples during periods of no release would result in composite values consistent with the Environmental Inc. findings. The average monitor tank tritium concentration for the quarter was 0.0969 μCi/ml. A dose calculation was performed using the quarterly discharged volume and this average tritium concentration using Genie software. The result was 4.9E-03 mrem. A dose estimate was also performed using the equations listed in the ODCM and the positive sample result. For the determination, an adult was assumed to drink water at 487 pCi/L for one quarter at the rate listed in Table 6. The dose from that calculation was 5.3E-03 mrem (487pCi/L * 730L/yr * .25yr * 5.99E-08 mrem/pCi).

In summation, no changes are required to the FCS effluent processes due to this positive environmental result. The dose attributed to the positive result is consistent with that estimated by LADTAP software. The level of this positive sample is well below the reporting level of 20,000 pCi/L. The dose estimated represents 0.16% of the annual limit of 3 mrem. A condition report was written. No plant system or operational modifications are required as a result of these findings.

Table 1.0 Sample collection program

Sample Class	Collection Frequency	Number of Sample Locations	Number of Samples Collected This Period
Background Radiation (TLD's)	Quarterly	12	48
Air Particulates	Weekly	5	260
Airborne Iodine	Weekly	5	260
Milk	Semimonthly	2	14
Pasture Grass (milk substitute)		2	10
Water	Monthly	3	36
Fish	Annually	2	5
Sediment	Semiannually	2	4
Food Crops	Annually	2	8
		TOTAL	645

Table 2.0 Radiological Environmental Monitoring Program Summary

Name of Facility: Fort Calhoun Nuclear Power Station - Unit 1 — Docket No. 50-285
Location of Facility: Washington, Nebraska — Reporting Period January-December, 2001
(County, State)

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location[d]	Location with Highest Annual Mean: Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Background Radiation (TLD) (mR/week)	Gamma 48	0.5	1.4 (40/40) (1.2-1.7)	OTD-J-(I), Onsite Stn. 0.7 mi @ 250°/WSW	1.6 (4 /4) (1.5-1.7)	1.4 (8/8) (1.1-1.6)	0
Airborne Particulates (pCi/m3)	GB 260	0.005	0.028 (208/208) (0.011-0.058)	OAP-B-(I) Old Plant Access Rd. 0.6 mi @ 208°/SSW	0.029 (52 /52) (0.013-0.047)	0.028 (52/52) (0.011-0.046)	0
	GS 20						
	Cs-134	0.001	< LLD	-	-	< LLD	0
	Cs-137	0.001	< LLD	-	-	< LLD	0
	Other Gammas	0.001	< LLD	-	-	< LLD	0
Airborne Iodine (pCi/m3)	I-131 260	0.07	< LLD	-	-	< LLD	0
Milk (pCi/L)	I-131 14	0.5	< LLD	-	-	< LLD	0
	GS 14						
	K-40	150	1940 (7/7) (1824-2049)	OFM-F-(I), Bansen, 0.7 mi. @ 207° /SSW	1940 (7/7) (1824-2049)	1299 (7/7) (1147-1408)	0
	Cs-134	15	< LLD	-	-	< LLD	0
	Cs-137	15	< LLD	-	-	< LLD	0
	Other Gammas	15	< LLD	-	-	< LLD	0
Pasture Grass (milk substitute) pCi/g wet	GS 10						
	Mn-54	0.022	< LLD	-	-	< LLD	0
	Co-58	0.026	< LLD	-	-	< LLD	0
	Co-60	0.024	< LLD	-	-	< LLD	0
	Fe-59	0.047	< LLD	-	-	< LLD	0
	Zn-65	0.066	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.022	< LLD	-	-	< LLD	0
	I-131	0.052	< LLD	-	-	< LLD	0
	Cs-134	0.030	< LLD	-	-	< LLD	0
	Cs-137	0.029	< LLD	-	-	< LLD	0
	Ba-La-140	0.021	< LLD	-	-	< LLD	0
Water (pCi/L)	GS 36						
	Cs-134	15	< LLD	-	-	< LLD	0
	Cs-137	18	< LLD	-	-	< LLD	0
	Other Gammas	15	< LLD	-	-	< LLD	0
	H3 12	300	487 (1/8)	OSW-B-I, Downstream 0.5 mi. @ 106° /ESE	487 (1/4)	< LLD	0

Table 2.0 Radiological Environmental Monitoring Program Summary

Name of Facility: Fort Calhoun Nuclear Power Station – Unit 1 | Docket No. 50-285
Location of Facility: Washington, Nebraska | Reporting Period January-December, 2001
(County, State)

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Fish	GS 5						
(pCi/g wet)	Mn-54	0.012	< LLD	-	-	< LLD	0
	Co-58	0.019	< LLD	-	-	< LLD	0
	Co-60	0.015	< LLD	-	-	< LLD	0
	Zn-65	0.025	< LLD	-	-	< LLD	0
	Ru-103	0.022	< LLD	-	-	< LLD	0
	Cs-134	0.018	< LLD	-	-	< LLD	0
	Cs-137	0.015	< LLD	-	-	< LLD	0
Sediment	GS 4						
pCi/g dry	Mn-54	0.020	< LLD	-	-	< LLD	0
	Co-58	0.025	< LLD	-	-	< LLD	0
	Co-60	0.013	< LLD	-	-	< LLD	0
	Zn-65	0.077	< LLD	-	-	< LLD	0
	Cs-134	0.032	< LLD	-	-	< LLD	0
	Cs-137	0.025	< LLD	-	-	< LLD	0
Food Crops	GS 8						
(pCi/g wet)	Mn-54	0.009	< LLD	-	-	< LLD	0
	Co-58	0.011	< LLD	-	-	< LLD	0
	Co-60	0.012	< LLD	-	-	< LLD	0
	Fe-59	0.027	< LLD	-	-	< LLD	0
	Zn-65	0.020	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.014	< LLD	-	-	< LLD	0
	Cs-134	0.011	< LLD	-	-	< LLD	0
	Cs-137	0.010	< LLD	-	-	< LLD	0
	Ba-La-140	0.026	< LLD	-	-	< LLD	0

[a] GB = gross beta, GS = gamma scan.

[b] LLD = nominal lower limit of detection based on a 95% confidence level.

[c] Mean and range are based on detectable measurements only (i.e., >LLD) Fraction of detectable measurements at specified locations is indicated in parentheses (F).

[d] Locations are specified: (1) by code, (2) by name, and (3) by distance and direction relative to the Reactor Containment Building.

[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 the typical pre-operational value for the medium or locationn.

Table 3.0 Listing of missed samples (samples scheduled but not collected)

Sample Type	Date	Location	Reason

All required samples for the REMP were collected as scheduled for 2000.

Review of Environmental Inc., Quality Assurance Program

Fort Calhoun Station contracts with Environmental Inc., Midwest Laboratory (vendor) to perform radioanalysis of environmental samples. Environmental Inc. participates in interlaboratory comparison (crosscheck) programs, as part of its quality control program. These programs are operated by agencies such as the Department of Energy which supply blind-spike environmental type samples such as milk or water containing concentrations of radionuclides unknown to the testing laboratory. This type of program provides an independent check of the testing laboratory's procedures and processes, and provides indication of possible weaknesses. In addition, Environmental Inc. has its own in-house QA program of blind-spike and duplicate analyses.

The plant staff reviewed the vendor's Interlaboratory Comparison Program for 2001 and noted that a total of seven standards analyzed did not meet the required acceptance criteria specifications. As a result, a chemistry evaluation was conducted to determine if these inconsistencies affected REMP sample analyses. The findings of the evaluation indicated that the vendor's explanations and corrective actions were appropriate and that the standards not meeting acceptance criteria did not affect REMP sample analyses.

During the year 2001, Environmental Inc. reported the following discrepancies:

Sample Code/Type	Date	Comments
STW-921/Water	July, 2001	Lab results for Sr-89 were 19.8 ± 1.5 pCi/L; Control limits: 22.5 - 39.9. Delay in processing may have contributed to deviation. Reanalysis results were within limits, 35.3 ± 4.4 pCi/L. Results for OPPD water samples for gamma isotopes <LLD for the year.
SPW-483/Water	Jan. 2001	Lab results for Ra-228 were 10.55 ± 2.02 pCi/L; Control limits: 13.6 - 25.26. Insufficient sample available to perform reanalysis.
SPMI-1270/Milk	Mar. 2001	Lab results for Cs-137 were 46.61 ± 8.81 pCi/L; Control limits: 25.90 - 45.90. A new Cs-137 spike was prepared. Reference sample SPMI-3232, which was within limits. No OPPD milk samples were collected or analyzed during March.
SPMI-3233/Milk	Apr. 2001	Lab results for Sr-90 were 1.18 ± 0.35 pCi/L; Control limits: <1.0. Low levels of Sr-90 are detected in the environment. These results are not unusual for milk. No OPPD milk samples were collected or analyzed during April.

Sample Code/Type	Date	Comments
SPMI-6146/Milk	July, 2001	Lab results for Sr-90 were 1.09 ± 0.36 pCi/L; Control limits: <1.0. Low levels of Sr-90 are detected in the environment. These results are not unusual for milk. OPPD milk sample results for July were <LLD for all gamma emitters except K-40, which is naturally occurring.
STSO-923/Soil	Jan. 2001	Lab results for Am-241 were <0.8 Bq/Kg; Control limits: 0.0 - 2.6. Results are considered a false positive as no activity was expected. OPPD does not at this time collect soil samples.
STSO-904/Soil	Mar. 2001	Lab results for Bi-212 were 53.20 ± 3.1 Bg/Kg; Control limits (which are determined by the ratio of Reported Value/EML value) were 0.45 - 1.23. Naturally occurring radium and thorium daughters are present in the shield background and a probable cause of the higher bias seen for bismuth. OPPD does not collect soil samples at this time.

Additional Notes:

Sample STW-921/Water was provided by Environmental Resources Associates for the Interlaboratory Comparison program. Samples SPW-483/Water, and SPMI-1270/Milk, were in-house "spike" samples. Samples SPMI-3233/Milk,and SPMI-6146/Milk were in-house "blank" samples. Sample STSO-923/Soil, was part of the Department of Energy's Mixed Analyte Performance Evaluation Program. Sample STSO-904/Soil was provided by the Environmental Laboratory Quality Assessment Program (EML).

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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, 2001 through December, 2001

Appendix A

Interlaboratory Comparison Program Results

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

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

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

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

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

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

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

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

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

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

Attachment A lists acceptance criteria for "spiked" samples.

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

ATTACHMENT A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

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

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

[b] Laboratory limit.

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b] Laboratory result[c]	ERA Result[d]	Control Limits
STW-897	WATER	Jan, 2001	Gr. Alpha	31.9 ± 2.1	45.7 ± 11.4	25.9 - 65.5
STW-897	WATER	Jan, 2001	Gr. Beta	25.3 ± 2.7	16.7 ± 5.0	8.0 - 25.4
STW-900	WATER	Feb, 2001	I-131	27.2 ± 0.8	28.3 ± 3.0	23.1 - 33.5
STW-902	WATER	Feb, 2001	Ra-226	4.0 ± 0.1	4.7 ± 0.7	3.4 - 5.9
STW-902	WATER	Feb, 2001	Ra-228	13.8 ± 0.4	14.4 ± 3.6	8.2 - 20.6
STW-902	WATER	Feb, 2001	Uranium	17.0 ± 0.3	20.4 ± 3.0	15.2 - 25.6
STW-903	WATER	Mar, 2001	H-3	17,400.0 ± 69.7	17,800.0 ± 1,780.0	14,700. - 20,900.0
STW-917	WATER	Apr, 2001	Gr. Alpha	57.4 ± 3.5	56.0 ± 14.0	31.8 - 80.2
STW-917	WATER	Apr, 2001	Ra-226	13.5 ± 0.4	17.7 ± 2.7	13.1 - 22.3
STW-917	WATER	Apr, 2001	Ra-228	10.1 ± 0.6	8.1 ± 2.0	4.6 - 11.6
STW-917	WATER	Apr, 2001	Uranium	14.2 ± 0.2	15.6 ± 3.0	10.4 - 20.8
STW-918	WATER	Apr, 2001	Co-60	27.9 ± 1.4	26.4 ± 5.0	17.7 - 35.1
STW-918	WATER	Apr, 2001	Cs-134	16.0 ± 0.4	16.9 ± 5.0	8.2 - 25.6
STW-918	WATER	Apr, 2001	Cs-137	195.4 ± 1.5	186.0 ± 9.3	170.0 - 202.0
STW-918	WATER	Apr, 2001	Gr. Beta	340.0 ± 51.0	343.0 ± 1.7	252.0 - 428.0
STW-918	WATER	Apr, 2001	Sr-89	62.8 ± 5.7	64.1 ± 5.0	55.5 - 72.8
STW-918	WATER	Apr, 2001	Sr-90	34.2 ± 1.6	33.8 ± 5.0	25.1 - 42.5
STW-919	WATER	Jun, 2001	Ba-133	37.8 ± 1.2	36.0 ± 5.0	27.3 - 44.7
STW-919	WATER	Jun, 2001	Co-60	49.9 ± 0.7	46.8 ± 5.0	38.1 - 55.5
STW-919	WATER	Jun, 2001	Cs-134	16.0 ± 1.4	15.9 ± 5.0	7.2 - 24.6
STW-919	WATER	Jun, 2001	Cs-137	208.0 ± 1.7	197.0 ± 9.9	180.0 - 214.0
STW-919	WATER	Jun, 2001	Zn-65	37.8 ± 0.7	36.2 ± 5.0	27.5 - 44.9
STW-920	WATER	Jun, 2001	Ra-226	14.6 ± 0.4	15.4 ± 2.3	11.4 - 19.4
STW-920	WATER	Jun, 2001	Ra-228	6.2 ± 0.2	4.5 ± 1.1	2.6 - 6.5
STW-920	WATER	Jun, 2001	Uranium	49.0 ± 1.0	55.7 ± 5.6	46.1 - 65.3
STW-921	WATER	Jul, 2001	Sr-89	19.8 ± 1.5	31.2 ± 5.0	22.5 - 39.9
Delay in processing may have attributed to deviation. Result of reanalysis; Sr-89, 35.3 ± 4.4 pCi/L. Sr-90, 25.0 ± 2.8 pCi/L.						
STW-921	WATER	Jul, 2001	Sr-90	26.3 ± 1.1	25.9 ± 5.0	17.2 - 34.6
STW-922	WATER	Jul, 2001	Gr. Alpha	23.3 ± 1.9	17.8 ± 5.0	9.1 - 26.5
STW-922	WATER	Jul, 2001	Gr. Beta	48.5 ± 4.6	53.0 ± 10.0	35.7 - 70.3
STW-924	WATER	Aug, 2001	H-3	2,680.0 ± 41.9	2,730.0 ± 356.0	2,110.0 - 3,350.0
STW-931	WATER	Sep, 2001	Ra-226	10.9 ± 0.2	10.8 ± 1.6	8.0 - 13.6
STW-931	WATER	Sep, 2001	Ra-228	9.7 ± 1.1	9.0 ± 2.2	5.1 - 12.8
STW-931	WATER	Sep, 2001	Uranium	11.2 ± 0.1	13.1 ± 3.0	7.9 - 18.3
STW-932	WATER	Oct, 2001	I-131	7.7 ± 0.3	7.7 ± 2.0	4.2 - 11.2
STW-933	WATER	Oct, 2001	Gr. Alpha	82.2 ± 4.0	97.5 ± 24.4	55.3 - 140.0
STW-933	WATER	Oct, 2001	Ra-226	9.5 ± 1.2	10.8 ± 1.6	8.0 - 13.6

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b]		
				Laboratory result[c]	ERA Result[d]	Control Limits
STW-933	WATER	Oct, 2001	Ra-228	17.0 ± 0.8	15.6 ± 3.9	8.9 - 22.4
STW-933	WATER	Oct, 2001	Uranium	32.2 ± 1.4	37.2 ± 3.7	30.7 - 43.6
STW-934	WATER	Oct, 2001	Co-60	82.4 ± 0.9	78.4 ± 5.0	69.7 - 87.1
STW-934	WATER	Oct, 2001	Cs-134	52.2 ± 1.3	54.1 ± 5.0	45.4 - 62.8
STW-934	WATER	Oct, 2001	Cs-137	39.4 ± 0.6	37.9 ± 5.0	26.3 - 43.7
STW-934	WATER	Oct, 2001	Gr. Beta	166.0 ± 7.1	192.0 ± 28.8	142.0 - 242.0
STW-934	WATER	Oct, 2001	Sr-89	12.8 ± 0.8	16.7 ± 5.0	8.0 - 25.4
STW-934	WATER	Oct, 2001	Sr-90	6.8 ± 0.7	7.7 ± 5.0	-1.0 - 16.4
STW-935	WATER	Oct, 2001	Gr. Alpha	63.5 ± 2.5	64.0 ± 16.0	36.5 - 91.5
STW-935	WATER	Oct, 2001	Gr. Beta	26.0 ± 1.2	21.5 ± 5.0	12.8 - 30.2
STW-938	WATER	Nov, 2001	Ba-133	66.7 ± 1.2	69.3 ± 6.9	57.5 - 81.1
STW-938	WATER	Nov, 2001	Co-60	59.3 ± 0.6	59.7 ± 5.0	51.0 - 68.4
STW-938	WATER	Nov, 2001	Cs-134	86.7 ± 1.5	93.9 ± 5.0	85.2 - 103.0
STW-938	WATER	Nov, 2001	Cs-137	45.0 ± 1.0	42.0 ± 5.0	33.3 - 50.7
STW-938	WATER	Nov, 2001	Zn-65	80.7 ± 0.6	77.3 ± 7.7	63.9 - 90.7

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

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

[c] Unless otherwise indicated, the laboratory 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.

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

Lab Code	TLD Type	Date	Measurement	mR Known Value	mR Lab result ± 2 Sigma	mR Control Limits
Teledyne Brown Engineering						
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #1	17.8	14.4 ± 0.2	12.46 - 23.14
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #2	35.5	32.4 ± 0.1	24.85 - 46.15
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #3	62.2	61.8 ± 0.9	43.54 - 80.86
Teledyne Brown Engineering						
2000-2	$CaSO_4$: Dy Cards	Mar, 2000	Reader 1, #1	17.8	21.3 ± 0.3	12.46 - 23.14
2000-2	$CaSO_4$: Dy Cards	Mar, 2000	Reader 1, #2	35.5	40.1 ± 1.9	24.85 - 46.15
2000-2	$CaSO_4$: Dy Cards	Mar, 2000	Reader 1, #3	62.2	69.9 ± 3.5	43.54 - 80.86
Chips and cards irradiated by Teledyne Brown Engineering, Westwood, New Jersey, in March of 2000.						
12th International Intercomparison						
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field	161.0	184.9 ± 1.9	112.70 - 209.30
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field 1	548.0	502.2 ± 1.7	383.60 - 712.40
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field 2	391.0	412.0 ± 2.9	273.70 - 508.30
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field 3	623.0	643.2 ± 2.9	436.10 - 809.90
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Lab, 1	391.0	442.8 ± 2.5	273.70 - 508.30
Environmental, Inc.						
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #1	4.0	3.7 ± 0.1	2.79 - 5.17
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #1	4.0	3.4 ± 0.1	2.79 - 5.17
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #2	7.1	7.9 ± 0.2	4.95 - 9.19
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #2	7.1	7.6 ± 0.3	4.95 - 9.19
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #3	15.9	18.6 ± 0.4	11.13 - 20.67
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #3	15.9	19.6 ± 0.1	11.13 - 20.67
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #4	63.6	78.2 ± 1.2	44.53 - 82.69
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #4	63.6	79.9 ± 2.5	44.53 - 82.69

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a] Laboratory results 2s, n=1[b]	Known Activity	Control[c] Limits
SPAP-477	Air Filter	Jan, 2001	Cs-137	1.76 ± 0.02	1.68	1.01 - 2.35
SPW-479	Water	Jan, 2001	H-3	54702.00 ± 644.00	54549.00	43639.20 - 65458.80
SPW-481	Water	Jan, 2001	Gr. Alpha	58.08 ± 2.79	69.14	34.57 - 103.71
SPW-481	Water	Jan, 2001	Gr. Beta	213.83 ± 3.07	220.26	198.23 - 242.29
SPW-482	Water	Jan, 2001	Gr. Alpha	51.77 ± 2.18	69.14	34.57 - 103.71
SPW-482	Water	Jan, 2001	Gr. Beta	202.48 ± 2.98	220.26	198.23 - 242.29
SPW-483	Water	Jan, 2001	Ra-226	20.11 ± 0.34	20.86	14.60 - 27.12
SPW-483	Water	Jan, 2001	Ra-228	10.55 ± 2.02	19.43	13.60 - 25.26
Sample was lost during analysis. Insufficient sample available to perform reanalysis.						
SPW-485	Water	Jan, 2001	Co-60	33.53 ± 3.40	31.13	21.13 - 41.13
SPW-485	Water	Jan, 2001	Cs-134	32.80 ± 2.54	30.81	20.81 - 40.81
SPW-485	Water	Jan, 2001	Cs-137	42.10 ± 5.60	36.00	26.00 - 46.00
SPW-485	Water	Jan, 2001	Sr-90	154.34 ± 3.49	137.66	110.13 - 165.19
SPAP-754	Air Filter	Jan, 2001	Gr. Beta	8.53 ± 0.02	7.88	-2.12 - 17.88
SPW-1037	Water	Feb, 2001	U-233/4	3.74 ± 0.10	4.17	2.50 - 5.84
SPW-1037	Water	Feb, 2001	U-238	3.81 ± 0.10	4.17	-7.83 - 16.17
SPW-1224	Water	Feb, 2001	Ra-226	21.25 ± 0.50	20.68	14.48 - 26.88
SPW-1224	Water	Feb, 2001	Ra-228	21.76 ± 2.65	19.27	13.49 - 25.05
SPW-1225	Water	Feb, 2001	Gr. Alpha	71.87 ± 3.07	69.14	34.57 - 103.71
SPW-1225	Water	Feb, 2001	Gr. Beta	36.30 ± 1.47	28.75	18.75 - 38.75
SPW-1272	Water	Feb, 2001	I-131	56.82 ± 0.71	63.05	50.44 - 75.66
SPW-1272	Water	Feb, 2001	I-131(g)	65.69 ± 10.21	63.05	53.05 - 73.05
SPVE-1274	Vegetation	Feb, 2001	I-131(g)	0.78 ± 0.05	0.76	0.45 - 1.06
SPCH-1276	Charcoal	Feb, 2001	I-131(g)	1.57 ± 0.05	1.58	0.95 - 2.21
SPMI-1270	Milk	Mar, 2001	Cs-134	31.89 ± 4.71	29.77	19.77 - 39.77
SPMI-1270	Milk	Mar, 2001	Cs-137	46.61 ± 8.81	35.90	25.90 - 45.90
The Cs-137 spike is suspect; A new cesium spike has been prepared. Reference to SPMI-3232.						
SPMI-1270	Milk	Mar, 2001	I-131(g)	81.92 ± 10.80	81.95	71.95 - 91.95
SPU-2901	Urine	Mar, 2001	H-3	51512.00 ± 1369.00	50189.00	40151.20 - 60226.80
SPW-2161	Water	Mar, 2001	Ra-228	29.92 ± 5.13	31.75	22.23 - 41.28
SPU-3128	Urine	Apr, 2001	H-3	2065.00 ± 408.00	2008.00	1317.37 - 2698.63
SPW-3129	Water	Apr, 2001	Gr. Alpha	37.94 ± 2.42	34.57	17.29 - 51.86

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a]		
				Laboratory results 2s, n=1[b]	Known Activity	Control[c] Limits
SPW-3129	Water	Apr, 2001	Gr. Beta	117.83 ± 2.37	109.46	98.51 - 120.41
SPAP-3508	Air Filter	Apr, 2001	Gr. Beta	0.80 ± 0.01	0.78	-9.22 - 10.78
SPMI-3232	Milk	Apr, 2001	Cs-134	32.69 ± 6.50	33.96	23.96 - 43.96
SPMI-3232	Milk	Apr, 2001	Cs-137	44.20 ± 9.08	35.79	25.79 - 45.79
SPMI-3232	Milk	Apr, 2001	I-131	48.05 ± 0.90	56.68	45.34 - 68.02
SPMI-3232	Milk	Apr, 2001	I-131(g)	55.64 ± 11.39	56.68	46.68 - 66.68
SPMI-3232	Milk	Apr, 2001	Sr-90	143.77 ± 3.04	136.82	109.46 - 164.18
SPSO-3356	Soil	Apr, 2001	Co-60	18.49 ± 0.21	19.57	9.57 - 29.57
SPSO-3356	Soil	Apr, 2001	Cs-137	18.71 ± 0.24	16.61	6.61 - 26.61
SPAP-3359	Air Filter	Apr, 2001	Cs-137	1.80 ± 0.01	1.67	1.00 - 2.34
SPW-3376	Water	Apr, 2001	Co-60	48.17 ± 4.85	45.19	35.19 - 55.19
SPW-3376	Water	Apr, 2001	Cs-134	37.14 ± 3.90	33.96	23.96 - 43.96
SPW-3376	Water	Apr, 2001	Sr-90	159.84 ± 3.42	136.82	109.46 - 164.18
SPW-3377	Water	Apr, 2001	I-131	68.60 ± 2.63	85.02	68.02 - 102.02
SPW-3129/1	Water	May, 2001	Gr. Alpha	37.94 ± 2.42	34.57	17.29 - 51.86
SPW-3129/1	Water	May, 2001	Gr. Beta	117.83 ± 2.37	109.46	98.51 - 120.41
SPW-3129/2	Water	Jun, 2001	Gr. Alpha	34.42 ± 2.14	34.57	17.29 - 51.86
SPW-3129/2	Water	Jun, 2001	Gr. Beta	119.99 ± 2.45	109.46	98.51 - 120.41
SPVE-3303	Vegetation	Jun, 2001	I-131(g)	0.81 ± 0.03	0.86	0.51 - 1.20
SPSO-5701	Soil	Jul, 2001	Co-60	17.42 ± 0.19	19.05	9.05 - 29.05
SPSO-5701	Soil	Jul, 2001	Cs-137	16.03 ± 0.22	16.52	6.52 - 26.52
SPW-5779	Water	Jul, 2001	Co-60	250.05 ± 18.63	233.26	209.93 - 256.59
SPW-5779	Water	Jul, 2001	Cs-137	178.68 ± 19.89	175.91	158.32 - 193.50
SPW-5779	Water	Jul, 2001	Sr-90	72.12 ± 2.24	68.12	54.50 - 81.74
SPF-5781	Fish	Jul, 2001	Co-60	1.87 ± 0.08	1.79	1.07 - 2.51
SPF-5781	Fish	Jul, 2001	Cs-137	1.43 ± 0.07	1.39	0.83 - 1.95
SPW-5937	Water	Jul, 2001	H-3	51177.00 ± 631.00	50189.00	40151.20 - 60226.80
SPW-59441	Water	Jul, 2001	Ra-226	36.62 ± 1.74	34.46	24.12 - 44.80
SPW-59441	Water	Jul, 2001	Ra-228	41.46 ± 6.44	36.06	25.24 - 46.88
SPAP-5703	Air Filter	Jul, 2001	Cs-137	1.81 ± 0.02	1.67	1.00 - 2.34
SPW-3129/3	Water	Jul, 2001	Gr. Alpha	35.31 ± 3.04	34.75	17.38 - 52.13

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a]		
				Laboratory results 2s, n=1[b]	Known Activity	Control[c] Limits
SPW-3129/3	Water	Jul, 2001	Gr. Beta	113.28 ± 3.65	109.46	98.51 - 120.41
SPMI-6145	Milk	Jul, 2001	Cs-137	188.45 ± 19.10	175.91	158.32 - 193.50
SPW-6604	Water	Jul, 2001	Gr. Alpha	35.36 ± 1.94	34.57	17.29 - 51.86
SPW-6604	Water	Jul, 2001	Gr. Beta	112.56 ± 2.46	108.82	97.94 - 119.70
SPW-9008	Water	Oct, 2001	H-3	48285.00 ± 606.10	50189.00	40151.20 - 60226.80
SPAP-9010	Air Filter	Oct, 2001	Cs-137	1.91 ± 0.01	1.67	1.00 - 2.34
SPW-10723	Water	Dec, 2001	U-233/4	40.12 ± 1.09	41.73	25.04 - 58.42
SPW-10723	Water	Dec, 2001	U-238	40.16 ± 1.09	41.73	29.21 - 54.25
SPAP-11550	Air Filter	Dec, 2001	Gr. Beta	1.58 ± 0.02	1.56	-8.44 - 11.56
SPW-11757	Water	Dec, 2001	Co-60	43.82 ± 3.14	41.36	31.36 - 51.36
SPW-11757	Water	Dec, 2001	Cs-134	24.11 ± 2.42	22.59	12.59 - 32.59
SPW-11757	Water	Dec, 2001	Cs-137	52.11 ± 4.40	50.89	40.89 - 60.89
SPMI-11759	Milk	Dec, 2001	Cs-134	28.03 ± 2.64	27.10	17.10 - 37.10
SPMI-11759	Milk	Dec, 2001	Cs-137	54.59 ± 5.08	50.89	40.89 - 60.89
SPF-11761	Fish	Dec, 2001	Cs-134	0.94 ± 0.02	0.90	0.54 - 1.26
SPF-11761	Fish	Dec, 2001	Cs-137	1.43 ± 0.04	1.43	0.86 - 2.00

[a] All results are in pCi/L, except for elemental potassium (K) in milk, which are in mg/L.; air filter samples, which are in pCi/Filter; and food products, which are in pCi/kg.
[b] Results are based on single determinations.
[c] Control limits are based on Attachment A, Page A2 of this report.

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

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

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Laboratory results (4.66 Sigma) LLD	Laboratory results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
SPAP-478	AIR FILTER	Jan 2001	Co-60	< 1.12		<100.0
SPAP-478	AIR FILTER	Jan 2001	Cs-134	< 1.66		<100.0
SPAP-478	AIR FILTER	Jan 2001	Cs-137	< 2.46		<100.0
SPW-480	WATER	Jan 2001	H-3	< 162.00	-1.86 ± 80.40	<200.0
SPW-484	WATER	Jan 2001	Gr. Alpha	< 0.68		<1.0
SPW-484	WATER	Jan 2001	Gr. Beta	< 1.35		<3.2
SPW-484	WATER	Jan 2001	Ra-226	< 0.02	0.03 ± 0.01	<1.0
SPW-484	WATER	Jan 2001	Ra-228	< 0.97	0.43 ± 0.50	<2.0
SPW-486	WATER	Jan 2001	Co-60	< 2.68		<10.0
SPW-486	WATER	Jan 2001	Cs-134	< 3.46		<10.0
SPW-486	WATER	Jan 2001	Cs-137	< 5.43		<10.0
SPW-486	WATER	Jan 2001	Sr-90	< 0.65	0.06 ± 0.31	<1.0
SPAP-755	AIR FILTER	Jan 2001	Gr. Beta	< 1.60	0.16 ± 0.90	<3.2
SPW-1038	WATER	Feb 2001	U-238	< 0.03		<1.0
SPW-1038	WATER	Feb 2001	U-238	< 0.00		<1.0
SPW-1223	WATER	Feb 2001	Gr. Alpha	< 0.46		<1.0
SPW-1223	WATER	Feb 2001	Gr. Beta	< 1.50		<3.2
SPW-1223	WATER	Feb 2001	Ra-226	< 0.02	0.03 ± 0.01	<1.0
SPW-1223	WATER	Feb 2001	Ra-228	< 0.95	0.45 ± 0.49	<2.0
SPMI-1268	MILK	Feb 2001	Cs-134	< 5.86		<10.0
SPMI-1268	MILK	Feb 2001	Cs-137	< 3.02		<10.0
SPMI-1268	MILK	Feb 2001	I-131(g)	< 7.46		<20.0
SPW-1271	WATER	Feb 2001	Co-60	< 1.06		<10.0
SPW-1271	WATER	Feb 2001	Cs-134	< 2.61		<10.0
SPW-1271	WATER	Feb 2001	Cs-137	< 2.37		<10.0
SPVE-1273	VEGETATION	Feb 2001	Cs-134	< 10.04		<100.0
SPVE-1273	VEGETATION	Feb 2001	Cs-137	< 6.00		<100.0
SPCH-1275	CHARCOAL CANISTER	Feb 2001	I-131(g)	< 0.01		<9.6
SPW-2164	WATER	Mar 2001	Ra-226	< 0.02	0.05 ± 0.01	<1.0
SPU-3126	URINE	Apr 2001	H-3	< 642.00	-66.00 ± 335.00	<200.0

2.0 ml. sample volume.

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

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Laboratory results (4.66 Sigma) LLD	Laboratory results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
SPDW-3130	WATER	Apr 2001	Gr. Alpha	< 0.54	0.04 ± 0.38	<1.0
SPDW-3130	WATER	Apr 2001	Gr. Beta	< 1.46	0.67 ± 1.04	<3.2
SPMI-3233	MILK	Apr 2001	Cs-137	< 2.66		<10.0
SPMI-3233	MILK	Apr 2001	I-131	< 0.26	-0.06 ± 0.14	<0.5
SPMI-3233	MILK	Apr 2001	I-131(g)	< 3.91		<20.0
SPMI-3233	MILK	Apr 2001	Sr-89	< 0.79	-0.32 ± 0.79	<5.0
SPMI-3233	MILK	Apr 2001	Sr-90		1.18 ± 0.35	<1.0
Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.						
SPSO-3357	SOIL	Apr 2001	Cs-134	< 14.77		<100.0
SPSO-3357	SOIL	Apr 2001	Cs-137	< 11.72		<100.0
SPAP-3358	AIR FILTER	Apr 2001	Cs-137	< 0.55		<100.0
SPW-3375	WATER	Apr 2001	Co-60	< 2.90		<10.0
SPW-3375	WATER	Apr 2001	Cs-134	< 3.71		<10.0
SPW-3375	WATER	Apr 2001	I-131(g)	< 0.39	0.02 ± 0.22	<20.0
SPW-3375	WATER	Apr 2001	Sr-90	< 0.56	0.05 ± 0.27	<1.0
SPDW-3130	WATER	May 2001	Gr. Alpha	< 0.45	0.15 ± 0.34	<1.0
SPDW-3130	WATER	May 2001	Gr. Beta	< 1.26	0.34 ± 0.95	<3.2
SPDW-3130	WATER	Jun 2001	Gr. Alpha	< 0.44	0.09 ± 0.32	<1.0
SPDW-3130	WATER	Jun 2001	Gr. Beta	< 1.46	0.66 ± 1.04	<3.2
SPVE-3304	VEGETATION	Jun 2001	Co-60	< 7.06		<100.0
SPVE-3304	VEGETATION	Jun 2001	Cs-134	< 11.56		<100.0
SPVE-3304	VEGETATION	Jun 2001	Cs-137	< 8.30		<100.0
SPSO-5702	SOIL	Jul 2001	Co-60	< 12.80		<100.0
SPSO-5702	SOIL	Jul 2001	Cs-134	< 13.96		<100.0
SPSO-5702	SOIL	Jul 2001	Cs-137	< 8.10		<100.0
SPAP-5704	AIR FILTER	Jul 2001	Co-60	< 0.79		<100.0
SPAP-5704	AIR FILTER	Jul 2001	Cs-134	< 0.84		<100.0
SPAP-5704	AIR FILTER	Jul 2001	Cs-137	< 0.60		<100.0
SPW-5780	WATER	Jul 2001	Co-60	< 1.86		<10.0
SPW-5780	WATER	Jul 2001	Cs-134	< 2.46		<10.0
SPW-5780	WATER	Jul 2001	Cs-137	< 3.77		<10.0

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

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Laboratory results (4.66 Sigma) LLD	Activity[b]	Acceptance Criteria (4.66 Sigma)
SPF-5782	FISH	Jul 2001	Co-60	< 5.64		<100.0
SPF-5782	FISH	Jul 2001	Cs-134	< 7.51		<100.0
SPW-5938	WATER	Jul 2001	H-3	< 163.22	-16.21 ± 85.07	<200.0
SPW-59451	WATER	Jul 2001	Ra-226	< 0.01	0.04 ± 0.01	<1.0
SPW-59451	WATER	Jul 2001	Ra-228	< 0.77	0.70 ± 0.44	<2.0
SPDW-3130	WATER	Jul 2001	Gr. Alpha	< 0.54	0.36 ± 0.40	<1.0
SPDW-3130	WATER	Jul 2001	Gr. Beta	< 2.27	-0.78 ± 1.35	<3.2
SPMI-6146	MILK	Jul 2001	Sr-90	< 0.50	1.09 ± 0.36	<1.0
Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.						
SPW-6605	WATER	Jul 2001	Gr. Beta	< 1.34	0.55 ± 1.01	<3.2
SPW-9009	WATER	Oct 2001	H-3	< 160.00	-56.70 ± 76.50	<200.0
SPAP-9011	AIR FILTER	Oct 2001	Co-60	< 0.76		<100.0
SPAP-9011	AIR FILTER	Oct 2001	Cs-137	< 0.58		<100.0
SPW-5780	WATER	Oct 2001	Sr-90	< 0.54	0.36 ± 0.30	<1.0
SPW-10724	WATER	Dec 2001	U-238	< 0.13	0.04 ± 0.10	<1.0
SPAP-11549	AIR FILTER	Dec 2001	Gr. Beta	< 0.00	0.01 ± 0.00	<3.2
SPW-11756	WATER	Dec 2001	Cs-137	< 2.62		<10.0
SPMI-11758	MILK	Dec 2001	Cs-137	< 4.00		<10.0
SPMI-11758	MILK	Dec 2001	I-131(g)	< 16.57		<20.0
SPF-11760	FISH	Dec 2001	Cs-137	< 7.96		<100.0

[a] Liquid sample results are reported in pCi/Liter, air filter sample results are in pCi/filter, charcoal sample results are in pCi/charcoal, and solid sample results are in pCi/kilogram.
[b] The activity reported is the net activity result.

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

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a]		
			First Result	Second Result	Averaged Result
AP-10675, 10676	Jan, 2001	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01
AP-10803, 10804	Jan, 2001	Be-7	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
AP-10833, 10834	Jan, 2001	Be-7	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
WW-51, 52	Jan, 2001	H-3	362.60 ± 94.70	417.20 ± 96.80	389.90 ± 67.71
MI-72, 73	Jan, 2001	K-40	1,566.90 ± 196.80	1,372.40 ± 152.50	1,469.65 ± 124.49
MI-96, 97	Jan, 2001	K-40	1,418.30 ± 117.80	1,545.70 ± 162.50	1,482.00 ± 100.35
U-858, 859	Jan, 2001	Gr. Beta	2.17 ± 2.47	4.23 ± 2.74	3.20 ± 1.84
MI-389, 390	Jan, 2001	K-40	1,489.20 ± 141.10	1,463.30 ± 168.20	1,476.25 ± 109.77
DW-879, 880	Jan, 2001	Gr. Beta	2.63 ± 0.52	2.37 ± 0.50	2.50 ± 0.36
SWU-813, 814	Jan, 2001	Gr. Beta	2.48 ± 0.58	2.46 ± 0.63	2.47 ± 0.43
MI-708, 709	Feb, 2001	K-40	1,179.40 ± 103.00	1,280.40 ± 90.26	1,229.90 ± 68.48
MI-740, 741	Feb, 2001	I-131	0.01 ± 0.26	-0.12 ± 0.26	-0.05 ± 0.18
MI-740, 741	Feb, 2001	K-40	1,434.00 ± 156.50	1,435.00 ± 126.10	1,434.50 ± 100.49
MI-789, 790	Feb, 2001	K-40	1,584.30 ± 158.80	1,390.70 ± 136.50	1,487.50 ± 104.70
DW-901, 902	Feb, 2001	Gr. Beta	4.67 ± 1.08	5.54 ± 1.13	5.11 ± 0.78
SWU-1544, 1545	Feb, 2001	Gr. Beta	3.13 ± 0.63	2.33 ± 0.52	2.73 ± 0.41
DW-1426, 1427	Feb, 2001	Gr. Beta	2.05 ± 0.92	2.34 ± 0.93	2.20 ± 0.65
DW-1426, 1427	Feb, 2001	H-3	42.60 ± 94.23	131.31 ± 95.34	86.96 ± 67.02
WW-1476, 1477	Feb, 2001	H-3	53.06 ± 65.79	53.06 ± 93.03	53.06 ± 56.97
MI-1523, 1524	Mar, 2001	I-131	-0.01 ± 0.20	-0.10 ± 0.37	-0.06 ± 0.21
MI-1523, 1524	Mar, 2001	K-40	1,396.00 ± 184.80	1,576.00 ± 184.90	1,486.00 ± 130.71
MI-1572, 1573	Mar, 2001	K-40	1,499.20 ± 113.30	1,326.00 ± 118.80	1,412.60 ± 82.08
MI-1572, 1573	Mar, 2001	Sr-90	1.65 ± 0.44	1.51 ± 0.52	1.58 ± 0.34
SW-1648, 1649	Mar, 2001	K-40	297.80 ± 67.20	344.80 ± 82.30	321.30 ± 53.13
MI-1800, 1801	Mar, 2001	K-40	1,425.80 ± 183.30	1,372.20 ± 119.70	1,399.00 ± 109.46
SW-1779, 1780	Mar, 2001	Gr. Alpha	2.22 ± 0.73	2.14 ± 0.69	2.18 ± 0.50
SW-1779, 1780	Mar, 2001	Gr. Beta	6.28 ± 0.74	6.62 ± 0.70	6.45 ± 0.51
MI-1447, 1448	Mar, 2001	I-131	-0.65 ± 0.27	0.13 ± 0.55	-0.26 ± 0.31
MI-1447, 1448	Mar, 2001	K-40	1,496.20 ± 155.40	1,413.40 ± 169.60	1,454.80 ± 115.01
WW-2115, 2116	Mar, 2001	H-3	540.04 ± 111.84	500.85 ± 110.46	520.44 ± 78.59
SW-1698, 1699	Mar, 2001	Gr. Beta	6.07 ± 1.75	5.57 ± 1.85	5.82 ± 1.27
DW-2272, 2273	Mar, 2001	Gr. Beta	2.10 ± 0.86	1.63 ± 0.83	1.87 ± 0.60
WW-2356, 2357	Mar, 2001	Gr. Beta	1.22 ± 0.50	1.32 ± 0.47	1.27 ± 0.35
AP-2812, 2813	Mar, 2001	Be-7	0.07 ± 0.02	0.05 ± 0.01	0.06 ± 0.01
AP-2812, 2813	Mar, 2001	Be-7	0.07 ± 0.02	0.05 ± 0.01	0.06 ± 0.01
LW-2217, 2218	Mar, 2001	Gr. Beta	1.85 ± 0.51	2.23 ± 0.55	2.04 ± 0.37

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

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a]		
			First Result	Second Result	Averaged Result
AP-2833, 2834	Mar, 2001	Be-7	0.04 ± 0.01	0.06 ± 0.02	0.05 ± 0.01
AP-3038, 3039	Mar, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
AP-3038, 3039	Mar, 2001	Be-7	0.06 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
DW-2398, 2399	Mar, 2001	Gr. Beta	1.58 ± 0.89	1.81 ± 0.88	1.69 ± 0.63
LW-2467, 2468	Mar, 2001	Gr. Beta	2.52 ± 0.53	2.42 ± 0.53	2.47 ± 0.37
MI-2446, 2447	Apr, 2001	K-40	1,285.40 ± 177.10	1,376.00 ± 175.90	1,330.70 ± 124.81
AP-3017, 3018	Apr, 2001	Be-7	0.05 ± 0.01	0.05 ± 0.01	0.05 ± 0.00
SW-2423, 2424	Apr, 2001	K-40	255.60 ± 59.80	268.40 ± 65.40	262.00 ± 44.31
BS-3103, 3104	Apr, 2001	Gr. Beta	7.99 ± 1.80	8.17 ± 1.73	8.08 ± 1.25
SWU-3239, 3240	Apr, 2001	Gr. Beta	3.30 ± 0.60	4.30 ± 0.74	3.80 ± 0.48
SS-3322, 3323	Apr, 2001	K-40	15.99 ± 1.08	15.59 ± 1.01	15.79 ± 0.74
W-3990, 3991	Apr, 2001	Sr-89	91.35 ± 18.94	85.29 ± 23.99	88.32 ± 15.28
BS-4347, 4348	Apr, 2001	K-40	3,982.40 ± 489.60	3,255.80 ± 450.10	3,619.10 ± 332.53
BS-4347, 4348	Apr, 2001	K-40	3.26 ± 0.45	3.98 ± 0.49	3.62 ± 0.33
MI-3364, 3365	May, 2001	K-40	1,325.90 ± 160.20	1,453.20 ± 163.00	1,389.55 ± 114.27
SO-3385, 3386	May, 2001	Gr. Alpha	6.51 ± 3.09	9.01 ± 3.44	7.76 ± 2.31
SO-3385, 3386	May, 2001	Gr. Beta	24.63 ± 3.15	28.17 ± 3.12	26.40 ± 2.22
SO-3385, 3386	May, 2001	K-40	19.17 ± 1.08	17.94 ± 0.76	18.56 ± 0.66
CL-4068, 4069	May, 2001	K-40	1.09 ± 0.27	1.13 ± 0.23	1.11 ± 0.18
MI-3475, 3476	May, 2001	Gr. Beta	1,297.10 ± 114.60	1,433.60 ± 156.60	1,365.35 ± 97.03
WW-3545, 3546	May, 2001	Gr. Beta	1.57 ± 0.55	1.36 ± 0.53	1.47 ± 0.38
MI-3681, 3682	May, 2001	K-40	1,417.20 ± 125.70	1,496.20 ± 124.50	1,456.70 ± 88.46
SW-3702, 3703	May, 2001	Gr. Alpha	4.51 ± 1.66	3.22 ± 1.55	3.87 ± 1.13
SW-3702, 3703	May, 2001	Gr. Beta	8.74 ± 1.36	7.11 ± 1.38	7.93 ± 0.97
BS-4021, 4022	May, 2001	Cs-137	224.30 ± 30.20	205.90 ± 43.00	215.10 ± 26.27
BS-4021, 4022	May, 2001	H-3	842.00 ± 47.00	860.00 ± 48.00	851.00 ± 33.59
BS-4021, 4022	May, 2001	K-40	21,117.00 ± 953.00	21,629.00 ± 1,357.00	21,373.00 ± 829.10
BS-4021, 4022	May, 2001	Pu-238	80.30 ± 36.50	59.50 ± 22.00	69.90 ± 21.31
BS-4021, 4022	May, 2001	Pu-239/40	49.40 ± 31.80	41.10 ± 19.60	45.25 ± 18.68
BS-4021, 4022	May, 2001	Ra-226	7,436.00 ± 577.90	9,126.00 ± 751.90	8,281.00 ± 474.16
BS-4021, 4022	May, 2001	Sr-90	10.60 ± 2.71	16.80 ± 3.22	13.70 ± 2.10
F-3813, 3814	May, 2001	K-40	2.10 ± 0.17	2.30 ± 0.26	2.20 ± 0.16
G-4158, 4159	May, 2001	Be-7	0.37 ± 0.13	0.41 ± 0.14	0.39 ± 0.10
SO-4179, 4180	May, 2001	Ac-228	0.45 ± 0.13	0.52 ± 0.14	0.49 ± 0.10
SO-4179, 4180	May, 2001	Bi-214	0.31 ± 0.06	0.41 ± 0.06	0.36 ± 0.04
SO-4179, 4180	May, 2001	Cs-137	0.46 ± 0.05	0.47 ± 0.04	0.47 ± 0.03

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

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SO-4179, 4180	May, 2001	Gr. Beta	26.65 ± 2.63	24.68 ± 2.52	25.67 ± 1.82
SO-4179, 4180	May, 2001	K-40	16.35 ± 0.86	16.05 ± 0.82	16.20 ± 0.59
SO-4179, 4180	May, 2001	Pb-212	0.35 ± 0.04	0.43 ± 0.05	0.39 ± 0.03
SO-4179, 4180	May, 2001	Ra-226	0.56 ± 0.98	1.03 ± 0.31	0.79 ± 0.51
SO-4179, 4180	May, 2001	Tl-208	0.14 ± 0.03	0.17 ± 0.03	0.15 ± 0.02
BS-4233, 4234	May, 2001	Cs-137	0.03 ± 0.01	0.03 ± 0.02	0.03 ± 0.01
BS-4233, 4234	May, 2001	K-40	8.18 ± 0.48	7.80 ± 0.58	7.99 ± 0.38
SWU-4376, 4377	May, 2001	Gr. Beta	2.58 ± 0.55	2.94 ± 0.58	2.76 ± 0.40
DW-4449, 4450	May, 2001	Gr. Beta	2.83 ± 0.55	3.74 ± 0.65	3.29 ± 0.43
DW-4397, 4398	May, 2001	Gr. Beta	9.13 ± 1.26	10.20 ± 1.34	9.66 ± 0.92
MI-4114, 4115	May, 2001	K-40	1,325.90 ± 118.80	1,394.70 ± 133.10	1,360.30 ± 89.20
F-4284, 4285	May, 2001	K-40	2.23 ± 0.32	2.12 ± 0.35	2.18 ± 0.24
DW-4326, 4327	Jun, 2001	Gr. Beta	2.60 ± 0.97	1.47 ± 0.83	2.04 ± 0.64
MI-4470, 4471	Jun, 2001	K-40	1,514.50 ± 116.60	1,456.80 ± 130.90	1,485.65 ± 87.65
SW-4493, 4494	Jun, 2001	Gr. Beta	4.05 ± 1.23	4.64 ± 1.32	4.35 ± 0.90
BS-4725, 4726	Jun, 2001	Co-60	112.00 ± 24.30	84.50 ± 8.70	98.25 ± 12.91
BS-4725, 4726	Jun, 2001	Cs-137	3,083.10 ± 100.10	3,094.80 ± 35.30	3,088.95 ± 53.07
BS-4725, 4726	Jun, 2001	K-40	8,143.70 ± 640.40	8,083.80 ± 225.10	8,113.75 ± 339.40
MI-4775, 4776	Jun, 2001	K-40	1,362.20 ± 71.80	1,363.90 ± 73.40	1,363.05 ± 51.34
WW-5110, 5111	Jun, 2001	H-3	1,173.50 ± 129.10	1,046.80 ± 125.20	1,110.15 ± 89.92
G-5085, 5086	Jun, 2001	Be-7	0.89 ± 0.17	1.14 ± 0.39	1.02 ± 0.21
G-5085, 5086	Jun, 2001	K-40	5.13 ± 0.39	5.22 ± 0.70	5.17 ± 0.40
MI-5259, 5260	Jun, 2001	K-40	1,529.70 ± 122.70	1,406.20 ± 123.80	1,467.95 ± 87.15
MI-5259, 5260	Jun, 2001	Sr-90	1.69 ± 0.42	1.71 ± 0.44	1.70 ± 0.30
SWU-5422, 5423	Jun, 2001	Gr. Beta	2.59 ± 0.54	1.91 ± 0.52	2.25 ± 0.37
VE-5401, 5402	Jun, 2001	Gr. Beta	8.12 ± 0.24	8.88 ± 0.26	8.50 ± 0.18
VE-5401, 5402	Jun, 2001	K-40	6.55 ± 0.52	6.26 ± 0.65	6.40 ± 0.42
AP-5830, 5831	Jun, 2001	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01
SW-5557, 5558	Jun, 2001	Gr. Beta	5.43 ± 1.70	5.96 ± 1.56	5.70 ± 1.15
AP-5851, 5852	Jun, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
SW-5636, 5637	Jun, 2001	Gr. Beta	4.75 ± 1.38	4.18 ± 1.34	4.47 ± 0.96
LW-5681, 5682	Jun, 2001	Gr. Beta	2.42 ± 0.37	2.18 ± 0.34	2.30 ± 0.25
G-5535, 5536	Jul, 2001	Be-7	0.99 ± 0.29	0.97 ± 0.54	0.98 ± 0.31
G-5535, 5536	Jul, 2001	Gr. Beta	7.62 ± 0.12	7.72 ± 0.12	7.67 ± 0.08
G-5535, 5536	Jul, 2001	K-40	7.26 ± 1.03	7.64 ± 0.93	7.45 ± 0.69
AP-5788, 5789	Jul, 2001	Be-7	0.08 ± 0.02	0.07 ± 0.02	0.08 ± 0.01

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

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a]		
			First Result	Second Result	Averaged Result
AP-5872, 5873	Jul, 2001	Be-7	0.07 ± 0.02	0.08 ± 0.02	0.07 ± 0.01
AP-5893, 5894	Jul, 2001	Be-7	0.08 ± 0.02	0.08 ± 0.01	0.08 ± 0.01
AP-5809, 5810	Jul, 2001	Be-7	0.07 ± 0.02	0.06 ± 0.01	0.06 ± 0.01
SW-5724, 5725	Jul, 2001	Gr. Alpha	2.95 ± 0.70	2.89 ± 0.60	2.92 ± 0.46
SW-5724, 5725	Jul, 2001	Gr. Beta	8.79 ± 0.71	8.21 ± 0.65	8.50 ± 0.48
SW-5767, 5768	Jul, 2001	I-131	0.79 ± 0.31	0.61 ± 0.26	0.70 ± 0.20
LW-5920, 5921	Jul, 2001	Gr. Beta	3.06 ± 0.64	3.15 ± 0.58	3.11 ± 0.43
SO-6172, 6173	Jul, 2001	Cs-137	0.30 ± 0.05	0.32 ± 0.04	0.31 ± 0.03
SO-6172, 6173	Jul, 2001	K-40	18.20 ± 1.08	17.55 ± 0.82	17.88 ± 0.68
SO-6172, 6173	Jul, 2001	Sr-90	0.03 ± 0.01	0.05 ± 0.02	0.04 ± 0.01
MI-6353, 6354	Jul, 2001	K-40	966.35 ± 82.28	986.31 ± 91.91	976.33 ± 61.68
SW-6376, 6377	Jul, 2001	I-131	0.58 ± 0.16	0.81 ± 0.17	0.70 ± 0.12
VE-6424, 6425	Jul, 2001	Gr. Beta	2.52 ± 0.05	2.49 ± 0.05	2.51 ± 0.03
VE-6424, 6425	Jul, 2001	K-40	3.04 ± 0.26	3.12 ± 0.37	3.08 ± 0.23
MI-6445, 6446	Jul, 2001	K-40	1,407.40 ± 97.10	1,442.20 ± 189.60	1,424.80 ± 106.51
LW-6489, 6490	Jul, 2001	Gr. Beta	2.61 ± 0.57	2.79 ± 0.54	2.70 ± 0.39
MI-6533, 6534	Jul, 2001	K-40	1,498.60 ± 113.90	1,375.50 ± 129.60	1,437.05 ± 86.27
DW-6835, 6836	Jul, 2001	Gr. Beta	2.01 ± 0.59	2.36 ± 0.63	2.19 ± 0.43
MI-6693, 6694	Aug, 2001	K-40	1,294.30 ± 118.70	1,417.30 ± 176.50	1,355.80 ± 106.35
MI-6693, 6694	Aug, 2001	Sr-90	1.47 ± 0.42	1.23 ± 0.41	1.35 ± 0.29
WW-6952, 6953	Aug, 2001	Gr. Beta	5.49 ± 0.69	5.80 ± 0.69	5.64 ± 0.49
MI-6906, 6907	Aug, 2001	K-40	1,613.80 ± 218.50	1,532.70 ± 135.80	1,573.25 ± 128.63
VE-6973, 6974	Aug, 2001	K-40	4.21 ± 0.24	4.29 ± 0.64	4.25 ± 0.34
LW-7851, 7852	Aug, 2001	Gr. Beta	2.20 ± 0.48	2.12 ± 0.42	2.16 ± 0.32
MI-7001, 7002	Aug, 2001	K-40	1,453.80 ± 148.10	1,285.30 ± 190.50	1,369.55 ± 120.65
MI-7073, 7074	Aug, 2001	K-40	1,217.30 ± 80.83	1,218.30 ± 99.13	1,217.80 ± 63.95
LW-7145, 7146	Aug, 2001	Gr. Beta	2.77 ± 0.53	3.60 ± 0.59	3.19 ± 0.39
MI-7221, 7222	Aug, 2001	K-40	1,192.90 ± 95.40	1,388.90 ± 132.70	1,290.90 ± 81.72
MI-7221, 7222	Aug, 2001	Sr-90	2.10 ± 0.48	1.72 ± 0.47	1.91 ± 0.34
SWU-7527, 7528	Aug, 2001	Gr. Beta	17.51 ± 3.06	20.36 ± 3.31	18.93 ± 2.25
VE-7485, 7486	Aug, 2001	K-40	2.12 ± 0.47	2.47 ± 0.34	2.30 ± 0.29
DW-7506, 7507	Aug, 2001	Gr. Beta	4.25 ± 1.18	4.13 ± 1.12	4.19 ± 0.81
MI-7622, 7623	Sep, 2001	K-40	1,340.10 ± 111.10	1,290.80 ± 116.50	1,315.45 ± 80.49
MI-7664, 7665	Sep, 2001	K-40	1,408.10 ± 102.70	1,396.90 ± 114.30	1,402.50 ± 76.83
MI-7876, 7877	Sep, 2001	K-40	1,416.40 ± 192.30	1,318.00 ± 155.50	1,367.20 ± 123.65
G-7960, 7961	Sep, 2001	Be-7	1.27 ± 0.21	1.25 ± 0.25	1.26 ± 0.16

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

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
G-7960, 7961	Sep, 2001	K-40	5.21 ± 0.57	5.70 ± 0.63	5.45 ± 0.43
F-8011, 8012	Sep, 2001	Cs-137	0.06 ± 0.02	0.04 ± 0.02	0.05 ± 0.01
F-8011, 8012	Sep, 2001	Gr. Beta	3.68 ± 0.12	3.50 ± 0.11	3.59 ± 0.08
F-8011, 8012	Sep, 2001	K-40	3.47 ± 0.49	3.38 ± 0.47	3.43 ± 0.34
MI-8149, 8150	Sep, 2001	K-40	1,551.70 ± 118.00	1,489.90 ± 123.60	1,520.80 ± 85.44
MI-8343, 8344	Sep, 2001	K-40	1,550.30 ± 170.60	1,368.10 ± 126.70	1,459.20 ± 106.25
VE-8319, 8320	Sep, 2001	Gr. Beta	3.37 ± 0.10	3.42 ± 0.11	3.39 ± 0.07
VE-8319, 8320	Sep, 2001	K-40	2.14 ± 0.46	2.24 ± 0.37	2.19 ± 0.29
AP-9069, 9070	Sep, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
AP-9566, 9567	Sep, 2001	Be-7	0.08 ± 0.02	0.09 ± 0.03	0.09 ± 0.02
VE-8700, 8701	Oct, 2001	Be-7	0.24 ± 0.10	0.19 ± 0.10	0.22 ± 0.07
VE-8700, 8701	Oct, 2001	K-40	2.03 ± 0.24	2.03 ± 0.21	2.03 ± 0.16
VE-8700, 8701	Oct, 2001	Sr-90	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00
AP-9048, 9049	Oct, 2001	Be-7	0.07 ± 0.01	0.07 ± 0.00	0.07 ± 0.01
DW-8636, 8637	Oct, 2001	Gr. Beta	4.74 ± 1.06	5.08 ± 1.21	4.91 ± 0.80
DW-8615, 8616	Oct, 2001	Gr. Beta	4.65 ± 0.58	4.28 ± 0.54	4.47 ± 0.40
AP-9090, 9091	Oct, 2001	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
AP-9166, 9167	Oct, 2001	Be-7	0.08 ± 0.02	0.08 ± 0.02	0.08 ± 0.01
AP-9187, 9188	Oct, 2001	Be-7	0.07 ± 0.01	0.05 ± 0.01	0.06 ± 0.01
VE-10562, 10563	Oct, 2001	Be-7	309.90 ± 158.80	348.30 ± 168.10	329.10 ± 115.62
VE-10562, 10563	Oct, 2001	K-40	6,407.10 ± 620.70	6,057.50 ± 660.40	6,232.30 ± 453.15
WW-8636, 8637	Oct, 2001	Gr. Beta	5.08 ± 1.20	4.74 ± 1.06	4.91 ± 0.80
DW-8894, 8895	Oct, 2001	Gr. Beta	4.28 ± 0.89	3.40 ± 0.90	3.84 ± 0.63
MI-9232, 9233	Oct, 2001	K-40	1,440.70 ± 46.60	1,424.80 ± 76.40	1,432.75 ± 44.75
VE-9518, 9519	Oct, 2001	K-40	1.91 ± 0.22	1.97 ± 0.39	1.94 ± 0.22
WW-10257, 10258	Nov, 2001	H-3	755.90 ± 102.50	684.70 ± 99.90	720.30 ± 71.57
VE-10333, 10334	Nov, 2001	Be-7	0.68 ± 0.26	0.99 ± 0.26	0.84 ± 0.18
VE-10333, 10334	Nov, 2001	K-40	6.10 ± 0.72	5.83 ± 0.72	5.97 ± 0.51
MI-10588, 10589	Nov, 2001	K-40	1,428.40 ± 114.70	1,445.50 ± 129.40	1,436.95 ± 86.46
DW-10688, 10689	Nov, 2001	Gr. Beta	3.49 ± 0.91	2.36 ± 0.76	2.93 ± 0.60
WW-10905, 10906	Dec, 2001	H-3	233.90 ± 90.60	226.30 ± 90.20	230.10 ± 63.92
SS-10953, 10954	Dec, 2001	Ac-228	1.10 ± 0.25	0.91 ± 0.16	1.00 ± 0.15
SS-10953, 10954	Dec, 2001	Bi-214	0.69 ± 0.08	0.75 ± 0.08	0.72 ± 0.06
SS-10953, 10954	Dec, 2001	Co-58	0.21 ± 0.05	0.18 ± 0.04	0.19 ± 0.03
SS-10953, 10954	Dec, 2001	Co-60	0.93 ± 0.06	0.94 ± 0.06	0.93 ± 0.04
SS-10953, 10954	Dec, 2001	Cs-137	0.13 ± 0.03	0.16 ± 0.03	0.14 ± 0.02

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

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SS-10953, 10954	Dec, 2001	K-40	9.91 ± 0.83	8.36 ± 0.80	9.13 ± 0.57
SS-10953, 10954	Dec, 2001	Pb-212	0.94 ± 0.05	0.91 ± 0.06	0.92 ± 0.04
SS-10953, 10954	Dec, 2001	Pb-214	0.83 ± 0.08	0.82 ± 0.07	0.83 ± 0.05
SS-10953, 10954	Dec, 2001	Ra-226	1.76 ± 0.37	1.67 ± 0.37	1.72 ± 0.26
SS-10953, 10954	Dec, 2001	Tl-208	0.34 ± 0.05	0.31 ± 0.05	0.32 ± 0.04
MI-11033, 11034	Dec, 2001	K-40	1,339.80 ± 128.70	1,435.80 ± 117.30	1,387.80 ± 87.07
MI-11033, 11034	Dec, 2001	Sr-90	1.31 ± 0.41	1.38 ± 0.37	1.35 ± 0.28
AP-11888, 11889	Dec, 2001	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01

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

[a] Results are reported in units of pCi/L, except for elemental potassium (K) in milk (mg/L), air filters (pCi/Filter), food products and vegetation (pCi/g), soil and sediments (pCi/kg).

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration[b] Laboratory result[c]	MAPEP Result[d] 1s, N=1	Control Limits
STSO-923	SOIL	Jan, 2001	Am-241			0.0 - 2.6
Included in the testing series as a "false positive". No activity expected. Result of analysis; < 0.8 Bq/L.						
STSO-923	SOIL	Jan, 2001	Co-57	100.2 ± 3.5	103.0 ± 10.3	72.1 - 133.9
STSO-923	SOIL	Jan, 2001	Co-60	1,285.1 ± 5.3	1,270.0 ± 127.0	889.0 - 1,651.0
STSO-923	SOIL	Jan, 2001	Cs-134	81.1 ± 1.8	91.1 ± 9.1	63.8 - 118.4
STSO-923	SOIL	Jan, 2001	Cs-137	1,210.6 ± 6.6	1,240.0 ± 124.0	868.0 - 1,612.0
STSO-923	SOIL	Jan, 2001	K-40	732.6 ± 21.2	652.0 ± 65.2	456.4 - 847.6
STSO-923	SOIL	Jan, 2001	Mn-54	212.6 ± 6.7	203.0 ± 20.3	142.1 - 263.9
STSO-923	SOIL	Jan, 2001	Pu-238	110.7 ± 7.2	115.0 ± 11.5	80.5 - 149.5
STSO-923	SOIL	Jan, 2001	Pu-239/40	79.6 ± 5.9	83.4 ± 8.3	58.4 - 108.4
STSO-923	SOIL	Jan, 2001	Sr-90	159.8 ± 9.5	209.0 ± 20.9	146.3 - 271.7
STSO-923	SOIL	Jan, 2001	U-233/4	45.0 ± 3.9	60.0 ± 6.0	42.0 - 78.0
STSO-923	SOIL	Jan, 2001	U-238	165.6 ± 7.4	191.0 ± 19.1	133.7 - 248.3
STSO-923	SOIL	Jan, 2001	Zn-65	428.5 ± 10.9	382.0 ± 38.2	267.4 - 496.6

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

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

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

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration [b] Laboratory result	EML Result[c]	Control Limits[d]
STSO-904	SOIL	Mar, 2001	Ac-228	45.60 ± 4.0	42.70	0.80 - 1.50
STSO-904	SOIL	Mar, 2001	Am-241	14.40 ± 0.5	14.80	0.63 - 2.64
STSO-904	SOIL	Mar, 2001	Bi-212	53.20 ± 3.1	42.00	0.45 - 1.23
	Naturally-occurring radium and thorium daughters are present in the shield background, and a probable cause of the higher bias seen for isotopes of lead and bismuth.					
STSO-904	SOIL	Mar, 2001	Bi-214	42.10 ± 7.7	32.60	0.78 - 1.50
STSO-904	SOIL	Mar, 2001	Cs-137	1,772.60 ± 79.8	1,740.00	0.80 - 1.29
STSO-904	SOIL	Mar, 2001	K-40	583.80 ± 52.6	468.00	0.80 - 1.37
STSO-904	SOIL	Mar, 2001	Pb-212	46.60 ± 8.5	41.50	0.74 - 1.36
STSO-904	SOIL	Mar, 2001	Pb-214	45.30 ± 8.6	34.30	0.76 - 1.53
STSO-904	SOIL	Mar, 2001	Pu-239/40	26.00 ± 0.8	25.60	0.71 - 1.33
STSO-904	SOIL	Mar, 2001	Sr-90	55.60 ± 2.2	69.00	0.61 - 3.91
STW-905	WATER	Mar, 2001	Am-241	2.15 ± 0.1	1.67	0.76 - 1.48
STW-905	WATER	Mar, 2001	Co-60	97.00 ± 0.8	98.20	0.80 - 1.20
STW-905	WATER	Mar, 2001	Cs-137	70.10 ± 4.0	73.00	0.80 - 1.20
STW-905	WATER	Mar, 2001	H-3	76.50 ± 5.5	79.30	0.74 - 2.29
STW-905	WATER	Mar, 2001	Pu-238	1.69 ± 0.1	1.58	0.74 - 1.22
STW-905	WATER	Mar, 2001	Pu-239/40	1.69 ± 0.1	1.64	0.75 - 1.26
STW-905	WATER	Mar, 2001	Sr-90	3.85 ± 0.1	4.40	0.64 - 1.50
STW-905	WATER	Mar, 2001	U-233/4	0.90 ± 0.1	1.04	0.80 - 1.40
STW-905	WATER	Mar, 2001	U-238	0.88 ± 0.1	1.04	0.80 - 1.29
STW-906	WATER	Mar, 2001	Gr. Alpha	1,724.60 ± 141.7	1,900.00	0.58 - 1.26
STW-906	WATER	Mar, 2001	Gr. Beta	1,246.40 ± 31.1	1,297.00	0.56 - 1.50
STAP-907	AIR FILTER	Mar, 2001	Am-241	0.47 ± 0.0	0.49	0.69 - 2.40
STAP-907	AIR FILTER	Mar, 2001	Co-60	20.11 ± 0.2	19.44	0.79 - 1.30
STAP-907	AIR FILTER	Mar, 2001	Cs-134	2.71 ± 0.2	2.83	0.74 - 1.21
STAP-907	AIR FILTER	Mar, 2001	Cs-137	9.86 ± 0.2	8.76	0.78 - 1.35
STAP-907	AIR FILTER	Mar, 2001	Mn-54	7.25 ± 0.2	6.52	0.80 - 1.36
STAP-907	AIR FILTER	Mar, 2001	Pu-238	0.23 ± 0.0	0.22	0.66 - 1.35
STAP-907	AIR FILTER	Mar, 2001	Pu-239/40	0.12 ± 0.0	0.14	0.69 - 1.29

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration [b]		
				Laboratory result	EML Result[c]	Control Limits[d]
STAP-907	AIR FILTER	Mar, 2001	Sr-90	7.41 ± 0.2	7.10	0.55 - 2.05
STAP-907	AIR FILTER	Mar, 2001	U-233/4	0.05 ± 0.0	0.05	0.80 - 1.92
STAP-907	AIR FILTER	Mar, 2001	U-238	0.05 ± 0.0	0.05	0.80 - 1.59
STAP-908	AIR FILTER	Mar, 2001	Gr. Alpha	2.66 ± 0.0	3.97	0.57 - 1.47
STAP-908	AIR FILTER	Mar, 2001	Gr. Beta	2.30 ± 0.0	2.58	0.76 - 1.52
STVE-909	VEGETATION	Mar, 2001	Am-241	6.10 ± 0.2	6.17	0.72 - 2.34
STVE-909	VEGETATION	Mar, 2001	Cm-244	3.50 ± 0.5	3.69	0.61 - 1.61
STVE-909	VEGETATION	Mar, 2001	Co-60	28.50 ± 2.1	30.40	0.75 - 1.51
STVE-909	VEGETATION	Mar, 2001	Cs-137	795.50 ± 76.4	842.00	0.80 - 1.37
STVE-909	VEGETATION	Mar, 2001	K-40	592.60 ± 42.5	603.00	0.78 - 1.43
STVE-909	VEGETATION	Mar, 2001	Pu-239/40	8.50 ± 0.6	9.58	0.67 - 1.49
STVE-909	VEGETATION	Mar, 2001	Sr-90	1,239.60 ± 130.0	1,330.00	0.52 - 1.23
STW-925	WATER	Sep, 2001	Am-241	0.70 ± 0.1	0.76	0.76 - 1.48
STW-925	WATER	Sep, 2001	Co-60	206.70 ± 4.7	209.00	0.80 - 1.20
STW-925	WATER	Sep, 2001	Cs-137	46.60 ± 0.8	45.13	0.80 - 1.24
STW-925	WATER	Sep, 2001	H-3	254.10 ± 3.6	207.00	0.74 - 2.29
STW-925	WATER	Sep, 2001	Ni-63	50.90 ± 3.0	45.25	0.70 - 1.30
STW-925	WATER	Sep, 2001	Pu-238	1.10 ± 0.1	1.09	0.74 - 1.22
STW-925	WATER	Sep, 2001	Pu-239/40	1.60 ± 0.1	1.63	0.75 - 1.26
STW-925	WATER	Sep, 2001	Sr-90	4.10 ± 0.3	3.73	0.64 - 1.50
STW-925	WATER	Sep, 2001	Uranium	2.20 ± 0.2	2.37	0.73 - 1.37
STW-926	WATER	Sep, 2001	Gr. Alpha	1,220.00 ± 32.0	1,150.00	0.58 - 1.26
STW-926	WATER	Sep, 2001	Gr. Beta	8,461.00 ± 206.0	7,970.00	0.56 - 1.50
STSO-927	SOIL	Sep, 2001	Ac-228	68.10 ± 1.4	59.57	0.80 - 1.50
STSO-927	SOIL	Sep, 2001	Am-241	5.20 ± 1.3	4.43	0.63 - 2.64
STSO-927	SOIL	Sep, 2001	Bi-212	65.10 ± 1.6	62.07	0.45 - 1.23
STSO-927	SOIL	Sep, 2001	Bi-214	47.30 ± 4.7	36.90	0.78 - 1.50
STSO-927	SOIL	Sep, 2001	Cs-137	659.20 ± 10.8	612.33	0.80 - 1.29
STSO-927	SOIL	Sep, 2001	K-40	737.70 ± 16.6	623.33	0.80 - 1.37

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration [b] Laboratory result	EML Result[c]	Control Limits[d]
STSO-927	SOIL	Sep, 2001	Pb-212	64.70 ± 3.8	58.33	0.74 - 1.36
STSO-927	SOIL	Sep, 2001	Pb-214	53.70 ± 7.7	39.67	0.76 - 1.53
STSO-927	SOIL	Sep, 2001	Pu-239/40	9.30 ± 2.9	8.95	0.71 - 1.33
STSO-927	SOIL	Sep, 2001	Sr-90	27.40 ± 6.3	30.60	0.61 - 3.91
STSO-927	SOIL	Sep, 2001	Uranium	155.60 ± 7.8	194.23	0.62 - 1.35
STVE-928	VEGETATION	Sep, 2001	Am-241	7.00 ± 0.3	6.92	0.72 - 2.34
STVE-928	VEGETATION	Sep, 2001	Cm-244	4.30 ± 0.8	4.31	0.61 - 1.61
STVE-928	VEGETATION	Sep, 2001	Co-60	40.20 ± 0.9	35.30	0.75 - 1.51
STVE-928	VEGETATION	Sep, 2001	Cs-137	1,184.00 ± 2.8	1,030.00	0.80 - 1.37
STVE-928	VEGETATION	Sep, 2001	K-40	1,023.00 ± 44.1	898.67	0.78 - 1.43
STVE-928	VEGETATION	Sep, 2001	Pu-239/40	8.90 ± 1.4	11.02	0.67 - 1.49
STVE-928	VEGETATION	Sep, 2001	Sr-90	1,364.00 ± 18.4	1,612.80	0.52 - 1.23
STAP-929	AIR FILTER	Sep, 2001	Am-241	0.09 ± 30.0	0.09	0.69 - 2.40
STAP-929	AIR FILTER	Sep, 2001	Co-60	16.90 ± 0.3	17.50	0.79 - 1.30
STAP-929	AIR FILTER	Sep, 2001	Cs-134	11.80 ± 0.2	12.95	0.74 - 1.21
STAP-929	AIR FILTER	Sep, 2001	Cs-137	18.30 ± 0.3	17.10	0.78 - 1.35
STAP-929	AIR FILTER	Sep, 2001	Mn-54	85.40 ± 1.3	81.15	0.80 - 1.36
STAP-929	AIR FILTER	Sep, 2001	Pu-238	0.05 ± 0.0	0.07	0.66 - 1.35
STAP-929	AIR FILTER	Sep, 2001	Pu-239/40	0.22 ± 0.0	0.23	0.69 - 1.29
STAP-929	AIR FILTER	Sep, 2001	Sr-90	3.11 ± 0.1	3.48	0.55 - 2.05
STAP-929	AIR FILTER	Sep, 2001	Uranium	0.24 ± 0.1	0.22	0.80 - 2.54
STAP-930	AIR FILTER	Sep, 2001	Gr. Alpha	6.30 ± 0.1	5.36	0.57 - 1.47
STAP-930	AIR FILTER	Sep, 2001	Gr. Beta	13.80 ± 0.1	12.77	0.76 - 1.52

[a] The Environmental Measurements Laboratory provides the following nuclear species : Air Filters, Soil, Vegetation and Water.
[b] Results are reported in Bq/L with the following exceptions: Air Filter results are reported in Bq/Filter, Soil results are reported in Bq/Kg, Vegetation results are reported in Bq/Kg.
[c] The EML result listed is the mean of replicate determinations for each nuclide±the standard error of the mean.
[d] Control limits are reported by EML as the ratio of Reported Value / EML value.

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

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

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

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

3.0. Duplicate analyses

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

4.5 In rounding off, the following rules are followed:

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

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

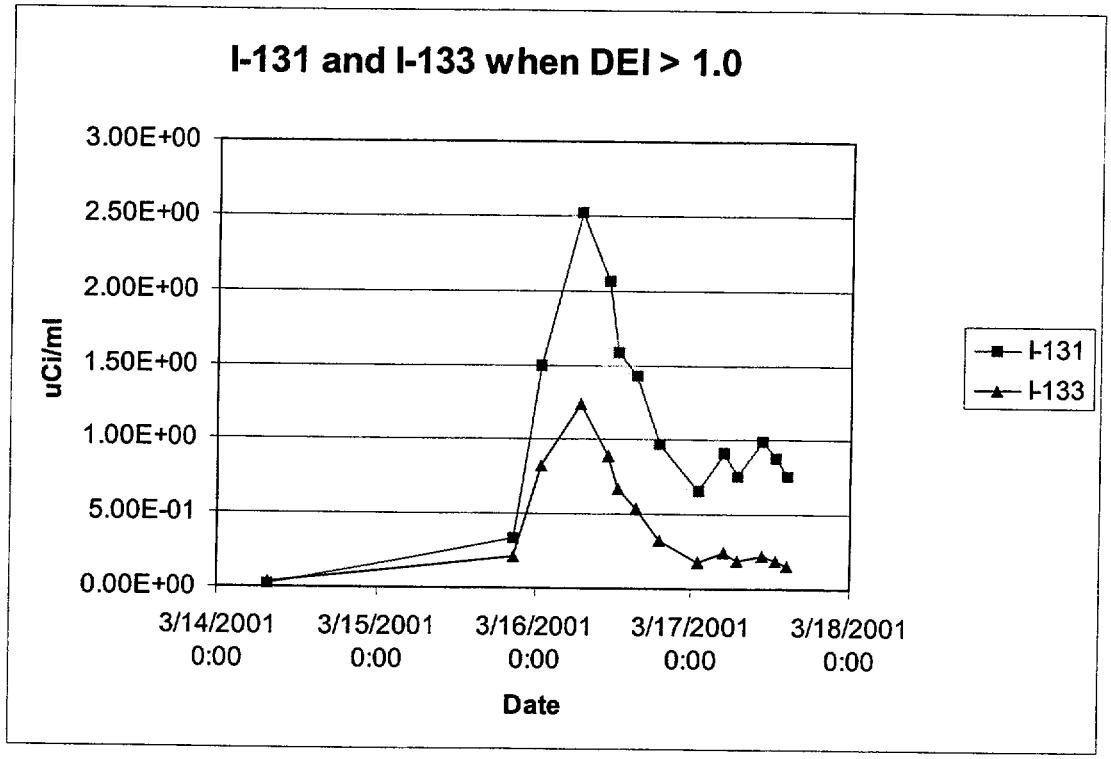
4.6 Composite samples which overlap the next month or year are reported for the month or year in which most of the sample is collected.

APPENDIX C

TECHNICAL SPECIFICATION 2.1.3

REACTOR COOLANT DOSE EQUIVALENT IODINE ABOVE TECHNICAL SPECIFICATION LIMIT

The following information is provided per Technical Specification 2.1.3(4).
On 3/16/2001 RCS Dose Equivalent Iodine (DEI) exceeded the Technical Specification Limit of 1.0 μCi/gm for approximately 23 hours.
On 3/17/2001 the limit was exceeded again for 2 hours.



Sum of ACTIVITY				NUCLIDE	
DAY	REACTOR_POWER	LETDOWN_FLOW	DEI	I-131	I-133
3/14/2001 7:33	30	73.7	3.61E-02	1.77E-02	3.80E-02
3/15/2001 20:43	11	69.2	4.11E-01	3.35E-01	2.07E-01
3/16/2001 0:55	0	72.8	1.77E+00	1.49E+00	8.30E-01
3/16/2001 6:55	0	75.6	2.91E+00	2.52E+00	1.24E+00
3/16/2001 11:23	0	73.4	2.34E+00	2.06E+00	8.96E-01
3/16/2001 12:53	0	70	1.79E+00	1.59E+00	6.68E-01
3/16/2001 15:35	0	65	1.59E+00	1.42E+00	5.39E-01
3/16/2001 19:00	0	78	1.07E+00	9.69E-01	3.26E-01
3/17/2001 1:00	0	16.7	7.15E-01	6.60E-01	1.83E-01
3/17/2001 4:43	0	74	9.86E-01	9.12E-01	2.42E-01
3/17/2001 6:46	0	75.4	8.15E-01	7.59E-01	1.87E-01
3/17/2001 10:27	0	74	1.06E+00	9.95E-01	2.24E-01
3/17/2001 12:33	0	74	9.40E-01	8.85E-01	1.87E-01
3/17/2001 14:29	0	74	8.08E-01	7.62E-01	1.57E-01