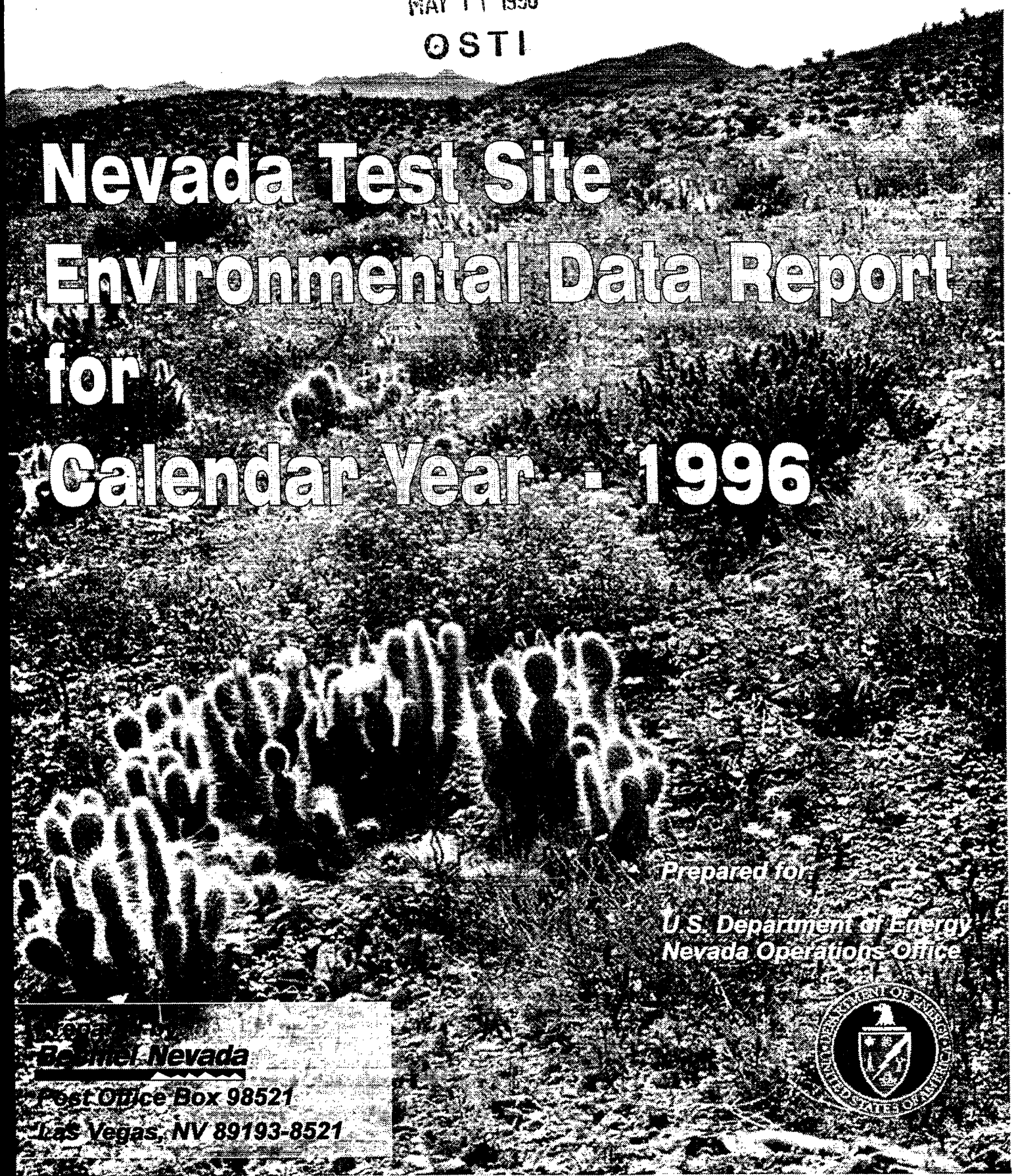
Contract No. DE-AC08-96NV11718
March 1998



Nevada Test Site Environmental Data Report for Calendar Year - 1996

Prepared for
U.S. Department of Energy
Nevada Operations Office

Prepared by
Bechtel Nevada
Post Office Box 98521
Las Vegas, NV 89193-8521

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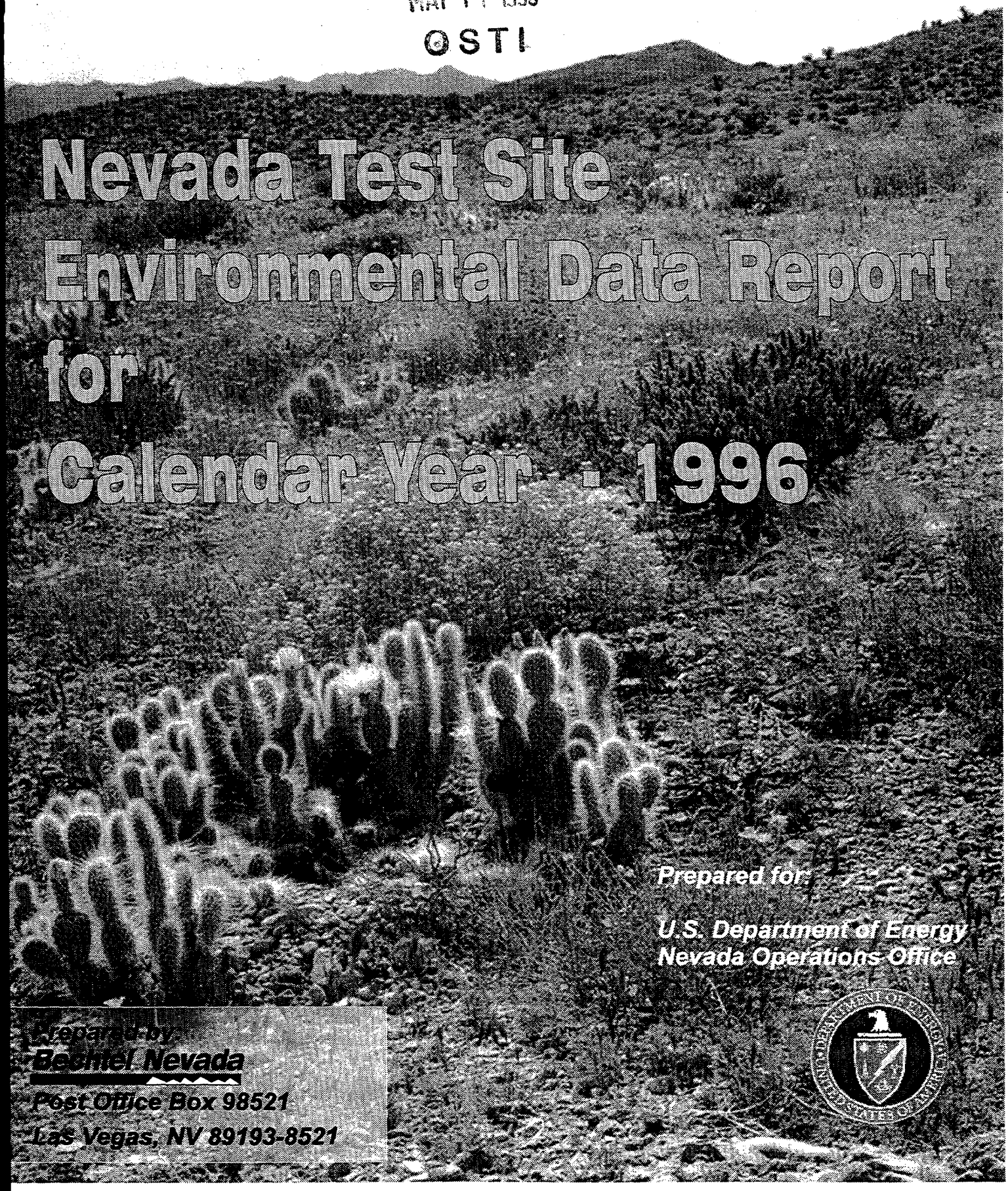

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Author: Robert R. Kinnison

Editors: Stuart C. Black and Yvonne E. Townsend

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DISCLAIMER

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FOREWORD

The chapters in this report contain the 1996 Nevada Test Site (NTS) onsite and offsite environmental monitoring results. Other offsite data collected by the U.S. Environmental Protection Agency (EPA) are available from the EPA, Radiation and Indoor Environments National Laboratory, Las Vegas, Nevada. Most of the onsite data presented in this document are accompanied by summaries and statistical evaluations of the data, and are summarized in the 1996 Annual Site Environmental Report.

TABLE OF CONTENTS

LIST OF FIGURES

List of Figures, cont. Page

LIST OF TABLES

List of Tables, cont. Page

List of Tables, cont. Page

EXECUTIVE SUMMARY

INTRODUCTION

Department of Energy (DOE) Order 5400.1 "General Environmental Protection Program," establishes environmental protection program requirements, authorities, and responsibilities for DOE operations. These mandates require compliance with applicable federal, state, and local environmental protection regulations. During calendar year (CY) 1996, environmental protection and monitoring programs were conducted at the Nevada Test Site (NTS) and other DOE Nevada Operations Office (DOE/NV) managed sites in Nevada and across the United States. A detailed discussion of these environmental protection and monitoring programs and summary data and assessments for environmental monitoring results are provided in the U.S. DOE/NV Annual Site Environmental Report - 1996 (ASER) DOE/NV/11718-137. This document provides summary data results and detailed assessments for the environmental monitoring conducted for all DOE/NV managed sites in CY 1996. A brief description of the scope of this environmental monitoring is provided below, categorized by "on-NTS" and "off-NTS" monitoring.

ON-NTS ENVIRONMENTAL MONITORING

Environmental monitoring on the 3500 km^2 (1350 mi^2) NTS is designed to cover the entire area with emphasis on areas of past nuclear testing and present operational activities. In CY 1996, monitoring included: (1) air sampling for particulates, tritium in atmospheric moisture, and noble gas; (2) water sampling from supply wells, water taps, natural springs and seeps, open reservoirs, containment ponds, and sewage lagoons; and (3) ambient radiation levels using thermoluminescent dosimeters (TLDs).

AIR MONITORING

Air sampling units for particulates were located at 49 stations on the NTS in 1996. Fourteen of these are located at the Area 5 Radiological Waste Management Site. Sampling filters were changed weekly and analyzed for gross alpha activity, gross beta activity, and by gamma spectroscopy. Additionally, the filters for each sampling location were composited either monthly (for waste management monitoring locations) or quarterly (for environmental monitoring locations) and analyzed for ^{238}Pu and $^{239+240}Pu$ isotopes. Airborne tritiated water (HTO) vapor was sampled at 16 permanent locations throughout the NTS. Samples were collected for two-week periods and analyzed for HTO content. Samples were collected for radioactive noble gas (^{85}Kr) at three permanent locations across the NTS.

WATER MONITORING

Surface water sampling was conducted annually at nine open reservoirs and seven natural springs. An additional six open reservoir locations and one natural spring were dry when visited for sampling. Surface water sampling was conducted quarterly at nine sewage lagoons and two containment ponds. Samples were analyzed for gross alpha, gross beta, tritium, gamma-emitting radionuclides, ^{238}Pu, and $^{239+240}Pu$ activity. Additionally, surface waters were analyzed annually for ^{90}Sr activity.

Water samples were collected quarterly from 12 supply wells and 7 potable water distribution system end points. Samples were analyzed for gross alpha, gross beta, tritium, gamma emitting radionuclides, and plutonium activity. Water supply wells were also analyzed for ^{90}Sr, ^{226}Ra, and ^{228}Ra activity. One annual sample from each potable water distribution end point was also analyzed for ^{90}Sr.

AMBIENT RADIATION LEVELS

Ambient gamma radiation level monitoring was conducted at 179 locations within the NTS in 1996, using Panasonic UD-814™ environmental TLDs. The TLDs were deployed in a holder placed about one meter above ground level and were exchanged quarterly.

OFF-NTS ENVIRONMENTAL MONITORING

Environmental monitoring was conducted in areas adjacent to the NTS and other DOE/NV managed sites, by the U.S. Environmental Protection Agency's (EPA's) Radiation and Indoor Environments National Laboratory, Las Vegas (R&IE-LV). This environmental monitoring included measurements of radioactivity in air, milk, and groundwater.

AIR SAMPLING

The Air Surveillance Network is made up of 20 sampling locations surrounding the NTS. Samples were collected weekly from this network and analyzed for gross alpha, gross beta, and gamma emitting radionuclide activity. Samples from selected locations were composited quarterly and analyzed for ^{238}Pu and $^{239+240}Pu$ activity.

MILK SAMPLING

The Milk Surveillance Network consists of 11 sampling locations within 300 km (186 mi) of the NTS. Samples were collected annually from this network and analyzed for tritium, ^{89}Sr, and ^{90}Sr.

GROUNDWATER SAMPLING

Supply wells and surface waters around the NTS were sampled as part of the Long-Term Hydrological Monitoring Program. This program also included groundwater and surface water monitoring at locations in Alaska, Colorado, Mississippi, Nevada, and New Mexico where underground nuclear tests have been previously conducted. Samples from specific locations are collected monthly, biannually, annually, or biennially in accordance with a preset schedule. These samples are analyzed for gamma emitting radionuclides and tritium activity.

AMBIENT RADIATION LEVELS

In CY 1996, ambient gamma radiation levels were monitored by a network of 51 TLDs and 27 pressurized ion chambers (PICs) at locations around the NTS. This network uses Panasonic UD-814™ environmental TLDs (the same as are used for onsite monitoring) and Reuter-Stokes™ Model 1011, 1012, and 1013 PICs. The TLDs were exchanged and processed quarterly. The PICs provided near real-time data. PIC data are collected and transmitted through the Geostationary Operational Environmental Satellite to a receiving station at Los Alamos National Laboratory and then by dedicated telephone lines to R&IE-LV. In addition to telemetry retrieval, PIC data are also recorded at the sampling location on either magnetic tapes and hard copy strip charts, or on magnetic cards.

COMMUNITY TECHNICAL LIAISON PROGRAM

In 1996, the Community Radiation Monitoring Program was renamed the Community Technical Liaison Program. This program consists of a network of 15 monitoring stations located in communities surrounding the NTS and operated by local residents. Each station is a part of the Air Sampling Network, the TLD network, and the real-time PIC network.

REPORTING OF DETECTION LIMITS

1996 was a transition year for the method used in this data report for reporting detection limits. In previous years reports, the sensitivity of the analytical methods to detect the presence of radioisotopes in a sample were quantified using the detection limit. In 1996, a change was initiated to replace the detection limit with the minimum detectable concentration (MDC). In this 1996 data report, the analyses of air samples use the detection limit and the analyses of water samples use the MDC. In subsequent reports, only the MDC will be used. The relationship of these two quantifiers, as defined below, should be kept in mind when evaluating historical data.

The detection limit is defined as the concentration of a radioisotope that is equal to twice the standard deviation of the counting error. The conversion from counts to concentration is included in the computation. Stated as a formula, the detection limit (DL) is:

$$DL = \frac{2 \times s}{K \times E \times R \times T \times S}$$

where:
- s = the standard deviation of the background (blank) count
- K = the conversion constant from disintegrations per minute to units of radioactivity
- E = counting efficiency
- R = chemical recovery
- T = counting time
- S = sample size (volume or weight)

The minimum detectable concentration is defined as the smallest concentration of radioactivity in a sample that can be detected with a 0.05 probability of erroneously detecting radioactivity, when in fact none was present (type I error) and also, a 0.05 probability of not detecting radioactivity, when in fact it is present (type II error). The formula for the MDC, using the same constants as defined above is:

$$MDC = \frac{4.65 \times s + 3}{K \times E \times R \times T \times S}$$

Note that, for any analytical procedure, the MDC is larger than the DL by both a multiplicative factor of 2.3 and an additive constant of $3/(K \times E \times R \times T \times S)$. The +3 in the numerator of the MDC equation is often given as +2.71.

1.0 ONSITE GROSS ALPHA IN AIR

In 1996, because of continuing budget decreases, an experiment was performed to determine if expensive plutonium analyses could be replaced by a surrogate, specifically gross alpha analyses. After the analysis of several hundred air samples for both plutonium and gross alpha, it was determined that gross alpha was not a surrogate for the presence of plutonium in air samples. However, this experiment did indicate that there were alpha emitters in the air of the Nevada Test Site (NTS) that were not related to either plutonium or radon progeny. Therefore it was decided to initiate a program for routine monitoring of gross alpha levels in air samples. The intent of this new monitoring program is to economize by only performing chemical separations when the gross alpha levels suggest that alpha emitting radionuclides are present at the NTS at levels above background. Monitoring of gross alpha in air levels at the NTS commenced in June of 1996.

Thirty-nine air sampling locations on the NTS were chosen to monitor for gross alpha levels. These are the same sampling locations as used for gross beta monitoring, except that the radiological waste management sites were not used for gross alpha. Gross alpha was measured on the same filters as used for gross beta measurements. The sampling units were equipped with glass-fiber filters and had an air flow rate of 140 L/min (5 cfm). The filters were changed after approximately one week of operation. The glass-fiber filters were analyzed by gamma spectroscopy and, after a five to seven day delay for radon progeny decay, for gross alpha, then gross beta.

Gross alpha in air sampling locations, sampling dates, measured concentrations, analytic standard deviations, and analytic detection limits for 1996 appear in Attachment 1.1. (All figures, tables, and attachments are located at the end of each chapter in that order.) The locations of NTS air sampling stations are shown in Figure 1.1. The names of the operational areas are the numbers in the middle of each area. Area 13 is not identified in Figure 1.1. It is located northeast of Area 15 and includes the Project 57 sampling station. Figure 1.1 also does not include Area 52, the location of the last three sampling sites listed in Attachment 1.1. These sampling locations are approximately 27 miles north of the northwest corner of Area 20. Area 52 contains three air sampling locations: the DOUBLE TRACKS and two CLEAN SLATE locations. Air monitoring at the DOUBLE TRACKS and CLEAN SLATE III locations began in December of 1995; monitoring at CLEAN SLATE I commenced in August of 1996.

Descriptive statistics for the results from individual stations are given in Table 1.1. None of the computed results are negative. The statistics for all stations combined appear at the foot of Table 1.1. For comparison purposes, the median detection limit is 0.54×10^{-15} µCi/mL, and 23 of the 821 results, or 2.8 percent, are less than their individual detection limits. A comparison of the station means in Table 1.1 to the median detection limit shows that the means are usually three or more times the median detection limit. It should be emphasized that since data collection began in mid year, the statistics in Table 1.1 only approximate annual exposure levels.

Figure 1.2, a normal probability plot, shows that the alpha in air data can be assumed to have a lognormal statistical distribution. This figure shows three segments with most of the data in the middle segment and about nine values in each of the lower and upper tail segments. The middle segment is reasonably approximated by a straight line, indicating that this data is lognormally distributed. The highest value, a result of 31.9×10^{-15} from the sample collected at the DOUBLE TRACKS location on June 13, 1996, was collected during cleanup activities and thus does not reflect environmental levels. Note that the lower and upper segments have approximately the same slope, which is distinct from the slope of the middle segment. This situation is statistically

consistent with two subsets of the data that have about the same mean but different variances. The upper and lower segments in Figure 1.2 then could represent the subset of the data with the larger variance. An examination of the sampling locations and dates represented in the upper and lower segments showed no patterns, and since these data encompass only 2 percent of the total data, the segmentation was assumed to be of no practical consequence.

Figure 1.3 is a time series plot of all the alpha in air sampling locations combined. The high value from the DOUBLE TRACKS location has been excluded from this plot. Note that the time span of this plot is the last half of 1996. The line passing through the approximate middle of the data points is a "locally weighted scatterplot smoother" line, a statistical device that approximates any trends in the time series data. This plot shows an obvious downward trend. A linear regression on this data indicated that this trend is statistically very significant. The F-value for regression is 249 with 1 and 818 degrees of freedom. Since this is the first six months of gross alpha in air data collection, there is no historical data base to compare for pattern in the data, and no correlations with other radiological levels or activities at the NTS could be found. Thus at this time, the significant trend in 1996 has been found but its interpretation and practical significance must wait until a historical data base is established.

Table 1.2 and Figure 1.4 summarize the gross alpha in air data by NTS operational area. Table 1.2 gives descriptive statistics for each area. Note that several of the areas have zero samples, which indicates that no gross alpha in air samples were collected in these areas. Samplers are usually located where there is potential exposure of personnel. The areas with zero samples are mostly those with minimal operational activities and thus are rarely visited by workers. Figure 1.4 is a thematic map of average gross alpha in air levels. The pattern within the areas indicates the average levels, and the ranges of values are given at the right side of the figure. The areas with no pattern are those with no samples. The ranges were determined as five evenly spaced intervals between the minimum and maximum area averages. The areas with the highest values are approximately those in which atmospheric testing was performed; thus, they have some residual plutonium in soils.

The pattern of averages in Figure 1.4 leads to a statistical test to see if the differences in averages are statistically significant. This situation suggests a two way analysis of variance (ANOVA), with monitoring locations nested within operational areas and date of sampling used as a covariate. This covariate will account for the effect of the trend seen in Figure 1.3. However, the data is rank deficient for this ANOVA model, which approximately means that there is not enough data in some of the operational areas to compute the ANOVA model coefficients. A simplified ANOVA, that is possible, is a one-way analysis for differences between operational areas. This analysis is less powerful than the one adjusting for the effects of the covariate and for the effects of individual stations, but if significant differences are found, they would also be found with higher significances by the two way analysis. The ANOVA was performed using the natural logarithms of the data values, since the data is lognormally distributed. This one way analysis found a statistically very significant difference between area averages ($p=8.4 \times 10^{-6}$). The average of the logarithms of the data values is an estimator of the medians of the data for lognormally distributed data. A Tukey's multiple comparison test was used to determine the pattern of differences between the areas. When the area average logarithms are ordered by rank, a gradual increase from the lowest value to the highest value is seen. There are no dichotomies in the sequence of values. The Tukey's test only finds that the lowest value is different from the highest value; thus, no useful pattern was found.

The conclusions of the statistical test on the gross alpha levels in air data can be summarized as follows. A very significant downward trend over time was found, but no significant covariate other than time could be identified. The interpretation of this trend must wait upon additional

years of data. A very significant difference between operational area levels was found. These differences are not due to any grouping of values by areas, but rather are due to statistically significant differences between the highest and lowest values.

HISTORICAL TRENDS

Gross alpha in air measurements were made in the years of the first NTS annual reports. The results were usually reported qualitatively, and so they are of no comparative value today. The first annual report was released in August 1964 and covered measurements made during the period of January to June 1964. This report simply states that only normal radon progeny products were detected. The second NTS annual report covered the time period from July 1964 to June 1965 or the fiscal 1965 period. This report states that the maximum gross alpha in air measured was 1.0×10^{-12} µCi/mL, which is almost two orders of magnitude above the typical values seen in 1996. However, in the 1965 report, it is not clear if this maximum includes or excludes the radon progenys. The fiscal 1965 report gives the approximate detection limit for gross alpha in air as 2.9×10^{-15} µCi/mL. This is over five times higher than the median detection limit in 1996, and thus the comparability of levels between then and now should be considered more qualitative than quantitative. The fiscal 1966 and 1967 reports only state that "detectable alpha activity values for air during this period occurred infrequently." The fiscal 1967 report repeats the 1996 statement about gross alpha levels. The fiscal 1968 report and subsequent reports, until the present, do not mention gross alpha in air.

CONCLUSION

Gross alpha in air sampling was initiated in mid 1996 after some experimentation to establish a plutonium surrogate indicated that there are measurable levels of gross alpha in air at the NTS. These experiments found that gross alpha in air is not a plutonium surrogate; however, this experiment also indicated that there were alpha emitters in the air of the NTS. Gross alpha in air was reported in the 1964 and 1965 reports. The average gross alpha in air levels for the entire NTS for the last half of 1966 is 2.06×10^{-15} µCi/mL. The most notable finding is a statistically significant linear decrease in gross alpha in air levels over the seven months of data collection in 1996.

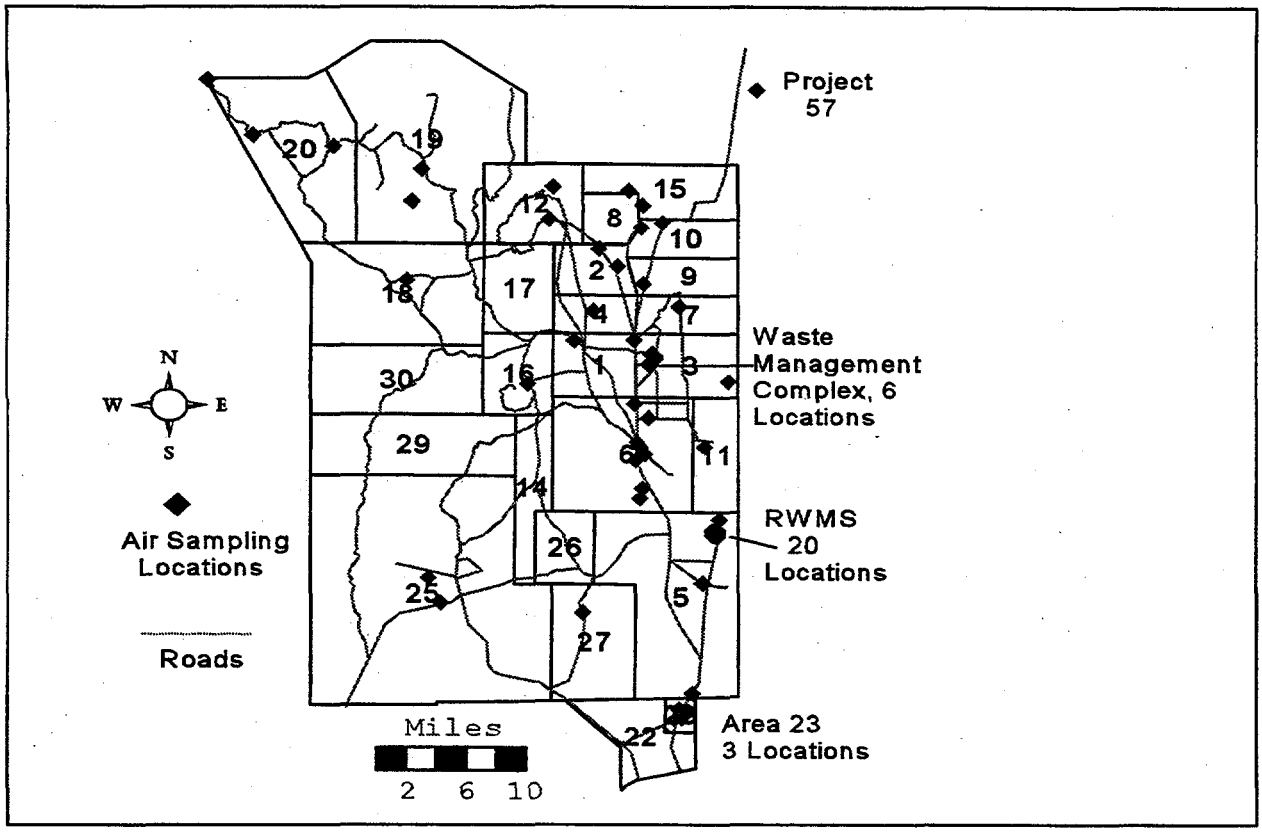


Figure 1.1 Locations of Air Sampling Stations on NTS

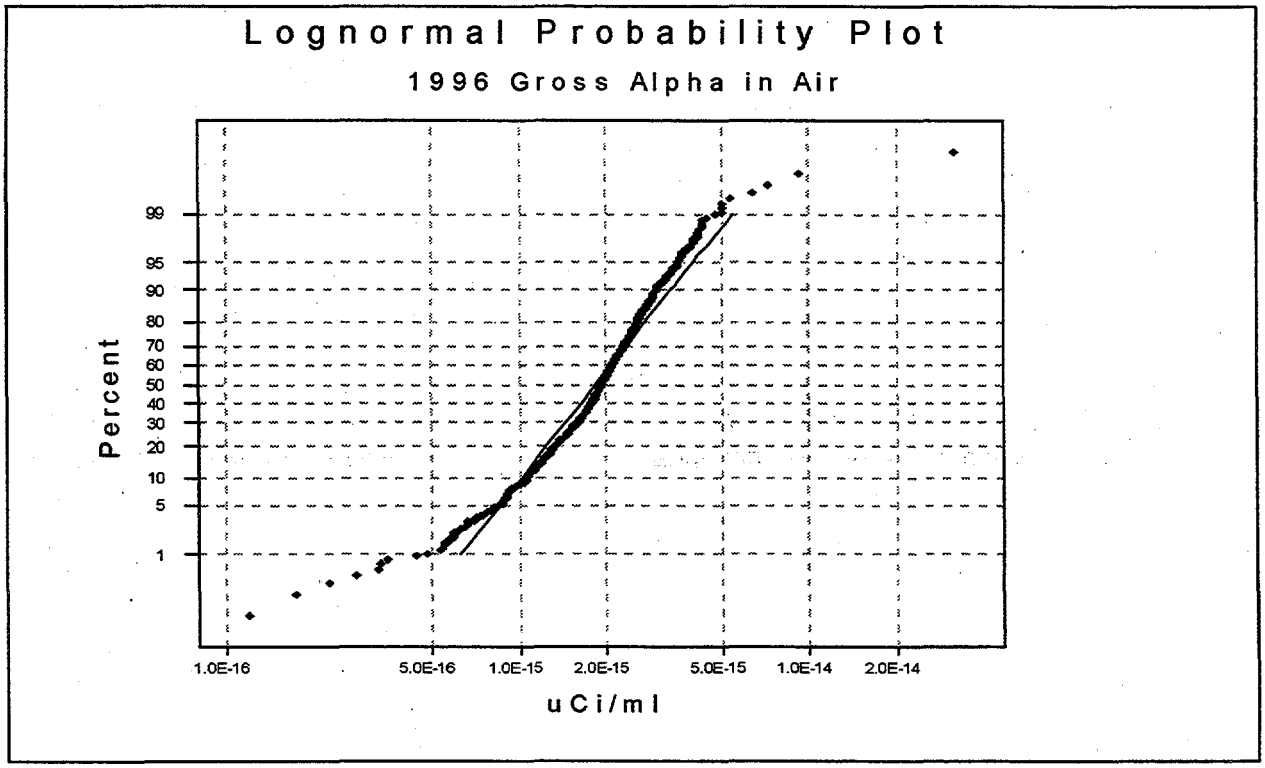


Figure 1.2 Probability Plot for All Data Combined

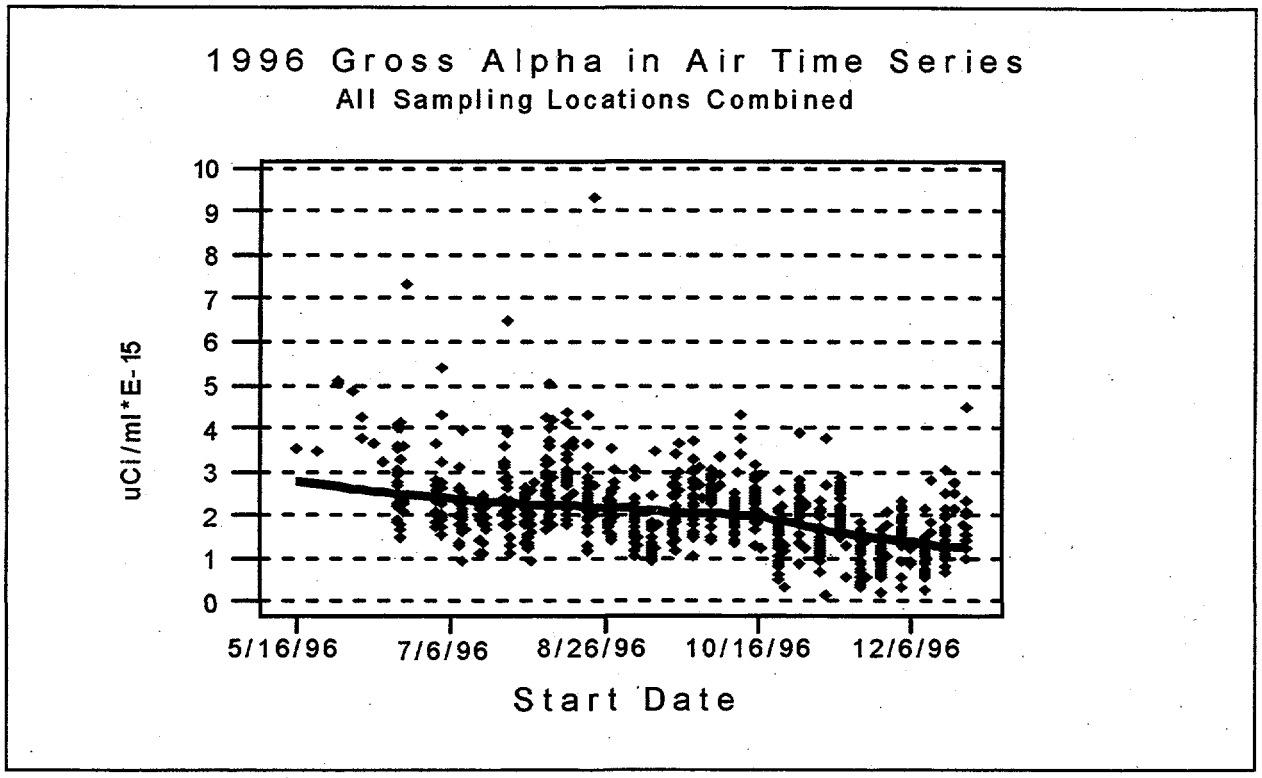


Figure 1.3 Time Series Plot of Gross Alpha in Air with LOWESS Line

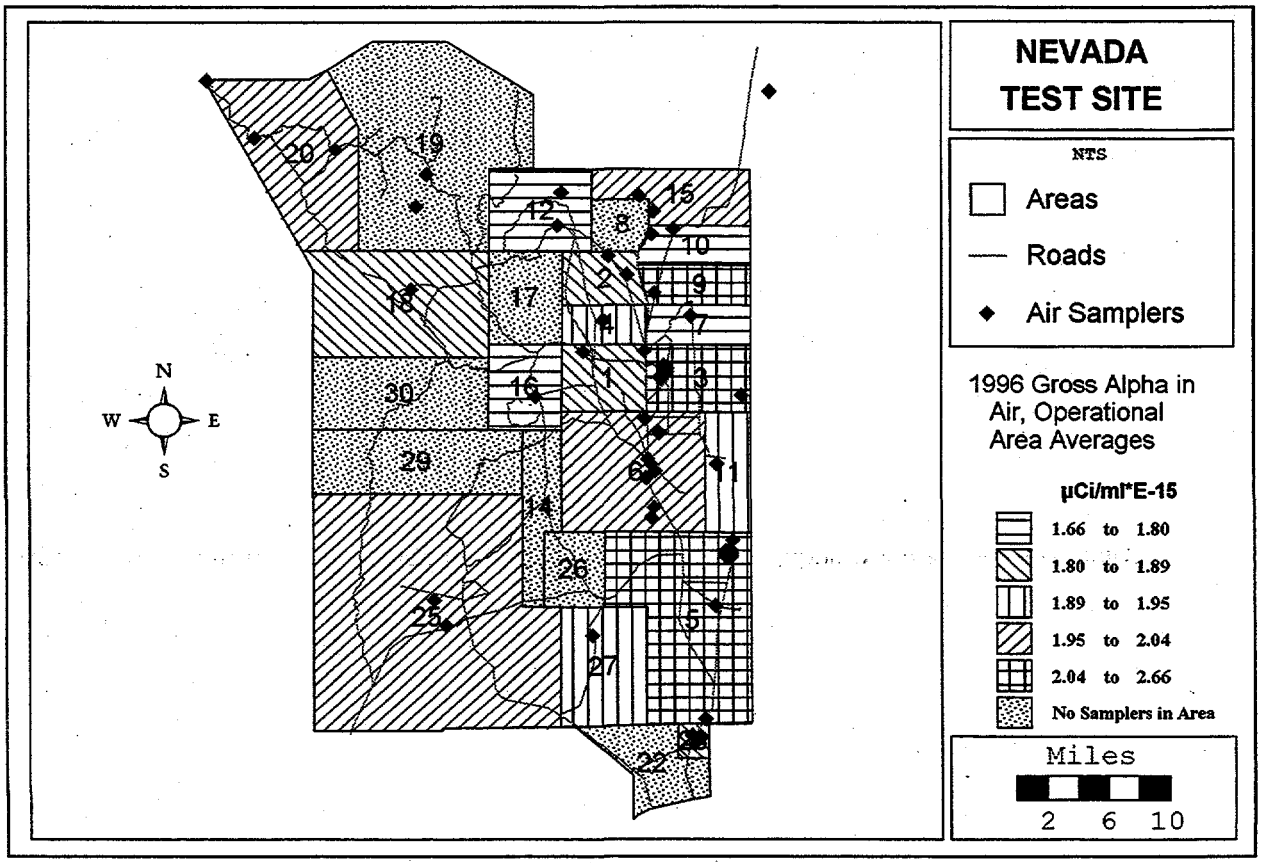


Figure 1.4 Thematic Map of 1996 Gross Alpha in Air

Table 1.1 Descriptive Statistic for Gross Alpha in Air by Sampling Location, $\mu Ci/mL \times 10^{-15}$

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
BJY	25	1.81	1.70	0.58	0.96	3.05
Area 2, Camp	26	1.94	1.89	0.63	0.81	3.67
2-1 Substation	25	1.74	1.58	0.83	0.28	4.32
Mud Plant	25	2.34	2.06	1.08	0.70	4.31
Well ER 3-1	27	2.17	1.93	0.89	0.87	4.48
Bunker T-4	25	1.94	1.92	0.52	0.93	3.30
WEF North	3	2.16	1.93	0.59	1.72	2.83
WEF South	4	2.39	2.44	0.57	1.73	2.95
RWMS No. 4	1	3.59	-	-	-	-
RWMS No. 5	1	2.16	-	-	-	-
RWMS No. 6	1	2.93	-	-	-	-
DOD Yard	27	2.07	2.10	0.70	0.90	4.00
RWMS No. 3	1	3.49	-	-	-	-
RWMS No. 1	1	2.97	-	-	-	-
Well 5B	27	2.15	2.11	0.62	0.88	3.60
Yucca	24	2.01	1.89	0.56	0.89	3.05
CP-6	27	2.13	2.12	0.54	0.92	3.11
Area 6, Well 3	26	1.98	2.00	0.66	0.63	3.26
UE-7ns	25	1.80	1.52	0.91	0.35	5.04
Area 9, 9-300	27	2.63	2.45	1.18	0.87	6.51
Gate 700 South	26	1.68	1.68	0.63	0.59	3.27
SEDAN Crater	26	1.82	1.96	0.66	0.65	2.95
Gate 293	26	1.95	1.92	0.56	0.93	3.39
Area 12, Camp	26	1.70	1.59	0.51	0.44	2.81
Project 57	31	2.35	2.35	0.92	0.88	4.82
EPA Farm	26	1.96	1.92	0.96	0.59	5.39
3545 Substation	25	1.66	1.59	0.80	0.17	4.34
Well UE-18t	26	1.90	1.81	0.73	0.54	3.42
SCHOONER	26	1.98	2.08	0.80	0.56	3.58
Area 20, Camp	26	1.71	1.87	0.83	0.32	3.30
CABRIOLET	3	1.51	1.41	0.40	1.16	1.95
Building 790 No. 2	27	1.81	1.72	0.71	0.76	3.23
H & S Building	27	1.82	1.80	0.72	0.22	3.07
E-MAD North	27	1.92	2.02	0.75	0.57	3.95
NRDS	27	2.01	1.92	0.77	0.65	4.25
Area 27, Camp	22	1.95	1.87	0.61	0.95	3.17
DOUBLE TRACKS	28	3.66	2.25	5.86	0.34	31.90
CLEAN SLATE III	29	2.51	2.31	1.05	1.18	5.05
CLEAN SLATE I	19	2.32	2.64	1.09	0.12	3.75
All stations combined	821	2.06	1.94	1.36	0.12	31.90

Table 1.2 Descriptive Statistic for Gross Alpha in Air by Operational Area, $\mu Ci/mL \times 10^{-15}$

Area	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	25	1.81	1.70	0.58	0.96	3.05
2	51	1.84	1.75	0.73	0.28	4.32
3	52	2.25	1.94	0.98	0.70	4.48
4	25	1.94	1.92	0.52	0.93	3.30
5	66	2.20	2.15	0.68	0.88	4.00
6	77	2.05	2.07	0.58	0.63	1.66
7	25	1.80	1.52	0.91	0.35	5.04
8	0					
9	27	2.63	2.45	1.18	0.87	6.51
10	52	1.75	1.83	0.64	0.59	3.27
11	26	1.95	1.92	0.56	0.93	3.39
12	26	1.70	1.59	0.51	0.44	2.81
13	31	2.35	2.35	0.92	0.88	4.82
14	0					
15	26	1.96	1.92	0.96	0.59	5.39
16	25	1.66	1.59	0.80	0.17	4.24
17	0					
18	26	1.90	1.81	0.73	0.54	3.42
19	0					
20	55	1.83	1.88	0.80	0.32	3.58
22	0					
23	54	1.81	1.74	0.70	0.22	3.23
25	54	1.97	1.98	0.75	0.57	4.25
26	0					
27	22	1.95	1.87	0.61	0.95	3.17
29	0					
30	0					
52	76	2.89	2.38	3.66	0.12	31.9

Attachment 1.1 Gross Alpha in Air - 1996

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 1, BJY	07/03/96	07/10/96	2.24	0.45	0.52
Area 1, BJY	07/10/96	07/17/96	1.96	0.40	0.39
Area 1, BJY	07/17/96	07/24/96	1.93	0.41	0.50
Area 1, BJY	07/24/96	07/31/96	2.70	0.41	0.41
Area 1, BJY	07/31/96	08/07/96	2.09	0.65	1.04
Area 1, BJY	08/07/96	08/13/96	1.78	0.38	0.55
Area 1, BJY	08/13/96	08/20/96	3.03	0.44	0.48
Area 1, BJY	08/20/96	08/28/96	1.18	0.29	0.43
Area 1, BJY	08/28/96	09/04/96	2.50	0.40	0.47
Area 1, BJY	09/04/96	09/10/96	2.09	0.43	0.58
Area 1, BJY	09/10/96	09/17/96	1.66	0.35	0.48
Area 1, BJY	09/17/96	09/24/96	1.52	0.33	0.47
Area 1, BJY	09/24/96	09/30/96	1.44	0.36	0.54
Area 1, BJY	09/30/96	10/08/96	3.05	0.41	0.41
Area 1, BJY	10/08/96	10/15/96	1.53	0.34	0.47
Area 1, BJY	10/15/96	10/22/96	2.27	0.39	0.47
Area 1, BJY	10/22/96	10/29/96	1.42	0.34	0.51
Area 1, BJY	10/29/96	11/05/96	1.49	0.34	0.52
Area 1, BJY	11/05/96	11/12/96	1.56	0.34	0.51
Area 1, BJY	11/12/96	11/19/96	1.89	0.37	0.50
Area 1, BJY	11/19/96	11/26/96	1.18	0.31	0.49
Area 1, BJY	11/26/96	12/03/96	0.96	0.30	0.52
Area 1, BJY	12/03/96	12/10/96	1.70	0.35	0.77
Area 1, BJY	12/10/96	12/17/96	1.08	0.31	0.75
Area 1, BJY	12/17/96	12/26/96	1.08	0.26	0.63
Area 2, Camp	06/19/96	06/26/96	2.24	0.38	0.39
Area 2, Camp	06/26/96	07/03/96	Alpha Analysis Not Requested		
Area 2, Camp	07/03/96	07/10/96	1.94	0.35	0.30
Area 2, Camp	07/10/96	07/17/96	1.74	0.34	0.39
Area 2, Camp	07/17/96	07/24/96	2.02	0.37	0.39
Area 2, Camp	07/24/96	07/31/96	1.95	0.36	0.43
Area 2, Camp	07/31/96	08/07/96	1.74	0.35	0.43
Area 2, Camp	08/07/96	08/13/96	3.67	0.55	0.61
Area 2, Camp	08/13/96	08/20/96	3.40	0.49	0.53
Area 2, Camp	08/20/96	08/28/96	2.07	0.38	0.49
Area 2, Camp	08/28/96	09/04/96	2.54	0.43	0.53
Area 2, Camp	09/04/96	09/10/96	1.48	0.40	0.65
Area 2, Camp	09/10/96	09/18/96	1.28	0.31	0.46
Area 2, Camp	09/18/96	09/24/96	1.83	0.42	0.61
Area 2, Camp	09/24/96	09/30/96	1.75	0.41	0.60
Area 2, Camp	09/30/96	10/08/96	2.36	0.40	0.47
Area 2, Camp	10/08/96	10/15/96	2.33	0.43	0.53

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 2, Camp	10/15/96	10/22/96	2.26	0.41	0.51
Area 2, Camp	10/22/96	10/29/96	1.32	0.35	0.56
Area 2, Camp	10/29/96	11/05/96	2.21	0.42	0.57
Area 2, Camp	11/05/96	11/12/96	2.11	0.41	0.56
Area 2, Camp	11/12/96	11/19/96	1.70	0.38	0.54
Area 2, Camp	11/19/96	11/26/96	1.57	0.36	0.52
Area 2, Camp	11/26/96	12/03/96	0.80	0.30	0.56
Area 2, Camp	12/03/96	12/10/96	1.25	0.34	0.85
Area 2, Camp	12/10/96	12/17/96	1.22	0.33	0.80
Area 2, Camp	12/17/96	12/26/96	1.61	0.32	0.67
Area 2, 2-1 Substation	06/19/96	06/26/96	1.45	0.33	0.43
Area 2, 2-1 Substation	06/26/96	07/03/96	Alpha Analysis Not Requested		
Area 2, 2-1 Substation	07/03/96	07/10/96	4.32	1.20	1.74
Area 2, 2-1 Substation	07/10/96	07/17/96	2.01	0.38	0.35
Area 2, 2-1 Substation	07/17/96	07/24/96	Power Out		
Area 2, 2-1 Substation	07/24/96	07/31/96	1.96	0.39	0.49
Area 2, 2-1 Substation	07/31/96	08/07/96	1.50	0.35	0.49
Area 2, 2-1 Substation	08/07/96	08/13/96	2.82	0.53	0.70
Area 2, 2-1 Substation	08/13/96	08/20/96	1.89	0.42	0.60
Area 2, 2-1 Substation	08/20/96	08/28/96	1.91	0.40	0.55
Area 2, 2-1 Substation	08/28/96	09/04/96	1.38	0.38	0.60
Area 2, 2-1 Substation	09/04/96	09/10/96	1.50	0.44	0.73
Area 2, 2-1 Substation	09/10/96	09/18/96	1.13	0.32	0.51
Area 2, 2-1 Substation	09/18/96	09/24/96	1.90	0.46	0.68
Area 2, 2-1 Substation	09/24/96	09/30/96	1.57	0.43	0.68
Area 2, 2-1 Substation	09/30/96	10/08/96	2.40	0.42	0.52
Area 2, 2-1 Substation	10/08/96	10/15/96	2.34	0.46	0.60
Area 2, 2-1 Substation	10/15/96	10/22/96	2.55	0.47	0.58
Area 2, 2-1 Substation	10/22/96	10/29/96	2.57	0.47	0.63
Area 2, 2-1 Substation	10/29/96	11/05/96	0.85	0.34	0.63
Area 2, 2-1 Substation	11/05/96	11/12/96	0.90	0.34	0.63
Area 2, 2-1 Substation	11/12/96	11/19/96	1.66	0.40	0.61
Area 2, 2-1 Substation	11/19/96	11/26/96	0.28	0.26	0.60
Area 2, 2-1 Substation	11/26/96	12/03/96	0.71	0.32	0.63
Area 2, 2-1 Substation	12/03/96	12/10/96	1.58	0.37	0.85
Area 2, 2-1 Substation	12/10/96	12/17/96	1.25	0.33	0.78
Area 2, 2-1 Substation	12/17/96	12/26/96	1.06	0.27	0.66
Area 3, Mud Plant	06/19/96	06/26/96	4.01	0.55	0.47
Area 3, Mud Plant	06/26/96	07/02/96	Alpha Analysis Not Requested		
Area 3, Mud Plant	07/02/96	07/10/96	2.61	0.44	0.44
Area 3, Mud Plant	07/10/96	07/17/96	3.94	0.55	0.38
Area 3, Mud Plant	07/17/96	07/24/96	1.77	0.40	0.50
Area 3, Mud Plant	07/24/96	07/31/96	3.86	0.60	0.61

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 3, Mud Plant	07/31/96	08/07/96	1.89	0.41	0.54
Area 3, Mud Plant	08/07/96	08/13/96	4.01	0.65	0.77
Area 3, Mud Plant	08/13/96	08/20/96	3.55	0.56	0.66
Area 3, Mud Plant	08/20/96	08/28/96	4.31	0.58	0.60
Area 3, Mud Plant	08/28/96	09/04/96	2.29	0.48	0.66
Area 3, Mud Plant	09/04/96	09/10/96	Motor Reversed		
Area 3, Mud Plant	09/10/96	09/18/96	1.46	0.31	0.43
Area 3, Mud Plant	09/18/96	09/24/96	3.42	0.52	0.58
Area 3, Mud Plant	09/24/96	09/30/96	2.45	0.45	0.57
Area 3, Mud Plant	09/30/96	10/08/96	1.70	0.33	0.43
Area 3, Mud Plant	10/08/96	10/15/96	1.75	0.37	0.50
Area 3, Mud Plant	10/15/96	10/22/96	1.93	0.38	0.49
Area 3, Mud Plant	10/22/96	10/29/96	2.06	0.40	0.54
Area 3, Mud Plant	10/29/96	11/05/96	2.06	0.40	0.54
Area 3, Mud Plant	11/05/96	11/12/96	1.05	0.32	0.54
Area 3, Mud Plant	11/12/96	11/19/96	1.44	0.35	0.53
Area 3, Mud Plant	11/19/96	11/26/96	0.70	0.27	0.50
Area 3, Mud Plant	11/26/96	12/03/96	1.38	0.35	0.54
Area 3, Mud Plant	12/03/96	12/10/96	2.29	0.41	0.82
Area 3, Mud Plant	12/10/96	12/17/96	1.05	0.31	0.76
Area 3, Mud Plant	12/17/96	12/26/96	1.52	0.30	0.65
Area 3, Well ER 3-1	06/18/96	06/24/96	4.05	0.59	0.54
Area 3, Well ER 3-1	06/24/96	07/01/96	Alpha Analysis Not Requested		
Area 3, Well ER 3-1	07/01/96	07/09/96	3.65	0.48	0.32
Area 3, Well ER 3-1	07/09/96	07/16/96	3.12	0.50	0.48
Area 3, Well ER 3-1	07/16/96	07/23/96	1.93	0.37	0.42
Area 3, Well ER 3-1	07/23/96	07/30/96	1.73	0.33	0.39
Area 3, Well ER 3-1	07/30/96	08/06/96	1.81	0.34	0.40
Area 3, Well ER 3-1	08/06/96	08/13/96	1.66	0.36	0.51
Area 3, Well ER 3-1	08/13/96	08/20/96	2.35	0.40	0.49
Area 3, Well ER 3-1	08/20/96	08/27/96	2.61	0.42	0.50
Area 3, Well ER 3-1	08/27/96	09/04/96	1.59	0.32	0.43
Area 3, Well ER 3-1	09/04/96	09/10/96	1.96	0.42	0.60
Area 3, Well ER 3-1	09/10/96	09/17/96	1.65	0.36	0.49
Area 3, Well ER 3-1	09/17/96	09/24/96	1.66	0.36	0.49
Area 3, Well ER 3-1	09/24/96	09/30/96	1.96	0.41	0.56
Area 3, Well ER 3-1	09/30/96	10/08/96	3.04	0.42	0.42
Area 3, Well ER 3-1	10/08/96	10/15/96	2.17	0.40	0.49
Area 3, Well ER 3-1	10/15/96	10/22/96	3.14	0.46	0.49
Area 3, Well ER 3-1	10/22/96	10/29/96	0.87	0.30	0.53
Area 3, Well ER 3-1	10/29/96	11/05/96	2.39	0.55	0.83
Area 3, Well ER 3-1	11/05/96	11/12/96	1.94	0.95	1.89
Area 3, Well ER 3-1	11/12/96	11/19/96	1.48	0.35	0.52

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 3, Well ER 3-1	11/19/96	11/26/96	1.82	0.37	0.49
Area 3, Well ER 3-1	11/26/96	12/03/96	1.14	0.32	0.53
Area 3, Well ER 3-1	12/03/96	12/10/96	1.89	0.38	0.81
Area 3, Well ER 3-1	12/10/96	12/17/96	1.23	0.95	3.23
Area 3, Well ER 3-1	12/17/96	12/24/96	1.28	0.35	0.88
Area 3, Well ER 3-1	12/24/96	12/31/96	4.48	0.97	2.17
Area 4, Bunker T-4	06/19/96	06/26/96	3.30	0.45	0.38
Area 4, Bunker T-4	06/26/96	07/03/96	Alpha Analysis Not Requested		
Area 4, Bunker T-4	07/03/96	07/10/96	1.87	0.36	0.39
Area 4, Bunker T-4	07/10/96	07/17/96	1.78	0.33	0.30
Area 4, Bunker T-4	07/17/96	07/24/96	2.24	0.38	0.39
Area 4, Bunker T-4	07/24/96	07/31/96	2.05	0.37	0.42
Area 4, Bunker T-4	07/31/96	08/07/96	1.48	0.32	0.42
Area 4, Bunker T-4	08/07/96	08/13/96	2.36	0.46	0.62
Area 4, Bunker T-4	08/13/96	08/20/96	2.74	0.45	0.54
Area 4, Bunker T-4	08/20/96	08/28/96	2.08	0.38	0.49
Area 4, Bunker T-4	08/28/96	09/04/96	1.92	0.39	0.54
Area 4, Bunker T-4	09/04/96	09/10/96	2.27	0.47	0.65
Area 4, Bunker T-4	09/10/96	09/18/96	1.61	0.34	0.46
Area 4, Bunker T-4	09/18/96	09/24/96	1.92	0.43	0.62
Area 4, Bunker T-4	09/24/96	09/30/96	2.73	0.49	0.61
Area 4, Bunker T-4	09/30/96	10/08/96	2.36	0.39	0.46
Area 4, Bunker T-4	10/08/96	10/15/96	1.67	0.38	0.53
Area 4, Bunker T-4	10/15/96	10/22/96	2.01	0.40	0.53
Area 4, Bunker T-4	10/22/96	10/29/96	Sampler Tipped Over		
Area 4, Bunker T-4	10/29/96	11/05/96	1.93	0.42	0.61
Area 4, Bunker T-4	11/05/96	11/12/96	1.65	0.39	0.60
Area 4, Bunker T-4	11/12/96	11/19/96	1.94	0.41	0.58
Area 4, Bunker T-4	11/19/96	11/26/96	1.30	0.36	0.56
Area 4, Bunker T-4	11/26/96	12/03/96	0.93	0.33	0.60
Area 4, Bunker T-4	12/03/96	12/10/96	1.34	0.37	0.92
Area 4, Bunker T-4	12/10/96	12/17/96	1.37	0.36	0.86
Area 4, Bunker T-4	12/17/96	12/26/96	1.58	0.33	0.72
Area 5, WEF North	10/10/96	10/15/96	Low Volume		
Area 5, WEF North	10/15/96	10/22/96	2.83	0.44	0.49
Area 5, WEF North	10/22/96	10/29/96	1.72	0.38	0.56
Area 5, WEF North	10/29/96	11/05/96	1.93	0.38	0.52
Area 5, WEF South	10/09/96	10/15/96	2.95	0.56	0.71
Area 5, WEF South	10/15/96	10/22/96	2.77	0.49	0.60
Area 5, WEF South	10/22/96	10/29/96	2.10	0.46	0.68
Area 5, WEF South	10/29/96	11/05/96	1.73	0.42	0.65
Area 5, RWMS No. 4	06/18/96	06/24/96	3.59	0.52	0.47
Area 5, RWMS No. 5	06/18/96	06/24/96	2.16	0.41	0.46
Area 5, RWMS No. 6	06/18/96	06/24/96	2.93	0.46	0.44

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 5, DOD Yard	06/18/96	06/24/96	4.00	0.55	0.47
Area 5, DOD Yard	06/24/96	07/01/96	Alpha Analysis Not Requested		
Area 5, DOD Yard	07/01/96	07/09/96	1.83	0.33	0.29
Area 5, DOD Yard	07/09/96	07/16/96	2.56	0.42	0.41
Area 5, DOD Yard	07/17/96	07/23/96	2.19	0.43	0.49
Area 5, DOD Yard	07/23/96	07/30/96	2.32	0.41	0.45
Area 5, DOD Yard	07/30/96	08/06/96	2.10	0.39	0.45
Area 5, DOD Yard	08/06/96	08/13/96	2.90	0.47	0.56
Area 5, DOD Yard	08/13/96	08/20/96	2.69	0.45	0.54
Area 5, DOD Yard	08/20/96	08/27/96	2.46	0.46	0.60
Area 5, DOD Yard	08/27/96	09/04/96	2.05	0.38	0.48
Area 5, DOD Yard	09/04/96	09/10/96	1.91	0.45	0.68
Area 5, DOD Yard	09/10/96	09/17/96	1.63	0.38	0.54
Area 5, DOD Yard	09/17/96	09/24/96	1.79	0.40	0.57
Area 5, DOD Yard	09/24/96	09/30/96	2.24	0.46	0.63
Area 5, DOD Yard	09/30/96	10/08/96	2.50	0.42	0.50
Area 5, DOD Yard	10/08/96	10/15/96	1.72	0.39	0.55
Area 5, DOD Yard	10/15/96	10/22/96	2.93	0.48	0.55
Area 5, DOD Yard	10/22/96	10/29/96	1.21	0.37	0.62
Area 5, DOD Yard	10/29/96	11/05/96	2.69	0.47	0.60
Area 5, DOD Yard	11/05/96	11/12/96	1.28	0.36	0.60
Area 5, DOD Yard	11/12/96	11/19/96	2.70	0.48	0.61
Area 5, DOD Yard	11/19/96	11/26/96	1.30	0.36	0.56
Area 5, DOD Yard	11/26/96	12/03/96	1.19	0.36	0.61
Area 5, DOD Yard	12/03/96	12/10/96	2.17	0.43	0.93
Area 5, DOD Yard	12/10/96	12/17/96	0.90	0.28	0.70
Area 5, DOD Yard	12/17/96	12/24/96	1.15	0.32	0.82
Area 5, DOD Yard	12/24/96	12/31/96	1.49	0.35	0.83
Area 5, RWMS No. 1	06/18/96	06/24/96	2.97	0.53	0.56
Area 5, RWMS No. 3	06/18/96	06/24/96	3.49	0.55	0.53
Area 5, Well 5B	06/18/96	06/26/96	2.95	0.44	0.40
Area 5, Well 5B	06/26/96	07/01/96	Alpha Analysis Not Requested		
Area 5, Well 5B	07/01/96	07/09/96	2.41	0.38	0.30
Area 5, Well 5B	07/09/96	07/16/96	2.59	0.44	0.43
Area 5, Well 5B	07/16/96	07/23/96	1.37	0.33	0.44
Area 5, Well 5B	07/23/96	07/30/96	3.60	0.52	0.49
Area 5, Well 5B	07/30/96	08/06/96	1.85	0.38	0.53
Area 5, Well 5B	08/06/96	08/13/96	3.26	0.47	0.53
Area 5, Well 5B	08/13/96	08/20/96	2.99	0.46	0.53
Area 5, Well 5B	08/20/96	08/27/96	2.33	0.43	0.55
Area 5, Well 5B	08/27/96	09/04/96	2.13	0.37	0.47
Area 5, Well 5B	09/04/96	09/10/96	2.38	0.47	0.65
Area 5, Well 5B	09/10/96	09/17/96	1.75	0.37	0.50

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 5, Well 5B	09/17/96	09/24/96	1.35	0.35	0.53
Area 5, Well 5B	09/24/96	09/30/96	1.73	0.41	0.60
Area 5, Well 5B	09/30/96	10/08/96	2.65	0.42	0.50
Area 5, Well 5B	10/08/96	10/15/96	2.11	0.40	0.51
Area 5, Well 5B	10/15/96	10/22/96	1.87	0.39	0.52
Area 5, Well 5B	10/22/96	10/29/96	1.89	0.41	0.59
Area 5, Well 5B	10/29/96	11/05/96	2.18	0.41	0.60
Area 5, Well 5B	11/05/96	11/12/96	2.31	0.42	0.56
Area 5, Well 5B	11/12/96	11/19/96	2.58	0.45	0.57
Area 5, Well 5B	11/19/96	11/26/96	1.83	0.39	0.53
Area 5, Well 5B	11/26/96	12/03/96	0.88	0.32	0.57
Area 5, Well 5B	12/03/96	12/10/96	1.93	0.40	0.88
Area 5, Well 5B	12/10/96	12/17/96	1.18	0.33	0.82
Area 5, Well 5B	12/17/96	12/24/96	1.92	0.41	0.90
Area 5, Well 5B	12/24/96	12/31/96	2.06	0.41	0.88
Area 6, Yucca	06/18/96	06/24/96	1.81	0.30	0.31
Area 6, Yucca	06/24/96	07/01/96	Alpha Analysis Not Requested		
Area 6, Yucca	07/01/96	07/09/96	Power Out		
Area 6, Yucca	07/09/96	07/16/96	Power Out		
Area 6, Yucca	07/16/96	07/23/96	1.39	0.39	0.56
Area 6, Yucca	07/23/96	07/30/96	2.77	0.42	0.42
Area 6, Yucca	07/30/96	08/06/96	2.49	0.40	0.42
Area 6, Yucca	08/06/96	08/13/96	2.52	0.43	0.53
Area 6, Yucca	08/13/96	08/20/96	1.76	0.37	0.52
Area 6, Yucca	08/20/96	08/27/96	2.29	0.42	0.54
Area 6, Yucca	08/27/96	09/04/96	1.84	0.35	0.46
Area 6, Yucca	09/04/96	09/10/96	1.58	0.41	0.63
Area 6, Yucca	09/10/96	09/17/96	0.89	0.30	0.51
Area 6, Yucca	09/17/96	09/24/96	2.67	0.44	0.51
Area 6, Yucca	09/24/96	09/30/96	2.72	0.48	0.59
Area 6, Yucca	10/08/96	10/15/96	2.23	0.41	0.51
Area 6, Yucca	10/15/96	10/22/96	2.28	0.42	0.52
Area 6, Yucca	10/22/96	10/29/96	1.76	0.38	0.55
Area 6, Yucca	10/29/96	11/05/96	2.35	0.43	0.56
Area 6, Yucca	11/05/96	11/12/96	1.62	0.37	0.54
Area 6, Yucca	11/12/96	11/19/96	2.53	0.48	0.63
Area 6, Yucca	11/19/96	11/26/96	1.12	0.34	0.57
Area 6, Yucca	11/26/96	12/03/96	1.53	0.39	0.62
Area 6, Yucca	12/03/96	12/10/96	1.93	0.43	0.97
Area 6, Yucca	12/10/96	12/17/96	1.47	0.39	0.92
Area 6, Yucca	12/17/96	12/24/96	3.05	0.53	1.04
Area 6, Yucca	12/24/96	12/31/96	1.71	0.43	1.03
Area 6, CP-6	06/18/96	06/24/96	2.45	0.47	0.54

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 6, CP-6	06/24/96	07/01/96	Alpha Analysis Not Requested		
Area 6, CP-6	07/01/96	07/09/96	2.02	0.36	0.32
Area 6, CP-6	07/09/96	07/16/96	1.99	0.40	0.46
Area 6, CP-6	07/16/96	07/23/96	2.18	0.42	0.46
Area 6, CP-6	07/23/96	07/30/96	3.11	0.49	0.50
Area 6, CP-6	07/30/96	08/06/96	2.45	0.44	0.49
Area 6, CP-6	08/06/96	08/13/96	2.49	0.48	0.64
Area 6, CP-6	08/13/96	08/20/96	2.83	0.50	0.62
Area 6, CP-6	08/20/96	08/27/96	1.97	0.45	0.65
Area 6, CP-6	08/27/96	09/04/96	2.34	0.42	0.54
Area 6, CP-6	09/04/96	09/10/96	2.10	0.51	0.77
Area 6, CP-6	09/10/96	09/17/96	1.69	0.41	0.61
Area 6, CP-6	09/17/96	09/24/96	2.43	0.47	0.62
Area 6, CP-6	09/24/96	09/30/96	2.07	0.48	0.69
Area 6, CP-6	09/30/96	10/08/96	2.93	0.48	0.55
Area 6, CP-6	10/08/96	10/15/96	2.04	0.44	0.61
Area 6, CP-6	10/15/96	10/22/96	2.61	0.49	0.63
Area 6, CP-6	10/22/96	10/29/96	1.49	0.41	0.66
Area 6, CP-6	10/29/96	11/05/96	2.61	0.50	0.67
Area 6, CP-6	11/05/96	11/12/96	1.41	0.40	0.65
Area 6, CP-6	11/12/96	11/19/96	2.48	0.49	0.67
Area 6, CP-6	11/19/96	11/26/96	0.92	0.34	0.61
Area 6, CP-6	11/26/96	12/03/96	0.97	0.37	0.68
Area 6, CP-6	12/03/96	12/10/96	1.50	0.41	1.02
Area 6, CP-6	12/10/96	12/17/96	2.12	0.46	0.96
Area 6, CP-6	12/17/96	12/24/96	2.11	0.47	1.06
Area 6, CP-6	12/24/96	12/31/96	2.30	0.48	1.04
Area 6, Well 3	07/01/96	07/09/96	1.99	0.33	0.26
Area 6, Well 3	07/09/96	07/16/96	2.62	0.41	0.39
Area 6, Well 3	07/16/96	07/23/96	2.12	0.37	0.38
Area 6, Well 3	07/23/96	07/30/96	2.09	0.37	0.41
Area 6, Well 3	07/30/96	08/06/96	2.42	0.39	0.41
Area 6, Well 3	08/06/96	08/13/96	2.85	0.45	0.52
Area 6, Well 3	08/13/96	08/20/96	3.25	0.47	0.52
Area 6, Well 3	08/20/96	08/27/96	2.42	0.42	0.52
Area 6, Well 3	08/27/96	09/04/96	1.72	0.34	0.54
Area 6, Well 3	09/04/96	09/10/96	1.53	0.39	0.61
Area 6, Well 3	09/10/96	09/17/96	1.48	0.36	0.53
Area 6, Well 3	09/17/96	09/24/96	1.82	0.38	0.53
Area 6, Well 3	09/24/96	09/30/96	3.26	0.52	0.60
Area 6, Well 3	09/30/96	10/08/96	2.29	0.38	0.45
Area 6, Well 3	10/08/96	10/15/96	2.03	0.40	0.53
Area 6, Well 3	10/15/96	10/22/96	2.49	0.43	0.52

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 6, Well 3	10/22/96	10/29/96	0.87	0.31	0.56
Area 6, Well 3	10/29/96	11/05/96	1.95	0.40	0.58
Area 6, Well 3	11/05/96	11/12/96	1.01	0.33	0.58
Area 6, Well 3	11/12/96	11/19/96	2.35	0.44	0.57
Area 6, Well 3	11/19/96	11/26/96	1.61	0.37	0.53
Area 6, Well 3	11/26/96	12/03/96	1.14	0.34	0.58
Area 6, Well 3	12/03/96	12/10/96	1.94	0.40	0.88
Area 6, Well 3	12/10/96	12/17/96	0.63	0.28	0.83
Area 6, Well 3	12/17/96	12/24/96	2.00	0.41	0.91
Area 6, Well 3	12/24/96	12/31/96	1.72	0.39	0.89
Area 7, UE-7ns	06/19/96	06/26/96	1.44	0.32	0.41
Area 7, UE-7ns	06/26/96	07/02/96	Alpha Analysis Not Requested		
Area 7, UE-7ns	07/02/96	07/10/96	2.35	0.37	0.30
Area 7, UE-7ns	07/10/96	07/17/96	2.09	0.37	0.33
Area 7, UE-7ns	07/17/96	07/24/96	1.96	0.38	0.43
Area 7, UE-7ns	07/24/96	07/31/96	2.88	0.45	0.46
Area 7, UE-7ns	07/31/96	08/07/96	1.33	0.31	0.41
Area 7, UE-7ns	08/07/96	08/13/96	5.04	1.60	2.73
Area 7, UE-7ns	08/13/96	08/20/96	Filter Head Missing		
Area 7, UE-7ns	08/20/96	08/28/96	2.42	0.40	0.49
Area 7, UE-7ns	08/28/96	09/04/96	1.52	0.35	0.52
Area 7, UE-7ns	09/04/96	09/10/96	1.51	0.40	0.63
Area 7, UE-7ns	09/10/96	09/18/96	1.24	0.30	0.44
Area 7, UE-7ns	09/18/96	09/24/96	1.37	0.38	0.59
Area 7, UE-7ns	09/24/96	09/30/96	2.35	0.45	0.58
Area 7, UE-7ns	09/30/96	10/08/96	2.46	0.39	0.44
Area 7, UE-7ns	10/08/96	10/15/96	1.81	0.37	0.50
Area 7, UE-7ns	10/15/96	10/22/96	2.55	0.43	0.50
Area 7, UE-7ns	10/22/96	10/29/96	1.29	0.34	0.55
Area 7, UE-7ns	10/29/96	11/05/96	2.01	0.39	0.55
Area 7, UE-7ns	11/05/96	11/12/96	1.38	0.35	0.54
Area 7, UE-7ns	11/12/96	11/19/96	1.73	0.37	0.53
Area 7, UE-7ns	11/19/96	11/26/96	0.35	0.23	0.50
Area 7, UE-7ns	11/26/96	12/03/96	1.07	0.32	0.55
Area 7, UE-7ns	12/03/96	12/10/96	0.93	0.31	0.83
Area 7, UE-7ns	12/10/96	12/17/96	0.88	0.30	0.77
Area 7, UE-7ns	12/17/96	12/26/96	1.14	0.28	0.66
Area 9, 9-300	06/19/96	06/26/96	4.14	0.49	0.38
Area 9, 9-300	06/26/96	07/01/96	Alpha Analysis Not Requested		
Area 9, 9-300	07/03/96	07/10/96	3.23	0.44	0.30
Area 9, 9-300	07/10/96	07/17/96	2.51	0.39	0.29
Area 9, 9-300	07/17/96	07/24/96	2.45	0.39	0.38
Area 9, 9-300	07/24/96	07/31/96	6.51	0.62	0.42

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 9, 9-300	07/31/96	08/07/96	2.49	0.40	0.42
Area 9, 9-300	08/07/96	08/13/96	3.56	0.54	0.61
Area 9, 9-300	08/13/96	08/20/96	4.13	0.52	0.52
Area 9, 9-300	08/20/96	08/28/96	3.62	0.47	0.48
Area 9, 9-300	08/28/96	09/04/96	3.54	0.49	0.53
Area 9, 9-300	09/04/96	09/10/96	1.95	0.44	0.64
Area 9, 9-300	09/10/96	09/18/96	2.43	0.39	0.45
Area 9, 9-300	09/18/96	09/24/96	2.21	0.45	0.60
Area 9, 9-300	09/24/96	09/30/96	3.69	0.55	0.60
Area 9, 9-300	09/30/96	10/08/96	2.87	1.20	2.25
Area 9, 9-300	10/08/96	10/15/96	2.21	0.41	0.52
Area 9, 9-300	10/15/96	10/22/96	2.83	0.44	0.50
Area 9, 9-300	10/22/96	10/29/96	1.64	0.36	0.53
Area 9, 9-300	10/29/96	11/05/96	2.77	0.44	0.54
Area 9, 9-300	11/05/96	11/12/96	1.62	0.37	0.55
Area 9, 9-300	11/12/96	11/19/96	1.91	0.39	0.53
Area 9, 9-300	11/19/96	11/26/96	1.45	0.34	0.50
Area 9, 9-300	11/26/96	12/03/96	1.61	0.36	0.54
Area 9, 9-300	12/03/96	12/10/96	1.84	0.38	0.81
Area 9, 9-300	12/10/96	12/17/96	0.87	0.29	0.76
Area 9, 9-300	12/17/96	12/24/96	1.60	0.36	0.83
Area 9, 9-300	12/24/96	12/31/96	1.37	0.34	0.82
Area 10, Gate 700 South	06/19/96	06/26/96	1.76	0.33	0.38
Area 10, Gate 700 South	06/26/96	07/03/96	Alpha Analysis Not Requested		
Area 10, Gate 700 South	07/03/96	07/10/96	2.00	0.35	0.30
Area 10, Gate 700 South	07/10/96	07/17/96	2.00	0.35	0.29
Area 10, Gate 700 South	07/17/96	07/25/96	2.16	0.37	0.38
Area 10, Gate 700 South	07/25/96	07/31/96	1.30	0.31	0.42
Area 10, Gate 700 South	07/31/96	08/07/96	1.26	0.31	0.43
Area 10, Gate 700 South	08/07/96	08/13/96	2.57	0.47	0.61
Area 10, Gate 700 South	08/13/96	08/20/96	3.27	0.47	0.52
Area 10, Gate 700 South	08/20/96	08/28/96	1.70	0.35	0.48
Area 10, Gate 700 South	08/28/96	09/04/96	1.47	0.35	0.52
Area 10, Gate 700 South	09/04/96	09/10/96	1.14	0.36	0.62
Area 10, Gate 700 South	09/10/96	09/18/96	1.66	0.33	0.44
Area 10, Gate 700 South	09/18/96	09/24/96	1.14	0.35	0.58
Area 10, Gate 700 South	09/24/96	09/30/96	2.19	0.43	0.57
Area 10, Gate 700 South	09/30/96	10/08/96	2.28	0.38	0.44
Area 10, Gate 700 South	10/08/96	10/15/96	1.91	0.38	0.50
Area 10, Gate 700 South	10/15/96	10/22/96	2.54	0.42	0.49
Area 10, Gate 700 South	10/22/96	10/29/96	0.59	0.27	0.52
Area 10, Gate 700 South	10/29/96	11/05/96	1.85	0.38	0.53
Area 10, Gate 700 South	11/05/96	11/12/96	1.03	0.31	0.53

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 10, Gate 700 South	11/12/96	11/19/96	1.63	0.36	0.52
Area 10, Gate 700 South	11/19/96	11/26/96	0.74	0.27	0.49
Area 10, Gate 700 South	11/26/96	12/03/96	1.22	0.32	0.52
Area 10, Gate 700 South	12/03/96	12/10/96	2.13	0.39	0.80
Area 10, Gate 700 South	12/10/96	12/17/96	0.85	0.28	0.74
Area 10, Gate 700 South	12/17/96	12/26/96	1.27	0.37	0.95
Area 10, SEDAN Crater	06/19/96	06/26/96	2.36	0.40	0.40
Area 10, SEDAN Crater	06/26/96	07/03/96	Alpha Analysis Not Requested		
Area 10, SEDAN Crater	07/03/96	07/10/96	1.97	0.36	0.32
Area 10, SEDAN Crater	07/10/96	07/17/96	1.86	0.34	0.31
Area 10, SEDAN Crater	07/17/96	07/24/96	2.43	0.41	0.41
Area 10, SEDAN Crater	07/24/96	07/31/96	2.24	0.38	0.41
Area 10, SEDAN Crater	07/31/96	08/07/96	1.21	0.29	0.41
Area 10, SEDAN Crater	08/07/96	08/13/96	1.98	0.42	0.59
Area 10, SEDAN Crater	08/13/96	08/20/96	2.95	0.44	0.50
Area 10, SEDAN Crater	08/20/96	08/28/96	2.10	0.37	0.46
Area 10, SEDAN Crater	08/28/96	09/04/96	1.53	0.35	0.50
Area 10, SEDAN Crater	09/04/96	09/10/96	1.80	0.42	0.61
Area 10, SEDAN Crater	09/10/96	09/18/96	1.01	0.28	0.43
Area 10, SEDAN Crater	09/18/96	09/24/96	2.87	0.49	0.58
Area 10, SEDAN Crater	09/24/96	09/30/96	1.05	0.33	0.57
Area 10, SEDAN Crater	09/30/96	10/08/96	2.93	0.42	0.44
Area 10, SEDAN Crater	10/08/96	10/15/96	1.94	0.39	0.51
Area 10, SEDAN Crater	10/15/96	10/22/96	2.15	0.40	0.50
Area 10, SEDAN Crater	10/22/96	10/29/96	1.52	0.36	0.55
Area 10, SEDAN Crater	10/29/96	11/05/96	2.12	0.41	0.56
Area 10, SEDAN Crater	11/05/96	11/12/96	1.69	0.37	0.55
Area 10, SEDAN Crater	11/12/96	11/19/96	2.06	0.40	0.54
Area 10, SEDAN Crater	11/19/96	11/26/96	0.65	0.27	0.51
Area 10, SEDAN Crater	11/26/96	12/03/96	0.80	0.29	0.52
Area 10, SEDAN Crater	12/03/96	12/10/96	2.14	0.41	0.85
Area 10, SEDAN Crater	12/10/96	12/17/96	0.66	0.28	0.79
Area 10, SEDAN Crater	12/17/96	12/26/96	1.19	0.28	0.66
Area 11, Gate 293	06/18/96	06/24/96	2.74	0.45	0.44
Area 11, Gate 293	06/24/96	07/01/96	Alpha Analysis Not Requested		
Area 11, Gate 293	07/01/96	07/09/96	2.53	0.37	0.27
Area 11, Gate 293	07/09/96	07/16/96	Bad Meter		
Area 11, Gate 293	07/16/96	07/23/96	1.39	0.32	0.41
Area 11, Gate 293	07/23/96	07/30/96	2.24	0.37	0.40
Area 11, Gate 293	07/30/96	08/06/96	2.40	0.86	1.50
Area 11, Gate 293	08/06/96	08/13/96	2.44	0.51	0.70
Area 11, Gate 293	08/13/96	08/20/96	3.39	0.56	0.68
Area 11, Gate 293	08/20/96	08/27/96	2.27	0.40	0.51

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 11, Gate 293	08/27/96	09/04/96	1.86	0.34	0.44
Area 11, Gate 293	09/04/96	09/10/96	1.70	0.40	0.60
Area 11, Gate 293	09/10/96	09/17/96	1.31	0.33	0.49
Area 11, Gate 293	09/17/96	09/24/96	1.83	0.37	0.49
Area 11, Gate 293	09/24/96	09/30/96	1.88	0.41	0.56
Area 11, Gate 293	09/30/96	10/08/96	1.88	0.34	0.43
Area 11, Gate 293	10/08/96	10/15/96	2.06	0.39	0.49
Area 11, Gate 293	10/15/96	10/22/96	2.58	0.42	0.49
Area 11, Gate 293	10/22/96	10/29/96	1.65	0.36	0.54
Area 11, Gate 293	10/29/96	11/05/96	1.77	0.38	0.54
Area 11, Gate 293	11/05/96	11/12/96	2.15	0.39	0.53
Area 11, Gate 293	11/12/96	11/19/96	1.96	0.39	0.53
Area 11, Gate 293	11/19/96	11/26/96	1.21	0.32	0.50
Area 11, Gate 293	11/26/96	12/03/96	0.93	0.30	0.53
Area 11, Gate 293	12/03/96	12/10/96	1.37	0.34	0.82
Area 11, Gate 293	12/10/96	12/17/96	1.11	0.31	0.76
Area 11, Gate 293	12/17/96	12/24/96	2.02	0.40	0.84
Area 11, Gate 293	12/24/96	12/31/96	2.01	0.39	0.84
Area 12, Camp	06/19/96	06/26/96	1.78	0.32	0.35
Area 12, Camp	06/26/96	07/03/96	Alpha Analysis Not Requested		
Area 12, Camp	07/03/96	07/10/96	2.71	0.40	0.29
Area 12, Camp	07/10/96	07/17/96	1.56	0.32	0.38
Area 12, Camp	07/17/96	07/25/96	1.75	0.32	0.35
Area 12, Camp	07/25/96	07/31/96	1.93	0.38	0.46
Area 12, Camp	07/31/96	08/07/96	2.13	0.37	0.42
Area 12, Camp	08/07/96	08/13/96	2.45	0.46	0.61
Area 12, Camp	08/13/96	08/20/96	2.81	0.44	0.52
Area 12, Camp	08/20/96	08/28/96	1.29	0.31	0.47
Area 12, Camp	08/28/96	09/04/96	1.51	0.35	0.52
Area 12, Camp	09/04/96	09/10/96	1.56	0.40	0.62
Area 12, Camp	09/10/96	09/18/96	1.61	0.33	0.43
Area 12, Camp	09/18/96	09/24/96	2.14	0.43	0.58
Area 12, Camp	09/24/96	09/30/96	1.53	0.38	0.58
Area 12, Camp	09/30/96	10/08/96	1.45	0.31	0.43
Area 12, Camp	10/08/96	10/15/96	1.34	0.34	0.50
Area 12, Camp	10/15/96	10/22/96	1.85	0.37	0.48
Area 12, Camp	10/22/96	10/29/96	1.49	0.34	0.52
Area 12, Camp	10/29/96	11/05/96	2.25	0.41	0.53
Area 12, Camp	11/05/96	11/12/96	1.72	0.36	0.53
Area 12, Camp	11/12/96	11/19/96	1.75	0.37	0.52
Area 12, Camp	11/19/96	11/26/96	0.44	0.34	0.76
Area 12, Camp	11/26/96	12/03/96	1.28	0.33	0.52
Area 12, Camp	12/03/96	12/10/96	1.29	0.32	0.78

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 12, Camp	12/10/96	12/17/96	1.37	0.33	0.75
Area 12, Camp	12/17/96	12/26/96	1.11	0.26	0.62
Area 13, Project 57	05/16/96	05/23/96	3.49	0.47	0.71
Area 13, Project 57	05/23/96	06/03/96	3.43	0.37	0.45
Area 13, Project 57	06/03/96	06/10/96	4.82	0.55	0.71
Area 13, Project 57	06/10/96	06/18/96	3.65	0.46	0.37
Area 13, Project 57	06/18/96	06/25/96	2.27	0.39	0.40
Area 13, Project 57	06/25/96	07/02/96	Alpha Analysis Not Requested		
Area 13, Project 57	07/02/96	07/09/96	2.43	0.40	0.32
Area 13, Project 57	07/09/96	07/16/96	1.31	0.36	0.57
Area 13, Project 57	07/16/96	07/23/96	2.31	0.44	0.59
Area 13, Project 57	07/23/96	07/31/96	2.35	0.37	0.38
Area 13, Project 57	07/31/96	08/06/96	2.46	0.45	0.52
Area 13, Project 57	08/06/96	08/13/96	2.97	0.47	0.56
Area 13, Project 57	08/13/96	08/20/96	2.93	0.47	0.55
Area 13, Project 57	08/20/96	08/27/96	3.09	0.49	0.58
Area 13, Project 57	08/27/96	09/04/96	1.74	0.35	0.48
Area 13, Project 57	09/04/96	09/10/96	1.36	0.40	0.66
Area 13, Project 57	09/10/96	09/17/96	1.18	0.33	0.54
Area 13, Project 57	09/17/96	09/24/96	1.60	0.34	0.48
Area 13, Project 57	09/24/96	10/01/96	2.97	0.48	0.55
Area 13, Project 57	10/01/96	10/08/96	2.55	0.44	0.80
Area 13, Project 57	10/08/96	10/16/96	2.47	0.41	0.47
Area 13, Project 57	10/16/96	10/23/96	1.80	0.40	0.56
Area 13, Project 57	10/23/96	10/29/96	2.19	0.46	0.67
Area 13, Project 57	10/29/96	11/05/96	3.87	0.53	0.54
Area 13, Project 57	11/05/96	11/12/96	Sample Missing		
Area 13, Project 57	11/12/96	11/19/96	2.04	0.42	0.59
Area 13, Project 57	11/19/96	11/27/96	0.88	0.28	0.47
Area 13, Project 57	11/27/96	12/03/96	1.04	0.39	0.72
Area 13, Project 57	12/03/96	12/10/96	1.91	0.40	0.90
Area 13, Project 57	12/10/96	12/17/96	0.91	0.32	0.85
Area 13, Project 57	12/17/96	12/23/96	2.48	0.50	1.06
Area 13, Project 57	12/23/96	12/30/96	1.76	0.37	0.80
Area 15, EPA Farm	06/19/96	06/26/96	1.62	0.34	0.40
Area 15, EPA Farm	06/26/96	07/03/96	Alpha analysis not requested		
Area 15, EPA Farm	07/03/96	07/10/96	5.39	0.58	0.31
Area 15, EPA Farm	07/10/96	07/18/96	2.12	0.35	0.35
Area 15, EPA Farm	07/18/96	07/24/96	1.73	0.37	0.45
Area 15, EPA Farm	07/24/96	07/31/96	2.62	0.42	0.43
Area 15, EPA Farm	07/31/96	08/07/96	2.10	0.38	0.43
Area 15, EPA Farm	08/07/96	08/13/96	1.95	0.43	0.62
Area 15, EPA Farm	08/13/96	08/20/96	2.95	0.46	0.53

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 15, EPA Farm	08/20/96	08/28/96	1.96	0.37	0.49
Area 15, EPA Farm	08/28/96	09/04/96	2.25	0.41	0.53
Area 15, EPA Farm	09/04/96	09/10/96	2.83	0.51	0.65
Area 15, EPA Farm	09/10/96	09/18/96	1.44	0.32	0.46
Area 15, EPA Farm	09/18/96	09/24/96	2.04	0.44	0.61
Area 15, EPA Farm	09/24/96	09/30/96	1.89	0.43	0.61
Area 15, EPA Farm	09/30/96	10/08/96	3.03	0.43	0.46
Area 15, EPA Farm	10/08/96	10/15/96	2.32	0.42	0.53
Area 15, EPA Farm	10/15/96	10/22/96	1.82	0.38	0.52
Area 15, EPA Farm	10/22/96	10/29/96	1.60	0.38	0.58
Area 15, EPA Farm	10/29/96	11/05/96	2.07	0.40	0.55
Area 15, EPA Farm	11/05/96	11/12/96	1.21	0.33	0.54
Area 15, EPA Farm	11/12/96	11/19/96	1.84	0.38	0.53
Area 15, EPA Farm	11/19/96	11/26/96	0.76	0.28	0.50
Area 15, EPA Farm	11/26/96	12/03/96	0.69	0.31	0.61
Area 15, EPA Farm	12/03/96	12/10/96	1.32	0.34	0.83
Area 15, EPA Farm	12/10/96	12/17/96	0.59	0.26	0.77
Area 15, EPA Farm	12/17/96	12/26/96	0.82	0.25	0.65
Area 16, 3545 Substation	06/20/96	06/26/96	2.05	0.39	0.51
Area 16, 3545 Substation	06/26/96	07/03/96	Alpha analysis not requested		
Area 16, 3545 Substation	07/03/96	07/10/96	1.53	0.30	0.29
Area 16, 3545 Substation	07/10/96	07/17/96	1.62	0.33	0.38
Area 16, 3545 Substation	07/17/96	07/25/96	2.10	0.35	0.34
Area 16, 3545 Substation	07/25/96	08/01/96	2.13	0.37	0.42
Area 16, 3545 Substation	08/01/96	08/07/96	1.57	0.35	0.47
Area 16, 3545 Substation	08/07/96	08/13/96	Sample head missing		
Area 16, 3545 Substation	08/13/96	08/20/96	4.34	0.53	0.52
Area 16, 3545 Substation	08/20/96	08/28/96	1.59	0.34	0.47
Area 16, 3545 Substation	08/28/96	09/04/96	2.56	0.43	0.52
Area 16, 3545 Substation	09/04/96	09/10/96	2.01	0.43	0.62
Area 16, 3545 Substation	09/10/96	09/18/96	1.07	0.28	0.44
Area 16, 3545 Substation	09/18/96	09/24/96	1.15	0.35	0.58
Area 16, 3545 Substation	09/24/96	09/30/96	1.74	0.40	0.58
Area 16, 3545 Substation	09/30/96	10/08/96	2.27	0.37	0.44
Area 16, 3545 Substation	10/08/96	10/15/96	1.58	0.36	0.51
Area 16, 3545 Substation	10/15/96	10/22/96	1.91	0.37	0.49
Area 16, 3545 Substation	10/22/96	10/29/96	0.48	0.26	0.52
Area 16, 3545 Substation	10/29/96	11/05/96	2.01	0.39	0.55
Area 16, 3545 Substation	11/05/96	11/12/96	1.33	0.34	0.54
Area 16, 3545 Substation	11/12/96	11/19/96	1.79	0.38	0.53
Area 16, 3545 Substation	11/19/96	11/26/96	1.42	0.35	0.51
Area 16, 3545 Substation	11/26/96	12/03/96	0.17	0.24	0.56
Area 16, 3545 Substation	12/03/96	12/10/96	0.90	0.31	0.85

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 16, 3545 Substation	12/10/96	12/17/96	0.73	0.28	0.79
Area 16, 3545 Substation	12/17/96	12/26/96	1.42	0.30	0.66
Area 18, Well UE-18t	06/20/96	06/27/96	2.28	0.44	0.58
Area 18, Well UE-18t	06/27/96	07/03/96	Alpha analysis not requested		
Area 18, Well UE-18t	07/03/96	07/10/96	1.67	0.32	0.31
Area 18, Well UE-18t	07/10/96	07/16/96	1.55	0.33	0.40
Area 18, Well UE-18t	07/16/96	07/25/96	2.32	0.37	0.36
Area 18, Well UE-18t	07/25/96	08/01/96	1.47	0.33	0.44
Area 18, Well UE-18t	08/01/96	08/07/96	1.73	0.38	0.50
Area 18, Well UE-18t	08/07/96	08/13/96	2.14	0.45	0.64
Area 18, Well UE-18t	08/13/96	08/20/96	3.42	0.49	0.54
Area 18, Well UE-18t	08/20/96	08/28/96	2.11	0.39	0.50
Area 18, Well UE-18t	08/28/96	09/04/96	1.84	0.39	0.55
Area 18, Well UE-18t	09/04/96	09/10/96	3.06	0.53	0.66
Area 18, Well UE-18t	09/10/96	09/18/96	1.69	0.35	0.47
Area 18, Well UE-18t	09/18/96	09/24/96	1.95	0.44	0.62
Area 18, Well UE-18t	09/24/96	09/30/96	2.76	0.50	0.61
Area 18, Well UE-18t	09/30/96	10/08/96	3.06	0.44	0.46
Area 18, Well UE-18t	10/08/96	10/15/96	1.74	0.38	0.54
Area 18, Well UE-18t	10/15/96	10/22/96	2.56	0.44	0.53
Area 18, Well UE-18t	10/22/96	10/29/96	0.77	0.31	0.58
Area 18, Well UE-18t	10/29/96	11/05/96	2.55	0.45	0.59
Area 18, Well UE-18t	11/05/96	11/12/96	1.96	0.41	0.58
Area 18, Well UE-18t	11/12/96	11/19/96	1.78	0.39	0.57
Area 18, Well UE-18t	11/19/96	11/26/96	1.08	0.33	0.55
Area 18, Well UE-18t	11/26/96	12/03/96	1.08	0.34	0.59
Area 18, Well UE-18t	12/03/96	12/10/96	0.54	0.29	0.90
Area 18, Well UE-18t	12/10/96	12/17/96	1.09	0.33	0.84
Area 18, Well UE-18t	12/17/96	12/26/96	1.08	0.28	0.67
Area 20, SCHOONER	06/20/96	06/27/96	3.55	0.53	0.60
Area 20, SCHOONER	06/27/96	07/03/96	Alpha analysis not requested		
Area 20, SCHOONER	07/03/96	07/10/96	2.63	0.42	0.33
Area 20, SCHOONER	07/10/96	07/18/96	0.91	0.26	0.39
Area 20, SCHOONER	07/18/96	07/25/96	2.19	0.40	0.43
Area 20, SCHOONER	07/25/96	08/01/96	2.30	0.42	0.47
Area 20, SCHOONER	08/01/96	08/07/96	0.92	0.31	0.53
Area 20, SCHOONER	08/07/96	08/13/96	1.67	0.44	0.70
Area 20, SCHOONER	08/13/96	08/21/96	3.58	0.49	0.52
Area 20, SCHOONER	08/21/96	08/28/96	2.20	0.45	0.61
Area 20, SCHOONER	08/28/96	09/04/96	1.81	0.41	0.59
Area 20, SCHOONER	09/04/96	09/10/96	2.08	0.48	0.71
Area 20, SCHOONER	09/10/96	09/18/96	1.84	0.38	0.51
Area 20, SCHOONER	09/18/96	09/24/96	2.66	0.52	0.68

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 20, SCHOONER	09/24/96	09/30/96	3.03	0.54	0.67
Area 20, SCHOONER	09/30/96	10/08/96	2.34	0.41	0.51
Area 20, SCHOONER	10/08/96	10/15/96	1.77	0.41	0.59
Area 20, SCHOONER	10/15/96	10/22/96	2.34	0.45	0.58
Area 20, SCHOONER	10/22/96	10/29/96	0.90	0.34	0.62
Area 20, SCHOONER	10/29/96	11/05/96	2.63	0.48	0.64
Area 20, SCHOONER	11/05/96	11/12/96	2.07	0.44	0.63
Area 20, SCHOONER	11/12/96	11/19/96	2.13	0.44	0.61
Area 20, SCHOONER	11/19/96	11/26/96	0.56	0.30	0.60
Area 20, SCHOONER	11/26/96	12/03/96	0.60	0.32	0.65
Area 20, SCHOONER	12/03/96	12/10/96	1.85	0.43	0.99
Area 20, SCHOONER	12/10/96	12/17/96	1.22	0.37	0.94
Area 20, SCHOONER	12/17/96	12/26/96	1.71	0.35	0.78
Area 20, Camp	06/20/96	06/27/96	2.23	0.41	0.53
Area 20, Camp	06/27/96	07/03/96	Alpha analysis not requested		
Area 20, Camp	07/03/96	07/10/96	1.86	0.34	0.30
Area 20, Camp	07/10/96	07/17/96	1.86	0.33	0.35
Area 20, Camp	07/17/96	07/25/96	1.33	0.31	0.39
Area 20, Camp	07/25/96	08/01/96	1.08	0.29	0.42
Area 20, Camp	08/01/96	08/07/96	1.99	0.39	0.48
Area 20, Camp	08/07/96	08/13/96	3.23	0.58	0.74
Area 20, Camp	08/13/96	08/20/96	3.30	0.48	0.53
Area 20, Camp	08/20/96	08/28/96	2.37	0.40	0.49
Area 20, Camp	08/28/96	09/04/96	2.04	0.40	0.54
Area 20, Camp	09/04/96	09/10/96	1.88	0.45	0.67
Area 20, Camp	09/10/96	09/18/96	1.30	0.31	0.45
Area 20, Camp	09/18/96	09/24/96	2.41	0.46	0.60
Area 20, Camp	09/24/96	09/30/96	2.39	0.46	0.59
Area 20, Camp	09/30/96	10/08/96	2.92	0.42	0.44
Area 20, Camp	10/08/96	10/15/96	1.95	0.39	0.51
Area 20, Camp	10/15/96	10/22/96	2.06	0.39	0.49
Area 20, Camp	10/22/96	10/29/96	0.81	0.29	0.53
Area 20, Camp	10/29/96	11/05/96	1.94	0.39	0.54
Area 20, Camp	11/05/96	11/12/96	0.66	0.28	0.53
Area 20, Camp	11/12/96	11/19/96	1.73	0.37	0.52
Area 20, Camp	11/19/96	11/26/96	0.87	0.29	0.50
Area 20, Camp	11/26/96	12/03/96	0.54	0.27	0.53
Area 20, Camp	12/03/96	12/10/96	0.32	0.24	0.81
Area 20, Camp	12/10/96	12/17/96	0.75	0.28	0.75
Area 20, Camp	12/17/96	12/26/96	0.66	0.23	0.62
Area 20, CABRIOLET	08/29/96	09/30/96	1.95	0.32	0.37
Area 20, CABRIOLET	09/30/96	11/05/96	1.41	0.26	0.33
Area 20, CABRIOLET	11/05/96	12/03/96	1.16	0.29	0.45

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 23, Building 790 No. 2	06/18/96	06/24/96	1.90	0.38	0.45
Area 23, Building 790 No. 2	06/24/96	07/01/96	Alpha analysis not requested		
Area 23, Building 790 No. 2	07/01/96	07/09/96	1.72	0.31	0.27
Area 23, Building 790 No. 2	07/09/96	07/16/96	1.95	0.36	0.40
Area 23, Building 790 No. 2	07/16/96	07/23/96	1.12	0.28	0.38
Area 23, Building 790 No. 2	07/23/96	07/30/96	3.23	0.47	0.45
Area 23, Building 790 No. 2	07/30/96	08/06/96	1.32	0.31	0.43
Area 23, Building 790 No. 2	08/06/96	08/13/96	3.18	0.47	0.53
Area 23, Building 790 No. 2	08/13/96	08/20/96	2.14	0.39	0.50
Area 23, Building 790 No. 2	08/20/96	08/27/96	2.04	0.42	0.59
Area 23, Building 790 No. 2	08/27/96	09/04/96	2.31	0.39	0.47
Area 23, Building 790 No. 2	09/04/96	09/10/96	2.05	0.45	0.65
Area 23, Building 790 No. 2	09/10/96	09/17/96	1.75	0.37	0.50
Area 23, Building 790 No. 2	09/17/96	09/24/96	1.64	0.37	0.53
Area 23, Building 790 No. 2	09/24/96	09/30/96	2.60	0.48	0.61
Area 23, Building 790 No. 2	09/30/96	10/08/96	2.78	0.43	0.48
Area 23, Building 790 No. 2	10/08/96	10/15/96	1.41	0.35	0.53
Area 23, Building 790 No. 2	10/15/96	10/22/96	2.45	0.43	0.53
Area 23, Building 790 No. 2	10/22/96	10/29/96	1.06	0.33	0.58
Area 23, Building 790 No. 2	10/29/96	11/05/96	1.34	0.34	0.54
Area 23, Building 790 No. 2	11/05/96	11/12/96	0.90	0.30	0.52
Area 23, Building 790 No. 2	11/12/96	11/19/96	2.87	0.47	0.56
Area 23, Building 790 No. 2	11/19/96	11/26/96	1.65	0.36	0.51
Area 23, Building 790 No. 2	11/26/96	12/03/96	0.76	0.29	0.53
Area 23, Building 790 No. 2	12/03/96	12/10/96	1.28	0.35	0.88
Area 23, Building 790 No. 2	12/10/96	12/17/96	1.08	0.32	0.79
Area 23, Building 790 No. 2	12/17/96	12/24/96	1.28	0.34	0.84
Area 23, Building 790 No. 2	12/24/96	12/31/96	0.94	0.32	0.89
Area 23, H & S Building	06/18/96	06/25/96	3.05	0.48	0.47
Area 23, H & S Building	06/25/96	07/01/96	Alpha analysis not requested		
Area 23, H & S Building	07/01/96	07/09/96	2.65	0.42	0.32
Area 23, H & S Building	07/09/96	07/16/96	2.26	0.44	0.49
Area 23, H & S Building	07/16/96	07/23/96	1.91	0.41	0.50
Area 23, H & S Building	07/23/96	07/30/96	3.07	0.50	0.53
Area 23, H & S Building	07/30/96	08/06/96	2.36	0.40	0.43
Area 23, H & S Building	08/06/96	08/13/96	1.80	0.39	0.55
Area 23, H & S Building	08/13/96	08/20/96	2.80	0.45	0.54
Area 23, H & S Building	08/20/96	08/27/96	2.75	0.47	0.59
Area 23, H & S Building	08/27/96	09/04/96	1.57	0.33	0.45
Area 23, H & S Building	09/04/96	09/10/96	1.04	0.38	0.69
Area 23, H & S Building	09/10/96	09/17/96	1.28	0.33	0.50
Area 23, H & S Building	09/17/96	09/24/96	1.80	0.39	0.54
Area 23, H & S Building	09/24/96	09/30/96	1.52	0.38	0.57

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 23, H & S Building	09/30/96	10/08/96	2.22	0.38	0.46
Area 23, H & S Building	10/08/96	10/15/96	2.34	0.42	0.52
Area 23, H & S Building	10/15/96	10/22/96	1.63	0.38	0.54
Area 23, H & S Building	10/22/96	10/29/96	1.72	0.37	0.54
Area 23, H & S Building	10/29/96	11/05/96	1.73	0.38	0.56
Area 23, H & S Building	11/05/96	11/12/96	1.13	0.34	0.58
Area 23, H & S Building	11/12/96	11/19/96	1.99	0.40	0.56
Area 23, H & S Building	11/19/96	11/26/96	1.15	0.33	0.52
Area 23, H & S Building	11/26/96	12/03/96	0.61	0.28	0.54
Area 23, H & S Building	12/03/96	12/10/96	2.12	0.41	0.86
Area 23, H & S Building	12/10/96	12/17/96	0.22	0.27	0.98
Area 23, H & S Building	12/17/96	12/24/96	1.29	0.33	0.81
Area 23, H & S Building	12/24/96	12/31/96	1.21	0.33	0.83
Area 25, E-MAD North	06/18/96	06/24/96	2.40	0.44	0.48
Area 25, E-MAD North	06/24/96	07/01/96	Alpha analysis not requested		
Area 25, E-MAD North	07/01/96	07/09/96	2.80	0.41	0.29
Area 25, E-MAD North	07/09/96	07/17/96	1.29	0.30	0.38
Area 25, E-MAD North	07/17/96	07/24/96	2.18	0.40	0.43
Area 25, E-MAD North	07/24/96	07/30/96	3.95	0.57	0.55
Area 25, E-MAD North	07/30/96	08/06/96	2.03	0.38	0.44
Area 25, E-MAD North	08/06/96	08/13/96	2.66	0.44	0.53
Area 25, E-MAD North	08/13/96	08/20/96	2.02	0.48	0.71
Area 25, E-MAD North	08/20/96	08/27/96	2.45	0.52	0.73
Area 25, E-MAD North	08/27/96	09/04/96	2.02	0.35	0.43
Area 25, E-MAD North	09/04/96	09/10/96	2.12	0.43	0.59
Area 25, E-MAD North	09/10/96	09/17/96	0.95	0.29	0.48
Area 25, E-MAD North	09/17/96	09/24/96	1.60	0.34	0.48
Area 25, E-MAD North	09/24/96	09/30/96	1.88	0.41	0.56
Area 25, E-MAD North	09/30/96	10/08/96	2.63	0.39	0.43
Area 25, E-MAD North	10/08/96	10/15/96	2.33	0.40	0.48
Area 25, E-MAD North	10/15/96	10/22/96	2.94	0.44	0.48
Area 25, E-MAD North	10/22/96	10/29/96	1.49	0.34	0.52
Area 25, E-MAD North	10/29/96	11/05/96	1.93	0.38	0.52
Area 25, E-MAD North	11/05/96	11/12/96	1.07	0.31	0.52
Area 25, E-MAD North	11/12/96	11/19/96	2.19	0.40	0.52
Area 25, E-MAD North	11/19/96	11/26/96	1.45	0.33	0.48
Area 25, E-MAD North	11/26/96	12/03/96	1.18	0.32	0.52
Area 25, E-MAD North	12/03/96	12/10/96	1.65	0.36	0.80
Area 25, E-MAD North	12/10/96	12/17/96	0.57	0.25	0.74
Area 25, E-MAD North	12/17/96	12/24/96	1.07	0.31	0.81
Area 25, E-MAD North	12/24/96	12/31/96	0.97	0.31	0.81
Area 25, NRDS	06/18/96	06/24/96	2.66	0.44	0.44
Area 25, NRDS	06/24/96	07/01/96	Alpha analysis not requested		

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 25, NRDS	07/01/96	07/09/96	2.09	0.34	0.27
Area 25, NRDS	07/09/96	07/17/96	2.61	0.39	0.35
Area 25, NRDS	07/17/96	07/24/96	1.10	0.28	0.40
Area 25, NRDS	07/24/96	07/30/96	1.67	0.37	0.50
Area 25, NRDS	07/30/96	08/06/96	1.79	0.35	0.43
Area 25, NRDS	08/06/96	08/13/96	4.25	0.54	0.54
Area 25, NRDS	08/13/96	08/20/96	3.27	0.47	0.52
Area 25, NRDS	08/20/96	08/27/96	2.88	0.48	0.58
Area 25, NRDS	08/27/96	09/04/96	1.58	0.33	0.47
Area 25, NRDS	09/04/96	09/10/96	2.24	0.46	0.64
Area 25, NRDS	09/10/96	09/17/96	1.10	0.31	0.50
Area 25, NRDS	09/17/96	09/24/96	2.06	0.39	0.50
Area 25, NRDS	09/24/96	09/30/96	2.22	0.44	0.58
Area 25, NRDS	09/30/96	10/08/96	2.53	0.40	0.45
Area 25, NRDS	10/08/96	10/15/96	1.90	0.38	0.50
Area 25, NRDS	10/15/96	10/22/96	1.66	0.36	0.49
Area 25, NRDS	10/22/96	10/29/96	1.36	0.35	0.55
Area 25, NRDS	10/29/96	11/05/96	2.61	0.44	0.55
Area 25, NRDS	11/05/96	11/12/96	1.15	0.32	0.54
Area 25, NRDS	11/12/96	11/19/96	2.65	0.44	0.53
Area 25, NRDS	11/19/96	11/26/96	1.21	0.32	0.50
Area 25, NRDS	11/26/96	12/03/96	1.61	0.36	0.54
Area 25, NRDS	12/03/96	12/10/96	1.92	0.38	0.82
Area 25, NRDS	12/10/96	12/17/96	0.65	0.27	0.77
Area 25, NRDS	12/17/96	12/24/96	1.52	0.35	0.82
Area 25, NRDS	12/24/96	12/31/96	2.04	0.40	0.85
Area 27, Camp	06/18/96	06/24/96	2.47	0.51	0.60
Area 27, Camp	06/24/96	07/01/96	Alpha analysis not requested		
Area 27, Camp	07/01/96	07/09/96	2.29	0.42	0.37
Area 27, Camp	07/09/96	07/17/96	1.78	0.66	1.13
Area 27, Camp	07/17/96	07/23/96	2.36	0.48	0.57
Area 27, Camp	07/23/96	07/30/96	3.17	0.53	0.57
Area 27, Camp	07/30/96	08/06/96	2.59	0.48	0.55
Area 27, Camp	08/06/96	08/13/96	2.57	0.51	0.70
Area 27, Camp	08/13/96	08/20/96	2.81	0.51	0.66
Area 27, Camp	08/20/96	09/04/96	2.19	0.30	0.33
Area 27, Camp	09/04/96	09/10/96	1.90	0.50	0.80
Area 27, Camp	09/10/96	09/17/96	1.72	0.44	0.67
Area 27, Camp	09/17/96	09/24/96	1.84	0.45	0.66
Area 27, Camp	09/24/96	09/30/96	2.16	0.52	0.78
Area 27, Camp	09/30/96	10/08/96	2.51	0.47	0.60
Area 27, Camp	10/08/96	10/15/96	1.84	0.45	0.66
Area 27, Camp	10/15/96	10/22/96	1.29	0.39	0.65

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 27, Camp	10/22/96	10/29/96	1.31	0.40	0.67
Area 27, Camp	10/29/96	11/05/96	1.36	0.43	0.73
Area 27, Camp	11/05/96	11/12/96	1.43	0.45	0.78
Area 27, Camp	11/09/96	11/26/96	No power		
Area 27, Camp	11/26/96	12/03/96	Pump failed		
Area 27, Camp	12/03/96	12/10/96	1.44	0.42	1.08
Area 27, Camp	12/10/96	12/17/96	1.01	0.37	1.02
Area 27, Camp	12/17/96	12/31/96	0.95	0.23	0.55
Area 52, DOUBLE TRACKS	05/30/96	06/06/96	5.09	0.58	0.75
Area 52, DOUBLE TRACKS	06/06/96	06/13/96	4.25	0.54	0.44
Area 52, DOUBLE TRACKS	06/13/96	06/21/96	31.90	1.43	0.43
Area 52, DOUBLE TRACKS	06/21/96	06/27/96	7.31	0.70	0.43
Area 52, DOUBLE TRACKS	06/27/96	07/03/96	Alpha analysis not requested		
Area 52, DOUBLE TRACKS	07/03/96	07/11/96	1.86	0.35	0.38
Area 52, DOUBLE TRACKS	07/11/96	07/18/96	1.65	0.36	0.45
Area 52, DOUBLE TRACKS	07/18/96	07/25/96	1.94	0.38	0.44
Area 52, DOUBLE TRACKS	07/25/96	08/02/96	1.93	0.36	0.41
Area 52, DOUBLE TRACKS	08/02/96	08/08/96	2.70	0.51	0.67
Area 52, DOUBLE TRACKS	08/08/96	08/15/96	1.78	0.41	0.61
Area 52, DOUBLE TRACKS	08/15/96	08/22/96	2.47	0.45	0.58
Area 52, DOUBLE TRACKS	08/22/96	08/29/96	9.36	0.80	0.59
Area 52, DOUBLE TRACKS	08/29/96	09/05/96	2.75	0.50	0.63
Area 52, DOUBLE TRACKS	09/05/96	09/12/96	2.05	0.43	0.61
Area 52, DOUBLE TRACKS	09/12/96	09/19/96	1.79	0.40	0.57
Area 52, DOUBLE TRACKS	09/19/96	09/27/96	2.52	0.42	0.49
Area 52, DOUBLE TRACKS	09/27/96	10/03/96	2.37	0.51	0.73
Area 52, DOUBLE TRACKS	10/03/96	10/10/96	2.64	0.48	0.61
Area 52, DOUBLE TRACKS	10/10/96	10/17/96	3.42	0.53	0.59
Area 52, DOUBLE TRACKS	10/17/96	10/24/96	1.21	0.36	0.58
Area 52, DOUBLE TRACKS	10/24/96	10/31/96	0.34	0.26	0.58
Area 52, DOUBLE TRACKS	10/31/96	11/07/96	1.24	0.38	0.64
Area 52, DOUBLE TRACKS	11/07/96	11/13/96	2.64	1.28	0.25
Area 52, DOUBLE TRACKS	11/13/96	11/21/96	Pump failure		
Area 52, DOUBLE TRACKS	11/21/96	11/28/96	0.58	0.28	0.55
Area 52, DOUBLE TRACKS	11/28/96	12/06/96	1.03	0.30	0.50
Area 52, DOUBLE TRACKS	12/06/96	12/12/96	0.82	0.35	1.03
Area 52, DOUBLE TRACKS	12/12/96	12/20/96	2.77	0.43	0.80
Area 52, DOUBLE TRACKS	12/20/96	12/27/96	2.12	0.42	0.89
Area 52, CLEAN SLATE III	05/30/96	06/06/96	5.05	0.55	0.69
Area 52, CLEAN SLATE III	06/06/96	06/13/96	3.76	0.48	0.39
Area 52, CLEAN SLATE III	06/13/96	06/20/96	3.24	0.45	0.39
Area 52, CLEAN SLATE III	06/20/96	06/27/96	2.39	0.39	0.39
Area 52, CLEAN SLATE III	06/27/96	07/03/96	Alpha analysis not requested		

Attachment 1.1 (Gross Alpha in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL × 10^{-15} Concentration	Standard Deviation	Detection Limit
Area 52, CLEAN SLATE III	07/03/96	07/11/96	1.95	0.33	0.34
Area 52, CLEAN SLATE III	07/11/96	07/18/96	2.31	0.41	0.42
Area 52, CLEAN SLATE III	07/18/96	07/25/96	1.66	0.33	0.39
Area 52, CLEAN SLATE III	07/25/96	08/01/96	1.77	0.35	0.42
Area 52, CLEAN SLATE III	08/01/96	08/08/96	2.57	0.44	0.55
Area 52, CLEAN SLATE III	08/08/96	08/15/96	4.16	0.53	0.53
Area 52, CLEAN SLATE III	08/15/96	08/22/96	3.55	0.50	0.54
Area 52, CLEAN SLATE III	08/22/96	08/29/96	2.03	0.40	0.54
Area 52, CLEAN SLATE III	08/29/96	09/05/96	2.60	0.45	0.56
Area 52, CLEAN SLATE III	09/05/96	09/11/96	1.29	0.39	0.66
Area 52, CLEAN SLATE III	09/11/96	09/19/96	1.21	0.30	0.46
Area 52, CLEAN SLATE III	09/19/96	09/26/96	3.61	0.49	0.49
Area 52, CLEAN SLATE III	09/26/96	10/03/96	2.69	0.46	0.56
Area 52, CLEAN SLATE III	10/03/96	10/10/96	2.90	0.45	0.52
Area 52, CLEAN SLATE III	10/10/96	10/17/96	4.29	0.54	0.52
Area 52, CLEAN SLATE III	10/17/96	10/24/96	1.98	0.39	0.50
Area 52, CLEAN SLATE III	10/24/96	10/31/96	1.18	0.32	0.51
Area 52, CLEAN SLATE III	10/31/96	11/07/96	2.18	0.41	0.56
Area 52, CLEAN SLATE III	11/07/96	11/14/96	3.76	0.50	0.50
Area 52, CLEAN SLATE III	11/14/96	11/21/96	1.29	0.34	0.54
Area 52, CLEAN SLATE III	11/21/96	11/28/96	1.42	0.35	0.53
Area 52, CLEAN SLATE III	11/28/96	12/06/96	2.04	0.37	0.49
Area 52, CLEAN SLATE III	12/06/96	12/12/96	1.20	0.38	1.00
Area 52, CLEAN SLATE III	12/12/96	12/20/96	1.85	0.36	0.75
Area 52, CLEAN SLATE III	12/20/96	12/27/96	2.74	0.45	0.86
Area 52, CLEAN SLATE I	08/08/96	08/15/96	2.83	0.45	0.52
Area 52, CLEAN SLATE I	08/15/96	08/22/96	3.69	0.49	0.52
Area 52, CLEAN SLATE I	08/22/96	08/29/96	2.64	0.43	0.79
Area 52, CLEAN SLATE I	08/29/96	09/05/96	3.05	0.47	0.54
Area 52, CLEAN SLATE I	09/05/96	09/11/96	1.47	0.40	0.64
Area 52, CLEAN SLATE I	09/11/96	09/19/96	3.46	0.45	0.45
Area 52, CLEAN SLATE I	09/19/96	09/26/96	2.99	0.45	0.50
Area 52, CLEAN SLATE I	09/26/96	10/03/96	3.11	0.48	0.56
Area 52, CLEAN SLATE I	10/03/96	10/10/96	3.36	0.49	0.54
Area 52, CLEAN SLATE I	10/10/96	10/17/96	3.75	0.52	0.53
Area 52, CLEAN SLATE I	10/17/96	10/24/96	2.90	0.46	0.51
Area 52, CLEAN SLATE I	10/24/96	10/31/96	1.25	0.33	0.51
Area 52, CLEAN SLATE I	10/31/96	11/07/96	2.22	0.42	0.57
Area 52, CLEAN SLATE I	11/07/96	11/14/96	0.12	0.20	0.51
Area 52, CLEAN SLATE I	11/14/96	11/28/96	0.55	0.17	0.28
Area 52, CLEAN SLATE I	11/28/96	12/06/96	1.74	0.35	0.50
Area 52, CLEAN SLATE I	12/06/96	12/12/96	0.89	0.36	1.03
Area 52, CLEAN SLATE I	12/12/96	12/20/96	1.60	0.35	0.77
Area 52, CLEAN SLATE I	12/20/96	12/27/96	2.47	0.44	0.88

2.0 ONSITE GROSS BETA IN AIR

Forty-nine air sampling locations on the Nevada Test Site (NTS) were monitored for gross beta in air during 1996. The sampling units were equipped with glass-fiber filters and had an air flow rate of 140 L/m (5cfm). The filters were typically changed after one week of operation. The glass-fiber filter was analyzed by gamma spectroscopy and, after a five to seven day wait, for radon progeny decay, gross beta, and gross alpha activity. More details on the air sampling activities on the NTS can be found in Chapters 4 and 5 of the U.S. Department of Energy, Nevada Operations Office (DOE/NV), Annual Site Environmental Report - 1996, (ASER) DOE/NV/11718-137.

The 1995 data report describes a number of changes made to the monitoring network in 1995 that resulted in the closing of 21 monitoring locations. In 1996, seven new air monitoring locations were established. A Waste Examination Facility (WEF) is under construction just south of the entrance to the Area 5 Radiological Waste Management Site (RWMS-5). The WEF north and the WEF south air monitoring locations were installed in October 1996 for preoperational monitoring of this facility. At the beginning of 1996, a monitoring station was installed at the Project 57 location. Project 57 was a safety shot experiment conducted on April 24, 1957, in Area 13. Currently this location is being considered for remediation, and air monitoring data is useful for planning remediation activities and evaluating the results of the remedial work. Area 13 is now a part of the Nellis Air Force Range Complex. The Project 57 location is approximately six miles north of the northeast corner of the NTS. In August of 1966, a new air monitoring station was established adjacent to the CABRIOLET test location. This test was a cratering experiment conducted on January 26,1968. This location is on the west boundary of Area 20, approximately halfway between the north and south boundaries of Area 20. Area 52 is approximately 27 miles north of the northwest corner of the NTS. The DOUBLE TRACKS and CLEAN SLATE III air sampling locations were established in Area 52 in December of 1995. The CLEAN SLATE I air sampling location was established in August of 1996. Figure 2.1 shows the locations of the air monitoring stations except for the new Area 52 locations, which are off this map to the north.

Sampling locations, sampling dates, measured concentrations, analytic standard deviations, and analytic detection limits for gross beta in air samples collected in 1996 appear in Attachment 2.1. (All figures, tables, and attachments are located at the end of each chapter.) Descriptive statistics for each station and for all stations combined are given in Table 2.1. The median detection limit for all data combined is 1.53×10^{-15} µCi/mL and only two of the 2,268 results are less than the individual detection limits. None of the 1996 gross beta in air results are negative. In Table 2.1 "Mud Plant" refers to a concrete batch mixing facility. The notation "RWMS TP Building" refers to the Transuranic Pad Building at the Radiological Waste Management Site. NRDS, a historical acronym for activities that occurred in Area 25, is now used to specify the group of administrative buildings in the center of Area 25. Table 2.2 gives descriptive statistics for the NTS operational areas, and Figure 2.2 is a thematic map showing the pattern of area averages of gross beta in air. The ranges for the thematic patterns were chosen to be five quantiles of the data, thus 20 percent of the data is in each range.

Figure 2.3 displays a lognormal probability plot of all the 1996 gross beta in air data, sampling stations, and sampling dates combined, except the three smallest values. This plot shows a very good fit to a lognormal distribution; thus, all statistical hypothesis testing have been done using logarithms of the data values. The data in previous years have also been lognormally distributed. A two way analysis of variance (ANOVA), using the natural logarithm of the gross beta concentrations as the response and sampling station and week of the year as factors,

showed very significant differences between stations and between weeks with no interaction. To simplify this analysis somewhat, the weeks were grouped into months, and the sampling stations were grouped into the NTS operational areas. The sampling stations are nested within the operational areas, and the weeks are nested within months, but this nesting could not be used in the ANOVA test because it results in rank deficient designs. The week was approximated by dividing the day of the year by seven and then rounding. The day of the year is the number of days between the earliest start date (at Well ER 3-1 on December 18, 1995) and the start date of a result. The month was approximated by dividing the day of the year by 30.5 and then rounding. The two way ANOVA using months and operational areas as the factors also showed very significant differences between months and between areas and no interaction. The program used for the two way analyses of variance does not provide for an investigation of patterns in the data that contribute to the significance found in the analysis. To accomplish such investigations, one way analyses of variance were done for each of the factors used in the two way analyses.

Table 2.3 displays the one way ANOVA results for differences between operational areas. The plot of means and confidence intervals has been ordered by increasing values of the mean of the logarithms of each area. The ANOVA table shows a very significant difference between areas. The plot of confidence intervals shows no clustering of mean values; rather there is a gradual increase from the lowest mean to the highest. Tukey's multiple comparison test was used to determine the pattern of means that resulted in the high significance of the ANOVA. This test only showed that the lowest means are significantly different from the highest means, a result which could be anticipated from a visual examination of the confidence intervals. Figure 2.2 gives similar results; however, in this figure, the mean of the gross beta concentrations for each area is used, while Table 2.3 shows the means of the logarithms of the data for each area. Figure 2.4 displays boxplots of the gross beta values (not the logarithms) by operational areas. This figure shows substantial overlap in the ranges of data values between the areas; thus, the statistical significance of the differences between areas may be of no operational significance.

Table 2.4 displays the one way ANOVA for differences in gross beta results between month of sampling. The ANOVA table indicates a very significant difference between month of sampling. The confidence interval portion of the table shows a pattern that is somewhat sinusoidal in shape, with a low point in March or April and a high point in August or September. This pattern suggest an increasing trend in gross beta concentrations during the warm months of the year and a decreasing trend during the cooler months. The thirteenth month in this plot results from the fact that sampling dates started in the middle of December of 1995. Figure 2.4 is a time series plot of all the 1996 gross beta in air results. In this figure, the data values, not their logarithms, are used. The line in this figure is a "locally weighted scatterplot smoother" line. This is a statistical tool for visualizing any trend that may be in the data. This line shows a sinusoidal trend with a low point about the beginning of springtime and a high point about the beginning of autumn. While this figure shows a correlation between higher temperature and rising gross beta concentrations and a decrease for falling temperatures, it does not establish a cause and effect relationship. This type of trend was not seen in the previous five years data; thus, a simple true correlation between temperature and gross beta levels is doubtful.

A sense of the accuracy of the gross beta in air measurements can be obtained from the empirical coefficients of variation which is the analytic standard deviation divided by the corresponding measured concentration. A histogram of these coefficients appears in Figure 2.6 for 1996 gross beta in air. One empirical coefficient is omitted from this histogram, a value of 3.84 that occurred at Area 12 for the measurement beginning April 25, 1996. This value is associated with the smallest measured value and is more of a representation of the measured value than of the analytical error. In most of the data cases the empirical coefficient of variation is 0.1 or less, indicating that the standard deviation tends to be at least an order of magnitude smaller than the measured concentration.

Figure 2.7 is a histogram of all detection limits for the 1996 gross beta in air data. Because of the scale of the ordinate of this figure, the largest values of the detection limit are not seen. There are 15 values above 5 in Figure 2.7 and the maximum is 11.1 $\mu Ci/mL \times 10^{-15}$. The detection limits are not normally distributed, nor are they lognormally distributed; thus, not much statistically can be done with them other than graphical presentations. Figure 2.7 shows that almost all detection limits are less than about 3×10^{-15} µCi/mL. The detection limits should be compared to Figure 2.3, the lognormal probability plot of the gross beta concentrations. Such a comparison shows that, in general, the gross beta concentrations are an order of magnitude larger than the detection limits.

HISTORICAL TRENDS

Since 1966, when annual environmental reports began, 70 different locations on the NTS have been used for gross beta in air monitoring. Were a complete analysis of historical trends for all sampling locations included, in addition to the current results, the resulting document would be unwieldy. The five sampling locations used continuously since the beginning of air monitoring in 1966 were selected for analysis of historical trends. Table 2.5 gives the annual averages from these five stations along with the number of active air sampling stations for each year and the annual average for all sampling locations combined for each year. This table does not include the three new sampling locations on the Tonopah Test Range Area 52; thus, for 1996 there are 46 sampling locations in the historical part of this chapter and 49 sampling locations in the annual report part. The Area 52 locations are not geographically a part of the NTS. The five selected stations are:

- Well 5B in Area 5 and located close to the southeast corner of the NTS.
- CP-6 (Building 6 at the Control Point) in Area 6 and located close to the center of the NTS.
- Gate 700 South in Area 10 and located close to the northeast corner of the NTS.
- Area 12 Complex located in the north central part of the NTS.
- Area 27 Cafeteria located in the south central part of the NTS.

The map in Figure 2.1 shows that relatively few air sampling locations have been located on the western side of the NTS. Sampling locations are usually chosen to monitor operational activities on the NTS and most such activities have been located on the eastern side. Figure 2.8 is a time series plot of the annual averages from the five selected stations. This figure also contains a "locally weighted scatterplot smoother" line, which is a statistical tool for displaying trends in data.

The line in Figure 2.8 suggests a trend peaking in 1971, then a steady decrease in annual averages until about 1983 when a level of about 20×10^{-15} µCi/mL was reached. Since 1982, the annual averages have remained at or slightly less than the 20×10^{-15} µCi/mL level, except for the peak in 1986. Four noticeable peaks of annual average gross beta levels may be seen in Figure 2.8.

- A significant peak occurred in 1971. This is probably attributable to the BANEBERRY event, which was detonated on December 18, 1970, and in which radioactive particles were accidently vented to the atmosphere. This event was located in the southwest section of Area 8 of the NTS.
- A peak occurred in 1977. This is probably attributable to foreign nuclear testing.
- A peak occurred in 1981. This is probably attributable to foreign nuclear testing
- A noticeable increase in annual average gross beta occurred in 1986. This is probably attributable to the accident at Chernoble.

CONCLUSIONS

Since about 1982, gross beta in air levels at the NTS have been uniformly low and essentially at world-wide background, except for a slight increase in 1986 that can be attributed to the Chernoble accident. Almost all values are well above analytical detection limits; thus, the data values are valid measures of environmental exposure levels. Statistically significant differences are found between locations, operational areas, and sample collection dates; however, these differences do not appear to follow any meaningful pattern, and their magnitude is too small to be of any operational significance.

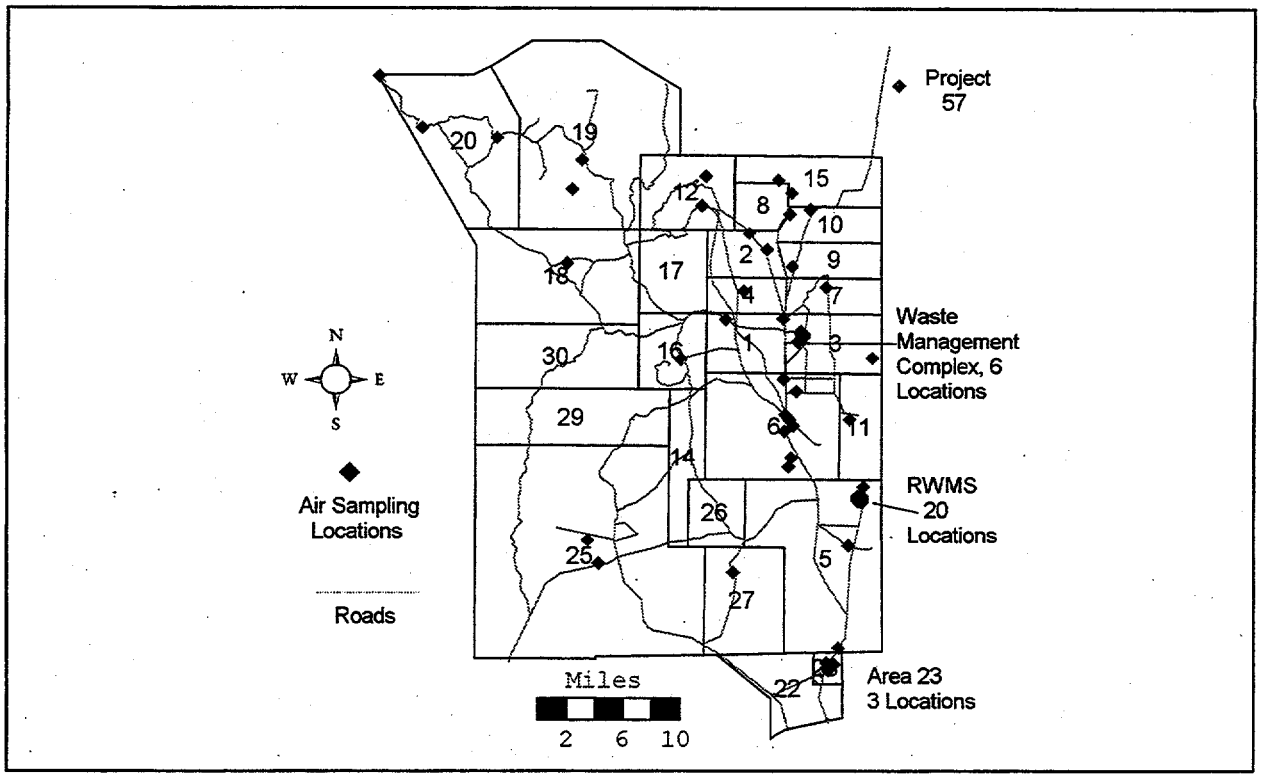


Figure 2.1 Locations of Air Sampling Stations on NTS

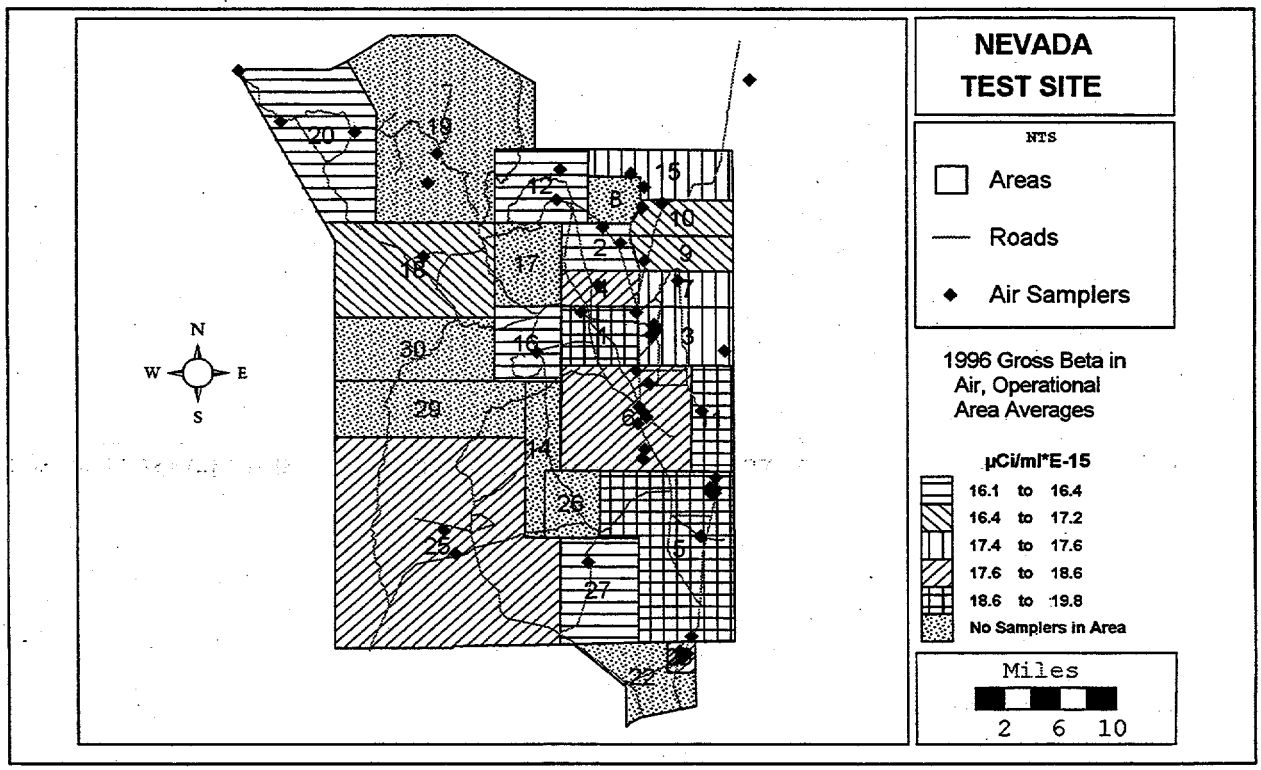


Figure 2.2 Thematic Map of 1996 Gross Beta in Air

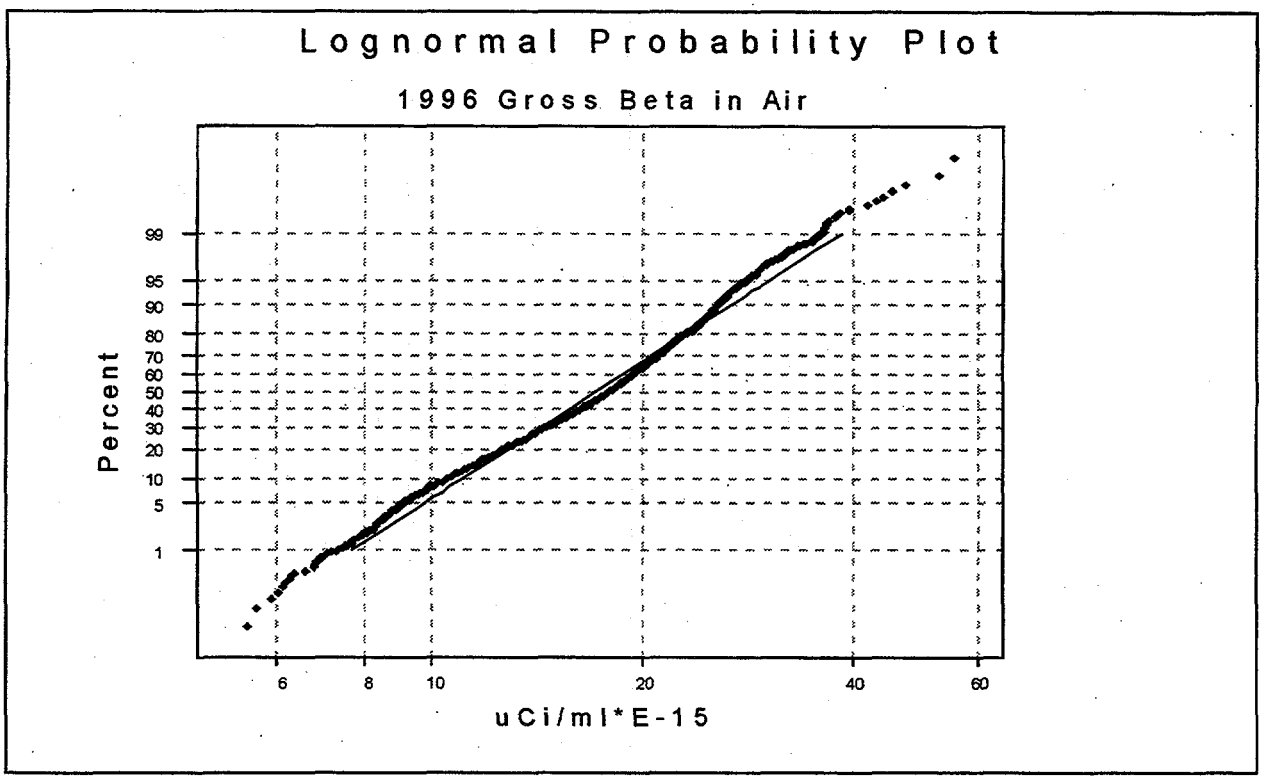


Figure 2.3 Probability Plot for All Stations and Dates Combined

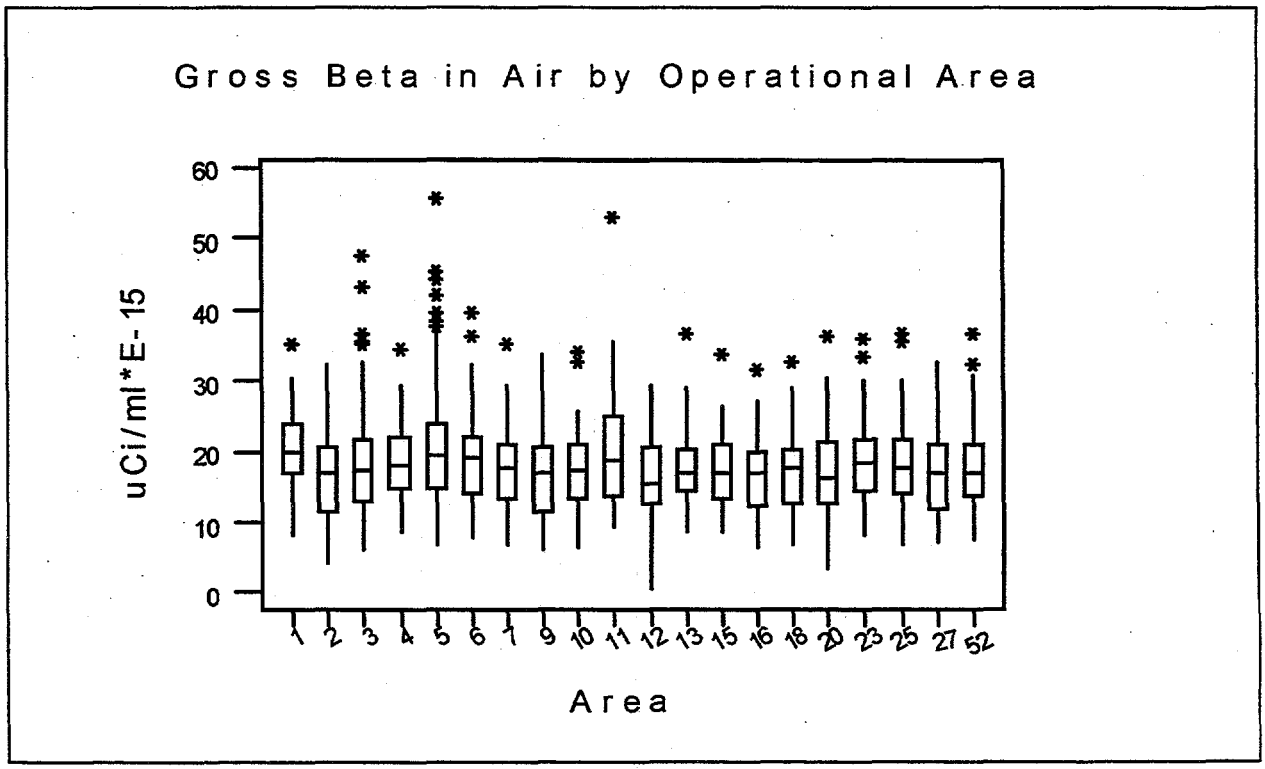


Figure 2.4 Boxplot of Gross Beta in Air by Area

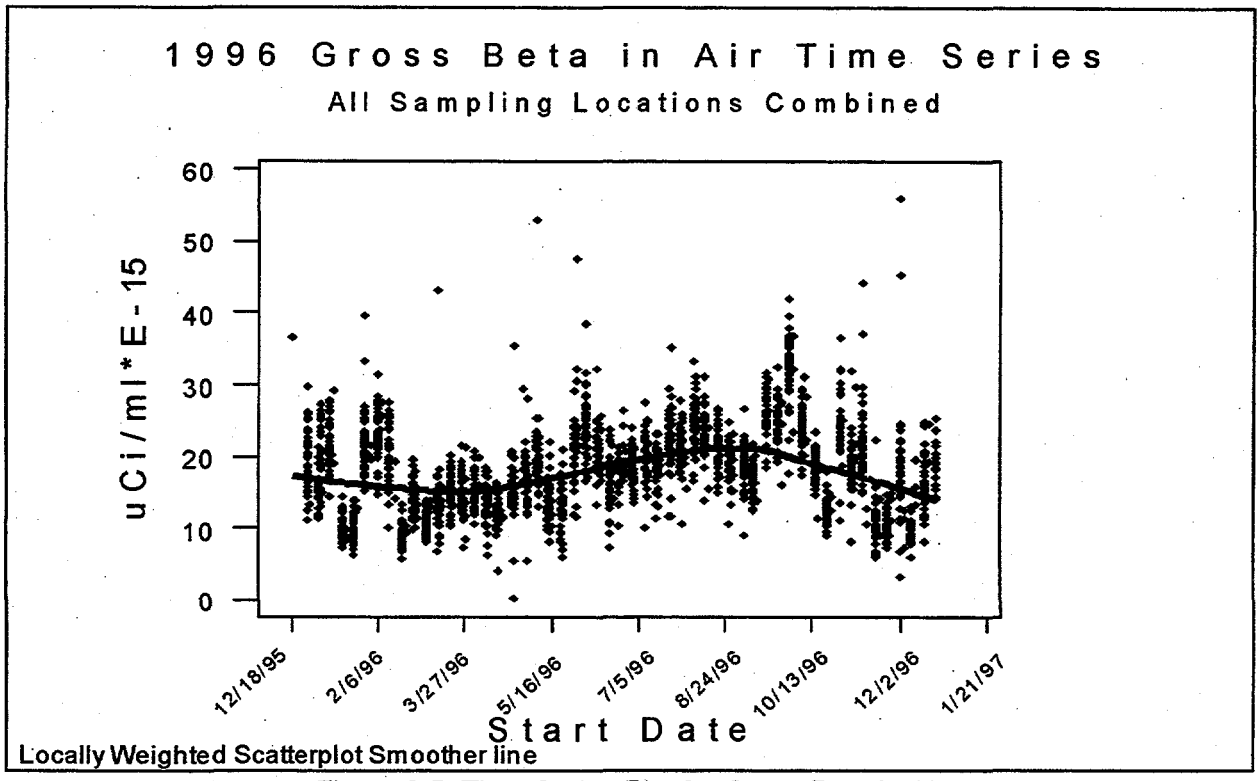


Figure 2.5 Time Series Plot for Gross Beta in Air

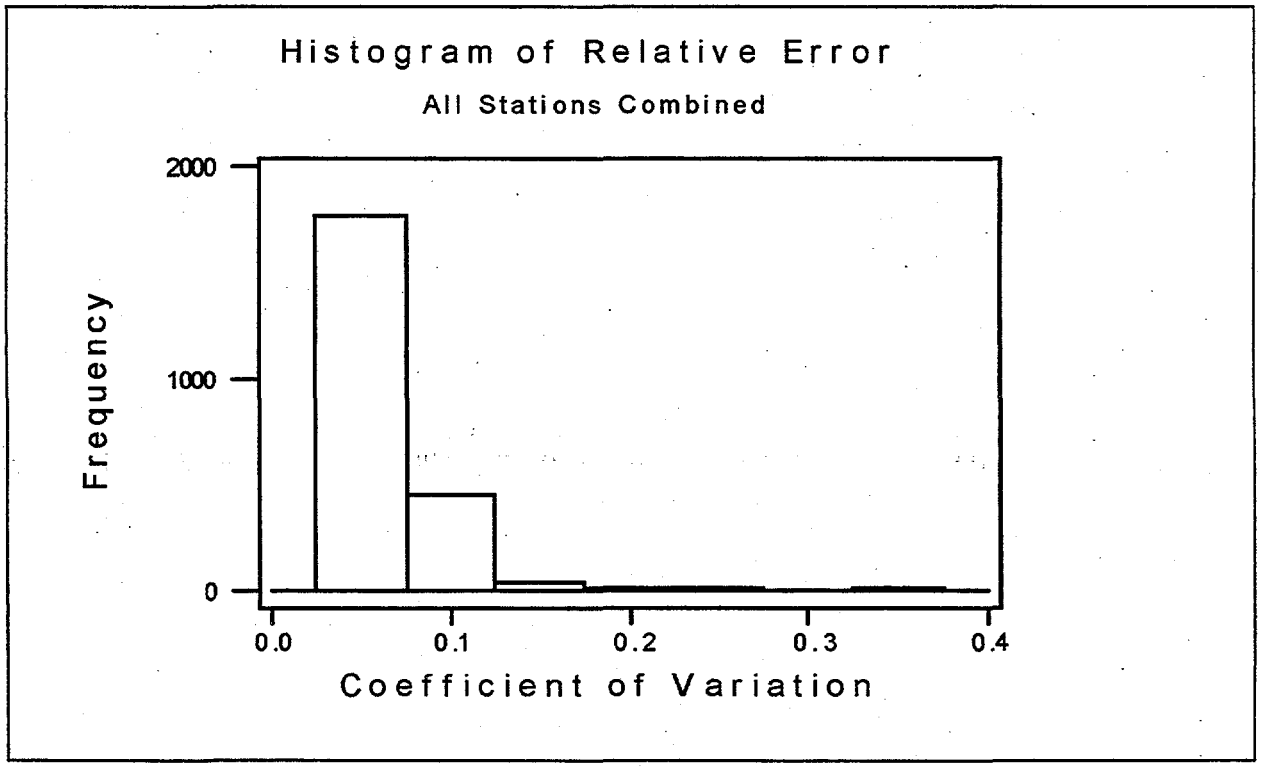


Figure 2.6 Histogram of 1996 Gross Beta in Air Coefficients of Variation

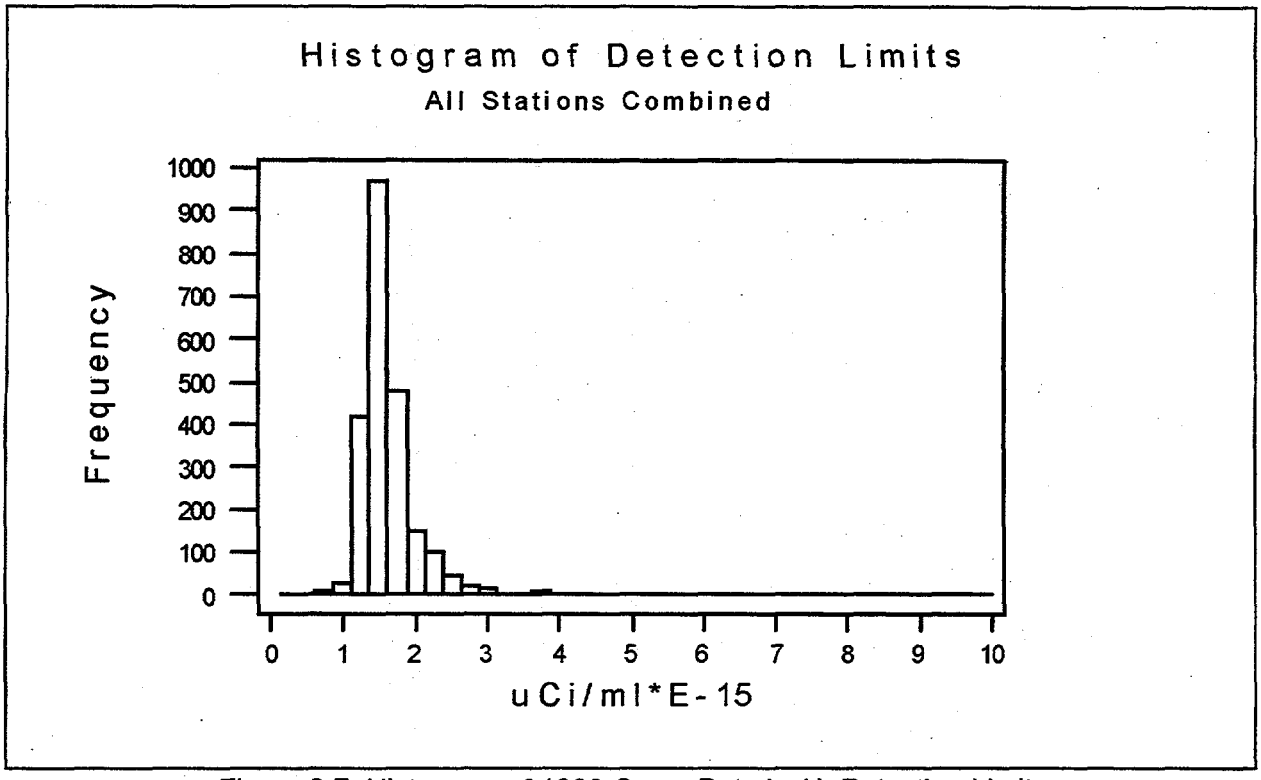


Figure 2.7 Histogram of 1996 Gross Beta in Air Detection Limits

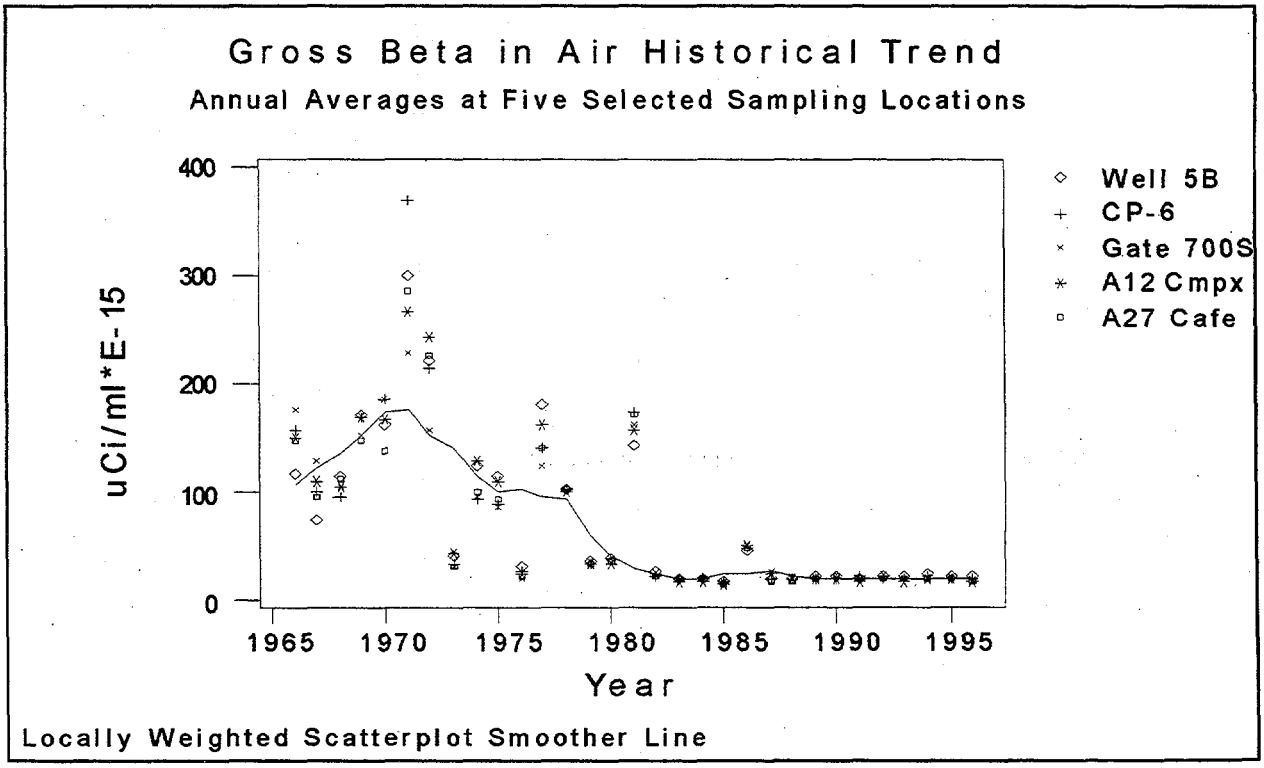


Figure 2.8 Historical Time Series, All Selected Stations Combined

Table 2.1 Descriptive Statistics for Gross Beta in Air by Sampling Location, $\mu Ci/mL \times 10^{-15}$

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
BJY	51	19.81	20.00	5.76	8.30	35.10
Area 2, Camp	50	17.79	17.35	5.41	8.47	32.10
2-1 Substation	51	14.96	16.10	6.16	4.10	10.50
U-3ah/at South	50	15.11	15.25	4.28	7.03	26.10
U-3ah/at East	50	17.17	16.75	5.30	7.51	19.90
U-3ah/at North	45	16.96	16.00	5.74	8.05	32.10
U-3ah/at West	50	16.26	16.40	5.05	6.87	26.40
Mud Plant	51	20.87	19.80	7.82	8.53	47.50
Well ER 3-1	49	19.13	20.40	6.98	6.03	36.60
Bunker T-4	50	18.62	18.15	5.63	8.61	34.50
WEF North	3	18.43	18.60	6.55	11.80	24.90
WEF South	4	24.40	24.30	6.75	18.00	31.00
RWMS Pit 5	50	17.52	17.00	5.38	6.78	30.80
RWMS No. 4	51	19.82	19.90	6.09	10.10	36.90
RWMS No. 5	43	20.24	19.70	5.37	11.60	35.60
RWMS No. 6	52	19.22	19.55	5.80	8.07	36.50
RWMS No. 7	39	17.53	17.30	5.58	8.34	35.10
RWMS No. 8	51	19.29	19.90	5.17	10.20	31.50
RWMS No. 9	41	19.62	19.40	6.44	8.79	37.90
DOD Pad	51	20.18	19.10	6.85	9.50	42.00
RWMS No. 3	43	20.16	18.50	5.63	7.63	38.50
RWMS No. 1	52	18.73	18.90	5.27	8.55	31.90
RWMS TP Bldg. North	51	22.25	22.60	9.75	6.92	55.80
RWMS TP Bldg. North	50	19.60	18.20	8.23	8.04	45.40
Well 5B	52	20.69	21.30	5.84	9.39	36.10
Yucca	47	18.84	20.20	5.33	9.73	32.30
CP 6	51	18.69	19.50	6.16	7.82	36.30
Well 3	52	18.06	18.70	6.16	8.24	39.60
UE-7ns	51	17.48	17.60	5.66	6.57	35.30
Area 9, 9-300	53	16.79	17.10	5.86	6.11	33.80
Gate 700 South	50	16.92	17.25	5.48	7.92	32.80
SEDAN Crater	52	17.54	17.25	5.48	6.16	34.20
Gate 293	52	19.84	18.90	7.33	8.25	53.00
Area 12, Camp	51	16.60	15.60	5.70	0.34	29.20
Project 57	51	17.84	17.00	5.40	8.35	36.70
EPA Farm	51	17.50	17.00	5.51	8.36	33.70
3545 Substation	48	16.13	16.90	5.62	6.30	31.70
Well UE-18t	49	17.17	17.50	5.45	6.83	32.50
SCHOONER	48	19.26	19.35	5.99	8.76	36.40
Area 20, Camp	52	14.89	15.05	5.74	3.72	29.50
CABRIOLET	3	14.50	17.50	5.37	8.30	17.70
Bldg. 790 No. 2	53	17.72	18.10	5.65	8.64	36.00

Table 2.1 (Descriptive Statistics for Gross Beta in Air by Sampling Location, μCi/mL × 10^{-15}, cont.)

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
H & S Bldg.	53	19.50	19.10	5.63	8.33	33.40
E-MAD North	52	18.01	18.35	5.64	6.89	36.80
NRDS	53	17.66	16.20	6.02	6.83	35.70
Area 27, Camp	47	16.57	16.80	5.62	7.15	32.60
DOUBLE TRACKS	49	16.09	15.60	4.11	7.43	25.70
CLEAN SLATE III	52	18.32	18.10	5.67	9.44	32.30
CLEAN SLATE I	18	21.29	21.90	7.04	10.70	36.70
All Stations Combined	2268	18.23	18.00	6.14	0.34	55.80

Table 2.2 Descriptive Statistics for Gross Beta in Air by Operational Areas, μCi/mL × 10^{-15}

Area Number	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	51	19.81	20.00	5.76	8.30	35.10
2	101	16.36	16.80	5.94	4.10	32.10
3	295	17.60	17.30	6.25	6.03	47.50
4	50	18.62	18.15	5.63	8.61	34.50
5	633	19.66	19.40	6.48	6.78	55.80
6	150	18.52	19.30	5.88	7.82	39.60
7	51	17.48	17.60	5.66	6.57	35.30
8	0					
9	53	16.79	17.10	5.86	6.11	33.80
10	102	17.24	17.25	5.46	6.16	34.20
11	52	19.84	18.90	7.33	9.25	53.00
12	51	16.60	15.60	5.70	0.34	29.20
13	51	17.84	17.00	5.40	8.35	36.70
14	0					
15	51	17.49	17.00	5.51	8.36	33.70
16	48	16.13	16.90	5.62	6.30	31.70
17	0					
18	49	17.17	17.50	5.45	6.83	32.50
19	0					
20	103	16.92	16.30	6.20	3.27	36.40
22	0					
23	106	18.61	18.50	5.62	8.33	36.00
25	105	17.83	17.50	5.81	6.83	36.80
26	0					
27	47	16.57	16.80	5.62	7.15	32.60
29	0					
30	0					
52	119	17.85	17.10	5.58	7.43	36.70

Table 2.3 One Way ANOVA on Natural Log of Gross Beta Results for Differences Between Operational Areas, µCi/mL

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Statistic	p-Value
Area	19	11.106	0.585	4.65	0.000
Error	2248	282.749	0.126		
Total	2267	293.854			

Area	N	Mean of Log	Standard Deviation
12	51	-31.833	0.623
2	101	-31.820	0.414
16	48	-31.824	0.378
27	47	-31.789	0.350
20	103	-31.785	0.408
9	53	-31.780	0.362
10	102	-31.748	0.350
18	49	-31.748	0.337
15	51	-31.728	0.326
3	295	-31.733	0.359
7	51	-31.731	0.337
25	105	-31.714	0.345
52	119	-31.704	0.310
13	51	-31.701	0.299
6	150	-31.673	0.336
23	106	-31.663	0.319
4	50	-31.660	0.310
5	633	-31.615	0.337
11	52	-31.609	0.338
1	51	-31.600	0.324

Pooled Standard Deviation = 0.355

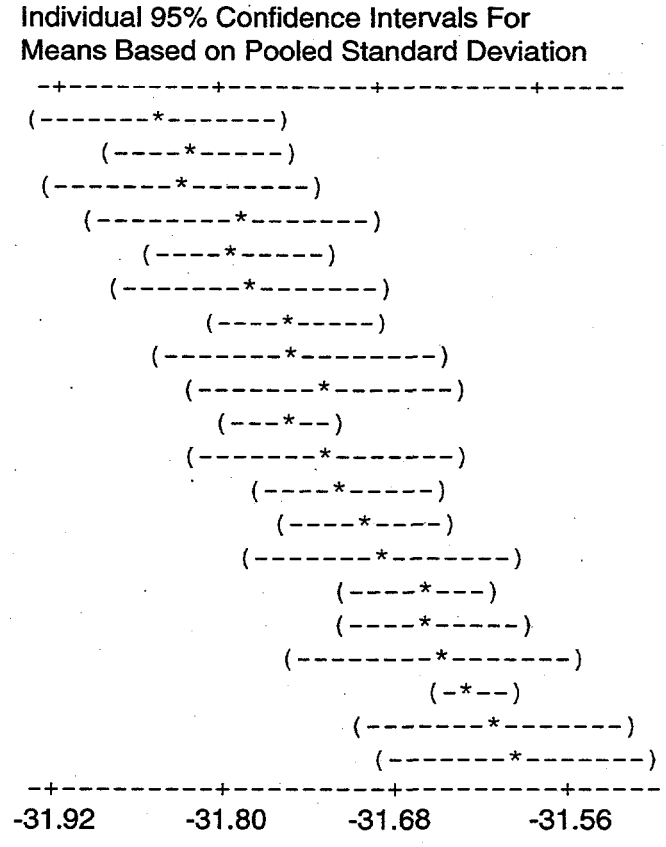


Table 2.4 One Way ANOVA on Natural Log of Gross Beta Results for Differences Between Month of Sample Collection, µCi/mL

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Statistic	p-Value
Month	12	97.6893	8.1408	93.58	0.000
Error	2255	196.1649	0.0870		
Total	2267	293.8541			

Table 2.4 (One Way ANOVA on Natural Log of Gross Beta Results for Differences Between Month of Sample Collection, µCi/mL, cont.)

Month	N	Mean of Log	Standard Deviation
1	82	-31.607	0.246
2	176	-31.868	0.418
3	218	-31.870	0.393
4	173	-31.868	0.210
5	202	-31.850	0.388
6	185	-31.689	0.343
7	211	-31.624	0.189
8	171	-31.477	0.197
9	229	-31.558	0.180
10	183	-31.259	0.183
11	215	-31.605	0.280
12	161	-32.089	0.355
13	62	-31.699	0.229

Pooled Standard Deviation = 0.295

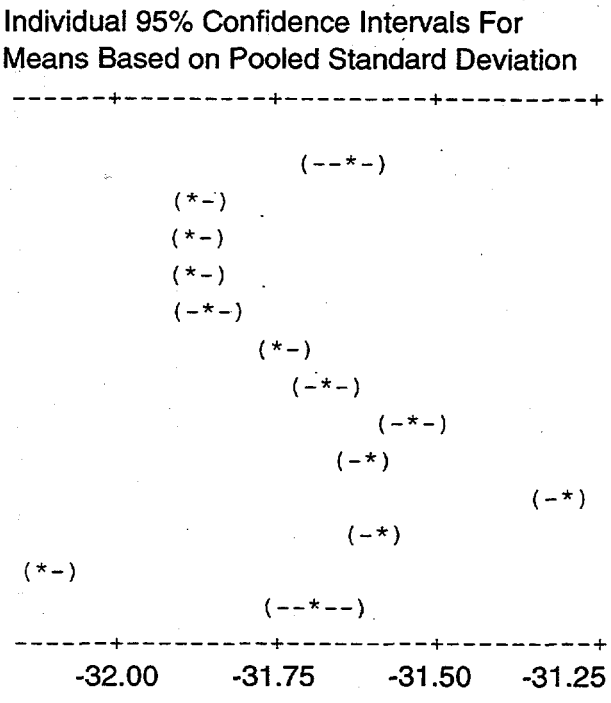


Table 2.5 Gross Beta in Air Historical Annual Averages at Selected Locations and for All Active Sampling Locations Combined, µCi/mL x 10^{-15}

Year	Well 5B Area 5	CP-6 Area 6	Gate 700S Area 10	Area 12 Complex	Area 27 Cafeteria	Number of Stations	Average of All Stations
1966	116.0	157.0	176.0	149.0	147.0	9	135.1
1967	74.7	98.9	128.0	110.0	94.2	14	104.5
1968	115.0	96.2	105.0	104.0	113.0	16	173.2
1969	172.0	170.0	153.0	170.0	148.0	16	171.0
1970	163.0	185.0	186.0	176.0	139.0	17	163.7
1971	300.0	370.0	229.0	266.0	286.0	19	337.7
1972	222.0	215.0	156.0	243.0	226.0	19	304.5
1973	41.0	34.0	31.0	42.0	30.0	19	48.2
1974	123.0	93.0	96.0	129.0	99.0	20	120.7
1975	115.0	87.0	85.0	110.0	93.0	20	97.1
1976	31.0	27.0	19.0	24.0	22.0	20	25.0
1977	181.0	141.0	123.0	162.0	141.0	20	168.9
1978	102.0	102.0	101.0	101.0	102.0	24	97.8
1979	36.0	34.0	35.0	33.0	33.0	30	33.4

Table 2.5 (Gross Beta in Air Historical Annual Averages at Selected Locations and for All Active Sampling Locations Combined, $\mu Ci/mL \times 10^{-15}$, cont.)

Year	Well 5B Area 5	CP-6 Area 6	Gate 700S Area 10	Area 12 Complex	Area 27 Cafeteria	Number of Stations	Average of All Stations
1980	37.0	39.0	37.0	34.0	36.0	40	38.4
1981	142.0	173.0	161.0	157.0	171.0	42	158.0
1982	25.0	22.0	21.0	24.0	22.0	42	23.0
1983	18.0	18.0	18.0	16.0	18.0	42	17.8
1984	19.0	18.0	18.0	17.0	18.0	42	18.7
1985	16.0	16.0	17.0	15.0	15.0	42	17.2
1986	46.0	48.0	50.0	49.0	48.0	42	48.6
1987	18.0	18.0	27.0	24.0	16.0	43	24.7
1988	20.0	19.0	18.0	19.0	17.0	45	19.8
1989	21.0	18.0	19.0	19.0	19.0	52	21.9
1990	20.4	19.1	18.3	18.2	20.3	52	19.0
1991	19.6	20.4	18.2	16.8	19.3	53	19.7
1992	20.5	18.1	18.0	20.9	18.0	53	19.6
1993	20.8	19.3	19.9	17.7	18.2	52	20.0
1994	23.0	22.0	20.0	19.0	20.0	54	20.7
1995	21.0	19.7	19.6	18.4	19.3	57	19.6
1996	20.7	18.7	16.9	16.6	16.6	46	18.2

Attachment 2.1 Gross Beta in Air - 1996

Sampling Location	Sampling Period Start	End	µCi/mL x 10^{-15} Concentration	Standard Deviation(s)	Detection Limit
Area 1, BJY	12/26/95	01/03/96	19.80	1.04	1.47
Area 1, BJY	01/03/96	01/08/96	20.70	1.53	2.42
Area 1, BJY	01/08/96	01/16/96	23.90	1.11	1.51
Area 1, BJY	01/16/96	01/22/96	11.60	1.17	2.01
Area 1, BJY	01/22/96	01/29/96	8.30	0.97	1.69
Area 1, BJY	01/29/96	02/05/96	25.40	1.23	1.69
Area 1, BJY	02/05/96	02/12/96	25.60	1.24	1.69
Area 1, BJY	02/12/96	02/20/96	24.10	1.12	1.51
Area 1, BJY	02/20/96	02/26/96	11.00	1.17	2.02
Area 1, BJY	02/26/96	03/04/96	16.40	1.15	1.79
Area 1, BJY	03/04/96	03/11/96	11.60	1.07	1.79
Area 1, BJY	03/11/96	03/18/96	12.50	1.08	1.79
Area 1, BJY	03/18/96	03/25/96	18.70	1.14	1.71
Area 1, BJY	03/25/96	04/01/96	21.70	1.22	1.76
Area 1, BJY	04/01/96	04/08/96	15.90	1.12	1.74
Area 1, BJY	04/08/96	04/15/96	18.10	1.18	1.81
Area 1, BJY	04/15/96	04/24/96	16.30	0.92	1.34
Area 1, BJY	04/24/96	05/01/96	20.70	1.22	1.81
Area 1, BJY	05/01/96	05/09/96	19.30	1.10	1.61
Area 1, BJY	05/09/96	05/15/96	25.50	1.47	2.16
Area 1, BJY	05/15/96	05/23/96	20.10	1.10	1.57
Area 1, BJY	05/23/96	05/30/96	20.90	1.23	1.84
Area 1, BJY	05/30/96	06/05/96	30.60	1.53	2.14
Area 1, BJY	06/05/96	06/12/96	30.30	1.41	1.94
Area 1, BJY	06/12/96	06/19/96	24.60	1.29	1.81
Area 1, BJY	06/19/96	06/26/96	Sample Head Missing		
Area 1, BJY	06/26/96	07/03/96	26.40	1.32	1.85
Area 1, BJY	07/03/96	07/10/96	21.30	1.27	1.88
Area 1, BJY	07/10/96	07/17/96	25.10	1.29	1.81
Area 1, BJY	07/17/96	07/24/96	17.70	1.19	1.82
Area 1, BJY	07/24/96	07/31/96	23.10	1.05	1.42
Area 1, BJY	07/31/96	08/07/96	23.50	2.16	3.61
Area 1, BJY	08/07/96	08/13/96	19.70	1.05	1.52
Area 1, BJY	08/13/96	08/20/96	21.30	0.98	1.34
Area 1, BJY	08/20/96	08/28/96	17.80	0.83	1.13
Area 1, BJY	08/28/96	09/04/96	20.00	0.95	1.30
Area 1, BJY	09/04/96	09/10/96	19.40	1.07	1.53
Area 1, BJY	09/10/96	09/17/96	17.20	0.93	1.33
Area 1, BJY	09/17/96	09/24/96	24.90	1.02	1.30
Area 1, BJY	09/24/96	09/30/96	23.60	1.11	1.50
Area 1, BJY	09/30/96	10/08/96	35.10	1.05	1.15
Area 1, BJY	10/08/96	10/15/96	24.00	1.02	1.32
Area 1, BJY	10/15/96	10/22/96	17.80	0.93	1.31

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 1, BJY	10/22/96	10/29/96	10.50	0.83	1.35
Area 1, BJY	10/29/96	11/05/96	24.70	1.04	1.36
Area 1, BJY	11/05/96	11/12/96	16.90	0.92	1.33
Area 1, BJY	11/12/96	11/19/96	21.70	0.98	1.30
Area 1, BJY	11/19/96	11/26/96	12.30	0.87	1.36
Area 1, BJY	11/26/96	12/03/96	9.30	0.82	1.36
Area 1, BJY	12/03/96	12/10/96	17.60	0.92	2.15
Area 1, BJY	12/10/96	12/17/96	9.10	0.83	2.24
Area 1, BJY	12/17/96	12/26/96	16.80	0.78	1.74
Area 2, Camp	12/26/95	01/02/96	17.30	0.93	1.32
Area 2, Camp	01/02/96	01/08/96	15.30	1.03	1.57
Area 2, Camp	01/08/96	01/16/96	20.30	0.90	1.20
Area 2, Camp	01/16/96	01/22/96	11.10	0.98	1.62
Area 2, Camp	01/22/96	01/29/96	8.65	0.80	1.33
Area 2, Camp	01/29/96	02/06/96	21.80	0.92	1.18
Area 2, Camp	02/06/96	02/12/96	20.40	1.07	1.52
Area 2, Camp	02/12/96	02/20/96	17.50	0.85	1.18
Area 2, Camp	02/20/96	02/27/96		Power Off	
Area 2, Camp	02/27/96	03/05/96	14.10	0.91	1.39
Area 2, Camp	03/05/96	03/12/96		Pump Failed	
Area 2, Camp	03/12/96	03/19/96	12.10	0.91	1.45
Area 2, Camp	03/19/96	03/26/96	14.70	0.95	1.44
Area 2, Camp	03/26/96	04/02/96	13.20	0.93	1.46
Area 2, Camp	04/02/96	04/09/96	15.80	0.96	1.43
Area 2, Camp	04/09/96	04/16/96	14.10	0.93	1.42
Area 2, Camp	04/16/96	04/25/96	13.50	0.74	1.07
Area 2, Camp	04/25/96	05/02/96	14.90	0.95	2.37
Area 2, Camp	05/02/96	05/09/96	14.30	0.94	1.44
Area 2, Camp	05/09/96	05/15/96	16.30	1.12	1.75
Area 2, Camp	05/15/96	05/23/96	9.52	0.75	1.21
Area 2, Camp	05/23/96	05/30/96	13.70	0.92	1.42
Area 2, Camp	05/30/96	06/05/96	23.20	1.21	1.73
Area 2, Camp	06/05/96	06/12/96	24.10	1.18	1.63
Area 2, Camp	06/12/96	06/19/96	18.40	0.98	1.43
Area 2, Camp	06/19/96	06/26/96	15.60	0.94	1.40
Area 2, Camp	06/26/96	07/03/96	17.40	1.00	1.47
Area 2, Camp	07/03/96	07/10/96	16.40	0.96	1.41
Area 2, Camp	07/10/96	07/17/96	20.20	1.02	1.41
Area 2, Camp	07/17/96	07/24/96	18.10	0.98	1.40
Area 2, Camp	07/24/96	07/31/96	24.60	1.10	1.48
Area 2, Camp	07/31/96	08/07/96	21.00	1.06	1.49
Area 2, Camp	08/07/96	08/13/96	26.70	1.25	1.71
Area 2, Camp	08/13/96	08/20/96	24.20	1.09	1.48
Area 2, Camp	08/20/96	08/28/96	22.70	0.97	1.27

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 2, Camp	08/28/96	09/04/96	20.10	1.04	1.47
Area 2, Camp	09/04/96	09/10/96	18.90	1.14	1.71
Area 2, Camp	09/10/96	09/18/96	16.90	0.90	1.28
Area 2, Camp	09/18/96	09/24/96	29.40	1.28	1.69
Area 2, Camp	09/24/96	09/30/96	25.00	1.22	1.67
Area 2, Camp	09/30/96	10/08/96	32.10	1.12	1.32
Area 2, Camp	10/08/96	10/15/96	23.30	1.09	1.48
Area 2, Camp	10/15/96	10/22/96	19.80	1.02	1.44
Area 2, Camp	10/22/96	10/29/96	11.30	0.90	1.47
Area 2, Camp	10/29/96	11/05/96	26.50	1.13	1.49
Area 2, Camp	11/05/96	11/12/96	17.40	0.99	1.45
Area 2, Camp	11/12/96	11/19/96	18.10	0.99	1.42
Area 2, Camp	11/19/96	11/26/96	11.40	0.91	1.46
Area 2, Camp	11/26/96	12/03/96	11.10	0.90	1.47
Area 2, Camp	12/03/96	12/10/96	11.60	0.90	2.38
Area 2, Camp	12/10/96	12/17/96	8.47	0.86	2.39
Area 2, Camp	12/17/96	12/26/96	16.80	0.82	1.87
Area 2, 2-1 Substation	12/26/95	01/02/96	17.80	1.30	2.04
Area 2, 2-1 Substation	01/02/96	01/08/96	16.10	2.97	5.53
Area 2, 2-1 Substation	01/08/96	01/16/96	17.90	0.95	1.37
Area 2, 2-1 Substation	01/16/96	01/22/96	7.88	1.02	1.81
Area 2, 2-1 Substation	01/22/96	01/29/96	7.67	0.86	1.49
Area 2, 2-1 Substation	01/29/96	02/06/96	16.50	0.92	1.33
Area 2, 2-1 Substation	02/06/96	02/12/96	14.70	1.12	1.77
Area 2, 2-1 Substation	02/12/96	02/20/96	14.90	0.91	1.36
Area 2, 2-1 Substation	02/20/96	02/27/96	7.07	0.86	1.52
Area 2, 2-1 Substation	02/27/96	03/05/96	10.20	0.94	1.57
Area 2, 2-1 Substation	03/05/96	03/12/96	8.43	0.92	1.60
Area 2, 2-1 Substation	03/12/96	03/19/96	8.74	0.93	1.61
Area 2, 2-1 Substation	03/19/96	03/26/96	10.30	0.97	1.62
Area 2, 2-1 Substation	03/26/96	04/02/96	7.28	0.95	1.70
Area 2, 2-1 Substation	04/02/96	04/09/96	10.80	1.03	1.73
Area 2, 2-1 Substation	04/09/96	04/16/96	6.26	1.15	2.14
Area 2, 2-1 Substation	04/16/96	04/25/96	4.10	1.52	3.00
Area 2, 2-1 Substation	04/25/96	05/02/96	5.60	2.63	5.24
Area 2, 2-1 Substation	05/02/96	05/09/96	5.43	2.27	4.51
Area 2, 2-1 Substation	05/09/96	05/15/96	17.30	1.20	1.89
Area 2, 2-1 Substation	05/15/96	05/23/96	12.80	0.88	1.35
Area 2, 2-1 Substation	05/23/96	05/30/96	14.10	0.99	1.55
Area 2, 2-1 Substation	05/30/96	06/05/96	21.70	1.28	1.89
Area 2, 2-1 Substation	06/05/96	06/12/96	22.40	1.16	1.68
Area 2, 2-1 Substation	06/12/96	06/19/96	20.10	1.09	1.54
Area 2, 2-1 Substation	06/19/96	06/26/96	7.46	0.91	1.61
Area 2, 2-1 Substation	06/26/96	07/03/96	17.50	1.08	1.64

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 2, 2-1 Substation	07/03/96	07/10/96	21.20	3.42	6.28
Area 2, 2-1 Substation	07/10/96	07/17/96	20.60	1.12	1.61
Area 2, 2-1 Substation	07/17/96	07/24/96		Pump Failed	
Area 2, 2-1 Substation	07/24/96	07/31/96	20.50	1.15	1.68
Area 2, 2-1 Substation	07/31/96	08/07/96	19.60	1.14	1.68
Area 2, 2-1 Substation	08/07/96	08/13/96	23.70	1.33	1.95
Area 2, 2-1 Substation	08/13/96	08/20/96	20.90	1.15	1.66
Area 2, 2-1 Substation	08/20/96	08/28/96	21.00	1.03	1.42
Area 2, 2-1 Substation	08/28/96	09/04/96	18.00	1.11	1.67
Area 2, 2-1 Substation	09/04/96	09/10/96	17.30	1.22	1.92
Area 2, 2-1 Substation	09/10/96	09/18/96	16.70	0.97	1.43
Area 2, 2-1 Substation	09/18/96	09/24/96	24.60	1.33	1.90
Area 2, 2-1 Substation	09/24/96	09/30/96	24.80	1.31	1.88
Area 2, 2-1 Substation	09/30/96	10/08/96	30.50	1.17	1.44
Area 2, 2-1 Substation	10/08/96	10/15/96	21.70	1.16	1.67
Area 2, 2-1 Substation	10/15/96	10/22/96	17.20	1.07	1.62
Area 2, 2-1 Substation	10/22/96	10/29/96	12.50	1.01	1.64
Area 2, 2-1 Substation	10/29/96	11/05/96	11.10	1.00	1.66
Area 2, 2-1 Substation	11/05/96	11/12/96	18.00	1.09	1.64
Area 2, 2-1 Substation	11/12/96	11/19/96	17.90	1.08	1.60
Area 2, 2-1 Substation	11/19/96	11/26/96	7.82	0.95	1.66
Area 2, 2-1 Substation	11/26/96	12/03/96	8.86	0.96	1.65
Area 2, 2-1 Substation	12/03/96	12/10/96	15.70	0.96	2.36
Area 2, 2-1 Substation	12/10/96	12/17/96	9.98	0.87	2.35
Area 2, 2-1 Substation	12/17/96	12/26/96	11.60	0.74	1.85
Area 3, U-3ah/at South	12/27/95	01/03/96		Pump Out	
Area 3, U-3ah/at South	01/03/96	01/08/96	13.70	1.68	2.94
Area 3, U-3ah/at South	01/08/96	01/16/96	18.90	1.27	1.95
Area 3, U-3ah/at South	01/16/96	01/22/96	9.26	1.39	2.53
Area 3, U-3ah/at South	01/22/96	01/29/96	7.73	0.91	1.58
Area 3, U-3ah/at South	01/29/96	02/05/96	18.50	0.97	1.37
Area 3, U-3ah/at South	02/05/96	02/12/96	17.70	0.95	1.34
Area 3, U-3ah/at South	02/12/96	02/20/96	18.40	0.88	1.21
Area 3, U-3ah/at South	02/20/96	02/26/96	7.03	0.89	1.59
Area 3, U-3ah/at South	02/26/96	03/04/96	11.80	0.90	1.44
Area 3, U-3ah/at South	03/04/96	03/11/96	8.27	0.83	1.42
Area 3, U-3ah/at South	03/11/96	03/18/96	11.60	0.86	1.37
Area 3, U-3ah/at South	03/18/96	03/25/96	12.00	0.86	1.35
Area 3, U-3ah/at South	03/25/96	04/01/96	13.10	0.90	1.40
Area 3, U-3ah/at South	04/01/96	04/08/96	11.90	0.87	1.37
Area 3, U-3ah/at South	04/08/96	04/15/96	10.30	0.85	1.38
Area 3, U-3ah/at South	04/15/96	04/25/96	10.10	0.64	0.96
Area 3, U-3ah/at South	04/25/96	05/02/96	13.50	0.90	1.40
Area 3, U-3ah/at South	05/02/96	05/09/96	13.50	0.90	1.37

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, U-3ah/at South	05/09/96	05/15/96	16.00	1.06	1.65
Area 3, U-3ah/at South	05/15/96	05/23/96	14.90	0.83	1.20
Area 3, U-3ah/at South	05/23/96	05/30/96	13.70	0.91	1.40
Area 3, U-3ah/at South	05/30/96	06/05/96	Sample Head Missing		
Area 3, U-3ah/at South	06/05/96	06/12/96	19.10	1.00	1.44
Area 3, U-3ah/at South	06/12/96	06/19/96	16.30	0.93	1.35
Area 3, U-3ah/at South	06/19/96	06/27/96	12.90	0.80	1.20
Area 3, U-3ah/at South	06/27/96	07/03/96	18.00	1.13	1.73
Area 3, U-3ah/at South	07/03/96	07/10/96	13.60	0.92	1.41
Area 3, U-3ah/at South	07/10/96	07/17/96	17.10	0.97	1.42
Area 3, U-3ah/at South	07/17/96	07/24/96	13.20	0.90	1.38
Area 3, U-3ah/at South	07/24/96	07/31/96	19.00	1.02	1.47
Area 3, U-3ah/at South	07/31/96	08/07/96	17.00	0.99	1.46
Area 3, U-3ah/at South	08/07/96	08/13/96	22.40	1.21	1.74
Area 3, U-3ah/at South	08/13/96	08/20/96	21.20	1.04	1.45
Area 3, U-3ah/at South	08/20/96	08/28/96	17.70	0.89	1.26
Area 3, U-3ah/at South	08/28/96	09/04/96	19.80	1.01	1.42
Area 3, U-3ah/at South	09/04/96	09/10/96	17.10	1.09	1.66
Area 3, U-3ah/at South	09/10/96	09/18/96	14.50	0.85	1.25
Area 3, U-3ah/at South	09/18/96	09/24/96	23.30	1.18	1.66
Area 3, U-3ah/at South	09/24/96	09/30/96	19.30	1.12	1.65
Area 3, U-3ah/at South	09/30/96	10/09/96	26.10	0.93	1.12
Area 3, U-3ah/at South	10/09/96	10/15/96	20.20	1.14	1.68
Area 3, U-3ah/at South	10/15/96	10/22/96	16.00	0.96	1.43
Area 3, U-3ah/at South	10/22/96	10/29/96	10.90	0.89	1.45
Area 3, U-3ah/at South	10/29/96	11/06/96	18.20	0.90	1.24
Area 3, U-3ah/at South	11/06/96	11/12/96	15.60	1.07	1.66
Area 3, U-3ah/at South	11/12/96	11/19/96	16.10	0.97	1.45
Area 3, U-3ah/at South	11/19/96	11/26/96	10.20	0.87	1.44
Area 3, U-3ah/at South	11/26/96	12/03/96	9.68	0.86	1.43
Area 3, U-3ah/at South	12/03/96	12/10/96	17.50	0.97	2.30
Area 3, U-3ah/at South	12/10/96	12/17/96	8.70	0.85	2.34
Area 3, U-3ah/at South	12/17/96	12/30/96	12.80	0.58	1.28
Area 3, U-3ah/at East	12/27/95	01/03/96	15.30	1.10	1.73
Area 3, U-3ah/at East	01/03/96	01/08/96	13.60	1.42	2.43
Area 3, U-3ah/at East	01/08/96	01/16/96	19.20	1.10	1.63
Area 3, U-3ah/at East	01/16/96	01/22/96	12.60	1.25	2.12
Area 3, U-3ah/at East	01/22/96	01/29/96	7.95	0.99	1.74
Area 3, U-3ah/at East	01/29/96	02/05/96	23.20	1.24	1.77
Area 3, U-3ah/at East	02/05/96	02/12/96	19.90	1.19	1.76
Area 3, U-3ah/at East	02/12/96	02/20/96	19.30	1.09	1.59
Area 3, U-3ah/at East	02/20/96	02/26/96	7.51	1.12	2.03
Area 3, U-3ah/at East	02/26/96	03/04/96	14.80	1.30	2.17
Area 3, U-3ah/at East	03/04/96	03/11/96	9.02	1.06	1.85

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, U-3ah/at East	03/11/96	03/18/96	15.20	1.14	1.80
Area 3, U-3ah/at East	03/18/96	03/25/96	13.80	1.10	1.77
Area 3, U-3ah/at East	03/25/96	04/01/96	12.90	1.11	1.82
Area 3, U-3ah/at East	04/01/96	04/08/96	13.80	1.12	1.81
Area 3, U-3ah/at East	04/08/96	04/15/96	10.80	1.07	1.81
Area 3, U-3ah/at East	04/15/96	04/25/96	11.80	0.81	1.26
Area 3, U-3ah/at East	04/25/96	05/02/96	14.20	1.15	1.87
Area 3, U-3ah/at East	05/02/96	05/09/96	15.80	1.16	1.83
Area 3, U-3ah/at East	05/09/96	05/15/96	18.90	1.40	2.21
Area 3, U-3ah/at East	05/15/96	05/23/96	15.60	1.05	1.60
Area 3, U-3ah/at East	05/23/96	05/30/96	11.40	1.09	1.84
Area 3, U-3ah/at East	05/30/96	06/05/96	23.90	1.47	2.20
Area 3, U-3ah/at East	06/05/96	06/12/96	25.50	1.35	1.95
Area 3, U-3ah/at East	06/12/96	06/19/96	20.70	1.23	1.82
Area 3, U-3ah/at East	06/19/96	06/27/96	15.20	1.05	1.61
Area 3, U-3ah/at East	06/27/96	07/03/96	19.40	1.46	2.32
Area 3, U-3ah/at East	07/03/96	07/10/96	17.70	1.23	1.92
Area 3, U-3ah/at East	07/10/96	07/17/96	19.70	1.26	1.92
Area 3, U-3ah/at East	07/17/96	07/24/96		Power Out	
Area 3, U-3ah/at East	07/24/96	07/31/96		Power Out	
Area 3, U-3ah/at East	07/31/96	08/07/96	24.80	1.39	2.03
Area 3, U-3ah/at East	08/07/96	08/13/96	23.50	1.47	2.22
Area 3, U-3ah/at East	08/13/96	08/20/96	24.20	1.32	1.91
Area 3, U-3ah/at East	08/20/96	08/28/96	21.90	1.17	1.67
Area 3, U-3ah/at East	08/28/96	09/04/96	18.40	1.21	1.85
Area 3, U-3ah/at East	09/04/96	09/10/96	15.10	1.34	2.22
Area 3, U-3ah/at East	09/10/96	09/18/96	15.50	0.87	1.28
Area 3, U-3ah/at East	09/18/96	09/24/96	25.00	1.22	1.69
Area 3, U-3ah/at East	09/24/96	09/30/96	22.20	1.18	1.69
Area 3, U-3ah/at East	09/30/96	10/09/96	29.90	0.99	1.15
Area 3, U-3ah/at East	10/09/96	10/15/96	21.80	1.18	1.71
Area 3, U-3ah/at East	10/15/96	10/22/96	19.20	1.00	1.42
Area 3, U-3ah/at East	10/22/96	10/29/96	11.20	0.86	1.37
Area 3, U-3ah/at East	10/29/96	11/06/96	24.20	0.94	1.17
Area 3, U-3ah/at East	11/06/96	11/12/96	19.50	1.08	1.58
Area 3, U-3ah/at East	11/12/96	11/19/96	18.70	0.96	1.37
Area 3, U-3ah/at East	11/19/96	11/26/96	10.20	0.85	1.39
Area 3, U-3ah/at East	11/26/96	12/03/96	10.60	0.84	1.35
Area 3, U-3ah/at East	12/03/96	12/10/96	21.10	0.99	2.19
Area 3, U-3ah/at East	12/10/96	12/17/96	8.80	0.82	2.23
Area 3, U-3ah/at East	12/17/96	12/30/96	14.20	0.56	1.17
Area 3, U-3ah/at North	12/27/95	01/03/96		Filter Head Missing	
Area 3, U-3ah/at North	01/03/96	01/08/96	15.70	1.11	1.73
Area 3, U-3ah/at North	01/08/96	01/16/96		Pump Out	

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, U-3ah/at North	01/16/96	01/22/96	9.51	0.92	1.56
Area 3, U-3ah/at North	01/22/96	01/29/96	8.05	0.76	1.27
Area 3, U-3ah/at North	01/29/96	02/05/96	17.80	0.93	1.32
Area 3, U-3ah/at North	02/05/96	02/12/96	21.00	0.97	1.30
Area 3, U-3ah/at North	02/12/96	02/20/96	19.20	0.88	1.20
Area 3, U-3ah/at North	02/20/96	02/26/96	8.62	0.87	1.49
Area 3, U-3ah/at North	02/26/96	03/04/96	14.30	0.89	1.36
Area 3, U-3ah/at North	03/04/96	03/11/96	10.30	0.83	1.37
Area 3, U-3ah/at North	03/11/96	03/18/96	12.90	0.86	1.32
Area 3, U-3ah/at North	03/18/96	03/25/96	16.10	0.90	1.30
Area 3, U-3ah/at North	03/25/96	04/01/96	14.30	0.89	1.35
Area 3, U-3ah/at North	04/01/96	04/08/96	15.00	0.90	1.34
Area 3, U-3ah/at North	04/08/96	04/15/96	13.30	0.87	1.33
Area 3, U-3ah/at North	04/15/96	04/25/96	12.90	0.66	0.93
Area 3, U-3ah/at North	04/25/96	05/02/96	13.80	0.90	1.39
Area 3, U-3ah/at North	05/02/96	05/09/96	14.00	0.90	1.36
Area 3, U-3ah/at North	05/09/96	05/15/96	19.40	1.12	1.65
Area 3, U-3ah/at North	05/15/96	05/23/96	13.70	0.80	1.18
Area 3, U-3ah/at North	05/23/96	05/30/96		Leak in Sampler	
Area 3, U-3ah/at North	05/30/96	06/05/96	32.10	3.08	5.21
Area 3, U-3ah/at North	06/05/96	06/12/96	25.20	1.09	1.46
Area 3, U-3ah/at North	06/12/96	06/19/96	19.80	0.98	1.36
Area 3, U-3ah/at North	06/19/96	06/27/96	17.40	0.87	1.20
Area 3, U-3ah/at North	06/27/96	07/03/96		Sample Head Missing	
Area 3, U-3ah/at North	07/03/96	07/10/96	14.20	0.82	1.22
Area 3, U-3ah/at North	07/10/96	07/17/96		Power Out	
Area 3, U-3ah/at North	07/17/96	07/24/96		Power Out	
Area 3, U-3ah/at North	07/24/96	07/31/96		Power Out	
Area 3, U-3ah/at North	07/31/96	08/07/96	10.70	0.76	1.19
Area 3, U-3ah/at North	08/07/96	08/13/96	30.30	1.47	2.02
Area 3, U-3ah/at North	08/13/96	08/20/96	21.70	1.01	1.39
Area 3, U-3ah/at North	08/20/96	08/28/96	15.00	0.83	1.21
Area 3, U-3ah/at North	08/28/96	09/04/96	17.20	0.94	1.34
Area 3, U-3ah/at North	09/04/96	09/10/96	17.40	1.08	1.62
Area 3, U-3ah/at North	09/10/96	09/18/96	17.30	0.86	1.21
Area 3, U-3ah/at North	09/18/96	09/24/96	27.30	1.21	1.61
Area 3, U-3ah/at North	09/24/96	09/30/96	19.90	1.10	1.60
Area 3, U-3ah/at North	09/30/96	10/09/96	26.90	0.92	1.08
Area 3, U-3ah/at North	10/09/96	10/15/96	22.10	1.15	1.63
Area 3, U-3ah/at North	10/15/96	10/22/96	16.00	0.94	1.39
Area 3, U-3ah/at North	10/22/96	10/29/96	12.10	0.88	1.40
Area 3, U-3ah/at North	10/29/96	11/06/96	25.70	0.98	1.21
Area 3, U-3ah/at North	11/06/96	11/12/96	19.80	1.11	1.61
Area 3, U-3ah/at North	11/12/96	11/19/96	15.40	0.93	1.41

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, U-3ah/at North	11/19/96	11/26/96	10.80	0.86	1.41
Area 3, U-3ah/at North	11/26/96	12/03/96	12.00	0.89	1.40
Area 3, U-3ah/at North	12/03/96	12/10/96	22.50	1.03	2.24
Area 3, U-3ah/at North	12/10/96	12/17/96	8.47	0.79	2.15
Area 3, U-3ah/at North	12/17/96	12/30/96	16.00	0.61	1.25
Area 3, U-3ah/at West	12/27/95	01/03/96		Filter Head Missing	
Area 3, U-3ah/at West	01/03/96	01/08/96	13.00	1.50	2.62
Area 3, U-3ah/at West	01/08/96	01/16/96	18.10	1.15	1.75
Area 3, U-3ah/at West	01/16/96	01/22/96	8.56	1.26	2.29
Area 3, U-3ah/at West	01/22/96	01/29/96	8.90	1.07	1.87
Area 3, U-3ah/at West	01/29/96	02/05/96	20.80	1.28	1.91
Area 3, U-3ah/at West	02/05/96	02/12/96	20.50	1.27	1.89
Area 3, U-3ah/at West	02/12/96	02/20/96	21.10	1.19	1.75
Area 3, U-3ah/at West	02/20/96	02/26/96	8.85	1.21	2.17
Area 3, U-3ah/at West	02/26/96	03/04/96	9.78	1.13	1.99
Area 3, U-3ah/at West	03/04/96	03/11/96	9.65	1.13	1.99
Area 3, U-3ah/at West	03/11/96	03/18/96	12.60	1.16	1.93
Area 3, U-3ah/at West	03/18/96	03/25/96	13.00	1.15	1.90
Area 3, U-3ah/at West	03/25/96	04/01/96	14.50	1.20	1.96
Area 3, U-3ah/at West	04/01/96	04/08/96	14.00	1.19	1.94
Area 3, U-3ah/at West	04/08/96	04/15/96	12.60	1.17	1.96
Area 3, U-3ah/at West	04/15/96	04/25/96	9.01	1.06	1.86
Area 3, U-3ah/at West	04/25/96	05/02/96	14.30	1.17	1.91
Area 3, U-3ah/at West	05/02/96	05/09/96	15.40	1.18	1.88
Area 3, U-3ah/at West	05/09/96	05/15/96	17.30	1.40	2.27
Area 3, U-3ah/at West	05/15/96	05/23/96	10.50	0.98	1.64
Area 3, U-3ah/at West	05/23/96	05/30/96	14.20	1.16	1.89
Area 3, U-3ah/at West	05/30/96	06/05/96	21.40	1.47	2.26
Area 3, U-3ah/at West	06/05/96	06/12/96	17.80	1.26	2.00
Area 3, U-3ah/at West	06/12/96	06/19/96	21.10	1.27	1.86
Area 3, U-3ah/at West	06/19/96	06/27/96	22.40	1.16	1.65
Area 3, U-3ah/at West	06/27/96	07/03/96	17.50	1.46	2.39
Area 3, U-3ah/at West	07/03/96	07/10/96	16.30	1.23	1.97
Area 3, U-3ah/at West	07/10/96	07/17/96		Filter Head Missing	
Area 3, U-3ah/at West	07/17/96	07/24/96	18.50	1.25	1.92
Area 3, U-3ah/at West	07/24/96	07/31/96	17.40	1.28	2.04
Area 3, U-3ah/at West	07/31/96	08/07/96	25.50	1.30	1.83
Area 3, U-3ah/at West	08/07/96	08/13/96	23.90	1.40	2.05
Area 3, U-3ah/at West	08/13/96	08/20/96	13.90	1.09	1.77
Area 3, U-3ah/at West	08/20/96	08/28/96	26.40	1.17	1.57
Area 3, U-3ah/at West	08/28/96	09/04/96	19.60	1.18	1.73
Area 3, U-3ah/at West	09/04/96	09/10/96	16.20	1.29	2.09
Area 3, U-3ah/at West	09/10/96	09/18/96	13.80	1.00	1.58
Area 3, U-3ah/at West	09/18/96	09/24/96	24.10	1.42	2.11

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, U-3ah/at West	09/24/96	09/30/96	22.00	1.37	2.08
Area 3, U-3ah/at West	09/30/96	10/09/96	22.50	1.04	1.41
Area 3, U-3ah/at West	10/09/96	10/15/96	21.80	1.40	2.12
Area 3, U-3ah/at West	10/15/96	10/22/96	17.10	1.17	1.82
Area 3, U-3ah/at West	10/22/96	10/29/96	13.90	1.13	1.84
Area 3, U-3ah/at West	10/29/96	11/06/96	22.30	1.13	1.58
Area 3, U-3ah/at West	11/06/96	11/12/96	16.50	1.31	2.10
Area 3, U-3ah/at West	11/12/96	11/19/96	18.80	1.20	1.83
Area 3, U-3ah/at West	11/19/96	11/26/96	6.87	1.01	1.83
Area 3, U-3ah/at West	11/26/96	12/03/96	10.20	1.06	1.81
Area 3, U-3ah/at West	12/03/96	12/10/96	17.60	1.17	2.92
Area 3, U-3ah/at West	12/10/96	12/17/96	9.10	1.04	2.96
Area 3, U-3ah/at West	12/17/96	12/30/96	11.70	1.46	4.22
Area 3, Mud Plant	12/26/95	01/03/96	17.60	0.84	1.14
Area 3, Mud Plant	01/03/96	01/08/96	18.90	1.25	1.91
Area 3, Mud Plant	01/08/96	01/16/96	17.50	0.86	1.20
Area 3, Mud Plant	01/16/96	01/22/96	10.20	0.93	1.56
Area 3, Mud Plant	01/22/96	01/29/96	8.53	0.79	1.31
Area 3, Mud Plant	01/29/96	02/05/96	23.50	1.02	1.34
Area 3, Mud Plant	02/05/96	02/12/96	25.50	1.21	1.63
Area 3, Mud Plant	02/12/96	02/20/96	24.50	1.10	1.47
Area 3, Mud Plant	02/20/96	02/26/96	12.50	1.13	1.88
Area 3, Mud Plant	02/26/96	03/04/96	16.40	1.11	1.71
Area 3, Mud Plant	03/04/96	03/11/96	12.60	1.06	1.75
Area 3, Mud Plant	03/11/96	03/18/96	43.10	3.06	4.82
Area 3, Mud Plant	03/18/96	03/25/96	20.10	1.14	1.66
Area 3, Mud Plant	03/25/96	04/01/96	19.30	1.18	1.77
Area 3, Mud Plant	04/01/96	04/08/96	15.70	1.11	1.74
Area 3, Mud Plant	04/08/96	04/15/96	15.70	1.11	1.76
Area 3, Mud Plant	04/15/96	04/24/96	15.80	0.90	1.31
Area 3, Mud Plant	04/24/96	05/01/96	20.20	1.17	1.70
Area 3, Mud Plant	05/01/96	05/09/96	19.10	1.06	1.54
Area 3, Mud Plant	05/09/96	05/15/96	19.90	1.33	2.05
Area 3, Mud Plant	05/15/96	05/23/96	18.60	1.03	1.50
Area 3, Mud Plant	05/23/96	05/30/96	12.60	0.83	1.26
Area 3, Mud Plant	05/30/96	06/05/96	47.50	2.54	3.63
Area 3, Mud Plant	06/05/96	06/12/96	27.40	1.30	1.80
Area 3, Mud Plant	06/12/96	06/19/96	23.90	1.22	1.69
Area 3, Mud Plant	06/19/96	06/26/96	18.30	1.16	1.77
Area 3, Mud Plant	06/26/96	07/02/96	24.40	1.43	2.11
Area 3, Mud Plant	07/02/96	07/10/96	24.00	1.16	1.58
Area 3, Mud Plant	07/10/96	07/17/96	24.80	1.28	1.78
Area 3, Mud Plant	07/17/96	07/24/96	23.10	1.26	1.80
Area 3, Mud Plant	07/24/96	07/31/96	35.10	1.57	2.11

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, Mud Plant	07/31/96	08/07/96	26.00	1.33	1.88
Area 3, Mud Plant	08/07/96	08/13/96	31.00	1.53	2.14
Area 3, Mud Plant	08/13/96	08/20/96	31.00	1.36	1.82
Area 3, Mud Plant	08/20/96	08/28/96	24.50	1.15	1.56
Area 3, Mud Plant	08/28/96	09/04/96	22.10	1.25	1.83
Area 3, Mud Plant	09/04/96	09/10/96		Pump Failed	
Area 3, Mud Plant	09/10/96	09/18/96	17.10	0.86	1.21
Area 3, Mud Plant	09/18/96	09/24/96	28.00	1.22	1.61
Area 3, Mud Plant	09/24/96	09/30/96	24.60	1.17	1.59
Area 3, Mud Plant	09/30/96	10/08/96	26.60	0.99	1.20
Area 3, Mud Plant	10/08/96	10/15/96	23.50	1.06	1.41
Area 3, Mud Plant	10/15/96	10/22/96	18.30	0.97	1.38
Area 3, Mud Plant	10/22/96	10/29/96	10.70	0.87	1.42
Area 3, Mud Plant	10/29/96	11/05/96	24.70	1.07	1.42
Area 3, Mud Plant	11/05/96	11/12/96	16.30	0.95	1.40
Area 3, Mud Plant	11/12/96	11/19/96	19.80	1.00	1.39
Area 3, Mud Plant	11/19/96	11/26/96	9.13	0.84	1.40
Area 3, Mud Plant	11/26/96	12/03/96	10.40	0.87	1.41
Area 3, Mud Plant	12/03/96	12/10/96	18.10	0.97	2.28
Area 3, Mud Plant	12/10/96	12/17/96	10.50	0.86	2.29
Area 3, Mud Plant	12/17/96	12/26/96	15.60	0.79	1.81
Area 3, Well ER 3-1	12/18/95	01/02/96	36.60	0.79	0.69
Area 3, Well ER 3-1	01/02/96	01/16/96	21.30	0.67	0.77
Area 3, Well ER 3-1	01/16/96	01/22/96	8.95	1.03	1.81
Area 3, Well ER 3-1	01/22/96	01/29/96	10.10	0.91	1.50
Area 3, Well ER 3-1	01/29/96	02/05/96	25.10	1.15	1.54
Area 3, Well ER 3-1	02/05/96	02/12/96		Motor Failed	
Area 3, Well ER 3-1	02/12/96	02/20/96	22.40	1.02	1.36
Area 3, Well ER 3-1	02/20/96	02/26/96	8.16	1.04	1.84
Area 3, Well ER 3-1	02/26/96	03/05/96	14.70	0.93	1.42
Area 3, Well ER 3-1	03/05/96	03/12/96	12.50	0.99	1.61
Area 3, Well ER 3-1	03/12/96	03/19/96	16.20	1.08	1.66
Area 3, Well ER 3-1	03/19/96	03/26/96	18.90	1.08	1.56
Area 3, Well ER 3-1	03/26/96	04/02/96	14.10	1.03	1.64
Area 3, Well ER 3-1	04/02/96	04/09/96	18.00	1.07	1.58
Area 3, Well ER 3-1	04/09/96	04/16/96	14.40	1.04	1.63
Area 3, Well ER 3-1	04/16/96	04/25/96	14.20	0.84	1.24
Area 3, Well ER 3-1	04/25/96	05/02/96	35.60	3.28	5.47
Area 3, Well ER 3-1	05/02/96	05/07/96		Pump Not Working	
Area 3, Well ER 3-1	05/07/96	05/14/96	23.00	1.15	1.58
Area 3, Well ER 3-1	05/14/96	05/22/96	11.40	0.90	1.45
Area 3, Well ER 3-1	05/22/96	05/29/96	10.50	1.00	1.68
Area 3, Well ER 3-1	05/29/96	06/04/96	29.20	1.39	1.89
Area 3, Well ER 3-1	06/04/96	06/13/96		Power Out	

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 3, Well ER 3-1	06/13/96	06/18/96	23.80	1.52	2.33
Area 3, Well ER 3-1	06/18/96	06/24/96	22.90	1.36	2.03
Area 3, Well ER 3-1	06/24/96	07/01/96	20.40	1.16	1.71
Area 3, Well ER 3-1	07/01/96	07/09/96	21.50	1.07	1.48
Area 3, Well ER 3-1	07/09/96	07/16/96	23.50	1.22	1.72
Area 3, Well ER 3-1	07/16/96	07/23/96	21.40	1.08	1.51
Area 3, Well ER 3-1	07/23/96	07/30/96	25.30	1.04	1.35
Area 3, Well ER 3-1	07/30/96	08/06/96	20.40	0.99	1.37
Area 3, Well ER 3-1	08/06/96	08/13/96	22.30	1.04	1.42
Area 3, Well ER 3-1	08/13/96	08/20/96	24.20	1.04	1.37
Area 3, Well ER 3-1	08/20/96	08/27/96	21.60	0.98	1.30
Area 3, Well ER 3-1	08/27/96	09/04/96	10.60	0.76	1.19
Area 3, Well ER 3-1	09/04/96	09/10/96	14.10	1.01	1.58
Area 3, Well ER 3-1	09/10/96	09/17/96	17.00	0.94	1.37
Area 3, Well ER 3-1	09/17/96	09/24/96	26.00	1.07	1.38
Area 3, Well ER 3-1	09/24/96	09/30/96	25.10	1.16	1.56
Area 3, Well ER 3-1	09/30/96	10/08/96	32.50	1.04	1.18
Area 3, Well ER 3-1	10/08/96	10/15/96	23.70	1.04	1.38
Area 3, Well ER 3-1	10/15/96	10/22/96	19.10	0.98	1.38
Area 3, Well ER 3-1	10/22/96	10/29/96	10.40	0.85	1.39
Area 3, Well ER 3-1	10/29/96	11/05/96	24.50	1.46	2.18
Area 3, Well ER 3-1	11/05/96	11/12/96	18.80	2.73	4.94
Area 3, Well ER 3-1	11/12/96	11/19/96	21.60	1.01	1.37
Area 3, Well ER 3-1	11/19/96	11/26/96	9.81	0.84	1.37
Area 3, Well ER 3-1	11/26/96	12/03/96	9.75	0.84	1.39
Area 3, Well ER 3-1	12/03/96	12/10/96	18.50	0.97	2.26
Area 3, Well ER 3-1	12/10/96	12/17/96	6.03	2.98	9.70
Area 3, Well ER 3-1	12/17/96	12/24/96	15.60	0.98	2.44
Area 3, Well ER 3-1	12/24/96	12/31/96	21.70	2.17	6.06
Area 4, Bunker T-4	12/26/95	01/03/96	15.10	0.88	1.29
Area 4, Bunker T-4	01/03/96	01/08/96	14.90	1.28	2.10
Area 4, Bunker T-4	01/08/96	01/16/96	19.60	0.95	1.32
Area 4, Bunker T-4	01/16/96	01/22/96	11.60	1.03	1.71
Area 4, Bunker T-4	01/22/96	01/29/96	9.20	0.88	1.49
Area 4, Bunker T-4	01/29/96	02/05/96	20.30	1.06	1.48
Area 4, Bunker T-4	02/05/96	02/12/96	21.80	1.12	1.58
Area 4, Bunker T-4	02/12/96	02/20/96	19.80	0.95	1.31
Area 4, Bunker T-4	02/20/96	02/26/96	8.61	1.02	1.78
Area 4, Bunker T-4	02/26/96	03/04/96	15.30	1.05	1.63
Area 4, Bunker T-4	03/04/96	03/11/96		Pump Failed	
Area 4, Bunker T-4	03/11/96	03/18/96	14.10	0.93	1.44
Area 4, Bunker T-4	03/18/96	03/25/96	15.70	0.93	1.37
Area 4, Bunker T-4	03/25/96	04/01/96	14.50	0.92	1.40
Area 4, Bunker T-4	04/01/96	04/08/96	15.50	0.94	1.39

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 4, Bunker T-4	04/08/96	04/15/96	14.10	0.93	1.43
Area 4, Bunker T-4	04/15/96	04/24/96	11.30	0.71	1.08
Area 4, Bunker T-4	04/24/96	05/01/96	13.60	0.92	1.42
Area 4, Bunker T-4	05/01/96	05/09/96	16.80	0.87	1.25
Area 4, Bunker T-4	05/09/96	05/15/96	16.90	1.09	1.66
Area 4, Bunker T-4	05/15/96	05/23/96	15.80	0.85	1.21
Area 4, Bunker T-4	05/23/96	05/30/96	12.20	0.88	1.38
Area 4, Bunker T-4	05/30/96	06/05/96	23.80	1.20	1.67
Area 4, Bunker T-4	06/05/96	06/12/96	27.00	1.11	1.46
Area 4, Bunker T-4	06/12/96	06/19/96	22.40	1.01	1.35
Area 4, Bunker T-4	06/19/96	06/26/96	22.10	1.04	1.43
Area 4, Bunker T-4	06/26/96	07/03/96	19.30	1.00	1.43
Area 4, Bunker T-4	07/03/96	07/10/96	14.70	0.94	1.42
Area 4, Bunker T-4	07/10/96	07/17/96	17.90	0.97	1.38
Area 4, Bunker T-4	07/17/96	07/24/96	19.00	0.99	1.39
Area 4, Bunker T-4	07/24/96	07/31/96	26.70	1.12	1.46
Area 4, Bunker T-4	07/31/96	08/07/96	20.80	1.05	1.47
Area 4, Bunker T-4	08/07/96	08/13/96	24.20	1.22	1.72
Area 4, Bunker T-4	08/13/96	08/20/96	24.90	1.11	1.49
Area 4, Bunker T-4	08/20/96	08/28/96	23.80	0.99	1.27
Area 4, Bunker T-4	08/28/96	09/04/96	17.50	1.01	1.49
Area 4, Bunker T-4	09/04/96	09/10/96	20.70	1.18	1.72
Area 4, Bunker T-4	09/10/96	09/18/96	19.00	0.93	1.29
Area 4, Bunker T-4	09/18/96	09/24/96	29.40	1.30	1.71
Area 4, Bunker T-4	09/24/96	09/30/96	23.40	1.21	1.68
Area 4, Bunker T-4	09/30/96	10/08/96	34.50	1.13	1.29
Area 4, Bunker T-4	10/08/96	10/15/96	26.70	1.14	1.49
Area 4, Bunker T-4	10/15/96	10/22/96	18.90	1.02	1.47
Area 4, Bunker T-4	10/22/96	10/29/96		Sampler Tipped Over	
Area 4, Bunker T-4	10/29/96	11/05/96	28.60	1.21	1.59
Area 4, Bunker T-4	11/05/96	11/12/96	18.40	1.06	1.56
Area 4, Bunker T-4	11/12/96	11/19/96	22.10	1.09	1.51
Area 4, Bunker T-4	11/19/96	11/26/96	11.60	0.96	1.57
Area 4, Bunker T-4	11/26/96	12/03/96	11.30	0.96	1.58
Area 4, Bunker T-4	12/03/96	12/10/96	16.80	1.03	2.55
Area 4, Bunker T-4	12/10/96	12/17/96	10.80	0.96	2.58
Area 4, Bunker T-4	12/17/96	12/26/96	17.90	0.88	2.00
Area 5, WEF North	10/10/96	10/15/96		Meter Failed	
Area 5, WEF North	10/15/96	10/22/96	18.60	0.97	1.37
Area 5, WEF North	10/22/96	10/29/96	11.80	0.91	1.46
Area 5, WEF North	10/29/96	11/05/96	24.90	1.05	1.37
Area 5, WEF South	10/09/96	10/15/96	31.00	1.46	1.99
Area 5, WEF South	10/15/96	10/22/96	19.20	1.13	1.68
Area 5, WEF South	10/22/96	10/29/96	18.00	1.16	1.79

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, WEF South	10/29/96	11/05/96	29.40	1.28	1.70
Area 5, RWMS Pit 5	12/26/95	01/03/96	25.90	1.10	1.43
Area 5, RWMS Pit 5	01/03/96	01/08/96	20.60	1.48	2.34
Area 5, RWMS Pit 5	01/08/96	01/16/96	16.90	1.03	1.55
Area 5, RWMS Pit 5	01/16/96	01/22/96	11.00	1.18	2.04
Area 5, RWMS Pit 5	01/22/96	01/29/96	10.20	1.01	1.70
Area 5, RWMS Pit 5	01/29/96	02/05/96	17.10	1.13	1.73
Area 5, RWMS Pit 5	02/05/96	02/12/96	15.60	1.11	1.73
Area 5, RWMS Pit 5	02/12/96	02/20/96		Filter Head Missing	
Area 5, RWMS Pit 5	02/20/96	02/26/96	9.28	1.13	1.99
Area 5, RWMS Pit 5	02/26/96	03/04/96	13.70	1.10	1.78
Area 5, RWMS Pit 5	03/04/96	03/11/96	10.40	1.07	1.83
Area 5, RWMS Pit 5	03/11/96	03/18/96	6.78	0.97	1.75
Area 5, RWMS Pit 5	03/18/96	03/25/96	13.90	1.09	1.76
Area 5, RWMS Pit 5	03/25/96	04/01/96	18.10	1.18	1.78
Area 5, RWMS Pit 5	04/01/96	04/09/96	12.80	1.00	1.60
Area 5, RWMS Pit 5	04/09/96	04/15/96	15.60	1.26	2.02
Area 5, RWMS Pit 5	04/15/96	04/24/96	12.50	0.88	1.36
Area 5, RWMS Pit 5	04/24/96	04/30/96	14.20	1.31	2.18
Area 5, RWMS Pit 5	04/30/96	05/08/96	16.60	1.07	1.65
Area 5, RWMS Pit 5	05/08/96	05/14/96	17.70	1.50	2.48
Area 5, RWMS Pit 5	05/14/96	05/22/96	11.10	1.16	1.97
Area 5, RWMS Pit 5	05/22/96	05/29/96	14.20	1.40	2.37
Area 5, RWMS Pit 5	05/29/96	06/04/96	21.90	1.70	2.71
Area 5, RWMS Pit 5	06/04/96	06/11/96	24.50	3.69	6.73
Area 5, RWMS Pit 5	06/11/96	06/18/96	25.20	4.66	8.68
Area 5, RWMS Pit 5	06/18/96	06/24/96	23.70	5.81	11.10
Area 5, RWMS Pit 5	06/24/96	07/01/96	18.10	1.21	1.87
Area 5, RWMS Pit 5	07/01/96	07/09/96	17.70	3.04	5.63
Area 5, RWMS Pit 5	07/09/96	07/16/96	18.30	1.34	2.11
Area 5, RWMS Pit 5	07/16/96	07/24/96	15.00	1.00	1.54
Area 5, RWMS Pit 5	07/24/96	07/30/96	25.10	1.43	2.10
Area 5, RWMS Pit 5	07/30/96	08/06/96	17.80	1.19	1.85
Area 5, RWMS Pit 5	08/06/96	08/13/96	20.60	1.18	1.73
Area 5, RWMS Pit 5	08/13/96	08/20/96	22.80	1.21	1.74
Area 5, RWMS Pit 5	08/20/96	08/27/96	20.90	1.24	1.85
Area 5, RWMS Pit 5	08/27/96	09/04/96	16.70	1.03	1.53
Area 5, RWMS Pit 5	09/04/96	09/10/96	18.80	1.33	2.11
Area 5, RWMS Pit 5	09/10/96	09/17/96	15.10	1.10	1.75
Area 5, RWMS Pit 5	09/17/96	09/24/96	24.80	1.28	1.82
Area 5, RWMS Pit 5	09/24/96	09/30/96	25.80	1.41	2.03
Area 5, RWMS Pit 5	09/30/96	10/08/96	30.80	1.25	1.60
Area 5, RWMS Pit 5	10/08/96	10/15/96	22.50	1.21	1.75
Area 5, RWMS Pit 5	10/15/96	10/22/96	15.70	1.12	1.77

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS Pit 5	10/22/96	10/29/96	14.20	1.12	1.83
Area 5, RWMS Pit 5	10/29/96	11/05/96	24.80	1.06	1.39
Area 5, RWMS Pit 5	11/05/96	11/12/96		Sample Head Missing	
Area 5, RWMS Pit 5	11/12/96	11/19/96	23.50	1.08	1.47
Area 5, RWMS Pit 5	11/19/96	11/26/96	10.50	0.89	1.45
Area 5, RWMS Pit 5	11/26/96	12/03/96	12.20	0.92	1.45
Area 5, RWMS Pit 5	12/03/96	12/10/96	19.90	1.03	2.37
Area 5, RWMS Pit 5	12/10/96	12/17/96	9.77	0.88	2.39
Area 5, RWMS Pit 5	12/17/96	12/30/96	14.90	0.62	1.32
Area 5, RWMS No. 4	12/26/95	01/03/96	23.70	1.05	1.39
Area 5, RWMS No. 4	01/03/96	01/08/96	25.90	1.46	2.13
Area 5, RWMS No. 4	01/08/96	01/16/96	21.30	1.02	1.40
Area 5, RWMS No. 4	01/16/96	01/22/96	13.00	1.13	1.87
Area 5, RWMS No. 4	01/22/96	01/29/96	13.10	0.99	1.57
Area 5, RWMS No. 4	01/29/96	02/05/96	22.60	1.13	1.57
Area 5, RWMS No. 4	02/05/96	02/12/96	27.90	1.20	1.57
Area 5, RWMS No. 4	02/12/96	02/20/96	25.90	1.07	1.38
Area 5, RWMS No. 4	02/20/96	02/26/96	11.00	1.08	1.82
Area 5, RWMS No. 4	02/26/96	03/04/96	15.80	1.05	1.63
Area 5, RWMS No. 4	03/04/96	03/11/96	10.70	0.98	1.64
Area 5, RWMS No. 4	03/11/96	03/18/96	15.50	1.03	1.58
Area 5, RWMS No. 4	03/18/96	03/25/96	16.70	1.04	1.56
Area 5, RWMS No. 4	03/25/96	04/01/96	17.70	1.09	1.62
Area 5, RWMS No. 4	04/01/96	04/08/96	19.80	1.09	1.57
Area 5, RWMS No. 4	04/08/96	04/15/96	15.10	1.05	1.62
Area 5, RWMS No. 4	04/15/96	04/24/96	12.50	0.81	1.22
Area 5, RWMS No. 4	04/24/96	05/01/96	18.60	1.10	1.64
Area 5, RWMS No. 4	05/01/96	05/08/96	19.90	1.11	1.61
Area 5, RWMS No. 4	05/08/96	05/14/96	22.00	1.45	2.23
Area 5, RWMS No. 4	05/14/96	05/22/96	16.20	0.95	1.40
Area 5, RWMS No. 4	05/22/96	05/29/96	12.00	1.03	1.69
Area 5, RWMS No. 4	05/29/96	06/04/96	18.80	1.17	1.74
Area 5, RWMS No. 4	06/04/96	06/11/96	25.70	1.17	1.59
Area 5, RWMS No. 4	06/11/96	06/18/96	22.20	1.08	1.48
Area 5, RWMS No. 4	06/18/96	06/24/96	19.40	1.17	1.77
Area 5, RWMS No. 4	06/24/96	07/01/96	10.50	0.95	1.58
Area 5, RWMS No. 4	07/01/96	07/09/96	21.40	1.01	1.40
Area 5, RWMS No. 4	07/09/96	07/23/96	10.10	0.55	0.78
Area 5, RWMS No. 4	07/23/96	07/30/96	22.00	1.14	1.63
Area 5, RWMS No. 4	07/30/96	08/06/96	22.40	1.12	1.58
Area 5, RWMS No. 4	08/06/96	08/13/96	27.30	1.18	1.55
Area 5, RWMS No. 4	08/13/96	08/20/96	25.90	1.14	1.52
Area 5, RWMS No. 4	08/20/96	08/27/96	19.70	1.12	1.65
Area 5, RWMS No. 4	08/27/96	09/04/96	22.80	1.02	1.36

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 4	09/04/96	09/10/96	20.10	1.25	1.88
Area 5, RWMS No. 4	09/10/96	09/17/96	15.20	1.00	1.55
Area 5, RWMS No. 4	09/17/96	09/24/96	26.50	1.21	1.63
Area 5, RWMS No. 4	09/24/96	09/30/96	26.60	1.31	1.83
Area 5, RWMS No. 4	09/30/96	10/08/96	36.90	1.23	1.44
Area 5, RWMS No. 4	10/08/96	10/15/96	26.70	1.18	1.58
Area 5, RWMS No. 4	10/15/96	10/22/96	19.40	1.10	1.61
Area 5, RWMS No. 4	10/22/96	10/29/96	13.00	1.04	1.69
Area 5, RWMS No. 4	10/29/96	11/05/96	32.10	1.26	1.59
Area 5, RWMS No. 4	11/05/96	11/12/96	22.00	1.13	1.60
Area 5, RWMS No. 4	11/12/96	11/19/96	26.00	1.22	1.66
Area 5, RWMS No. 4	11/19/96	11/26/96	11.50	1.00	1.65
Area 5, RWMS No. 4	11/26/96	12/03/96	13.60	1.02	1.62
Area 5, RWMS No. 4	12/03/96	12/10/96	Sample Head Missing		
Area 5, RWMS No. 4	12/10/96	12/17/96	11.30	0.99	2.67
Area 5, RWMS No. 4	12/17/96	12/24/96	24.50	1.20	2.70
Area 5, RWMS No. 4	12/24/96	12/31/96	20.40	1.14	2.74
Area 5, RWMS No. 5	12/26/95	01/03/96	21.50	0.96	1.28
Area 5, RWMS No. 5	01/03/96	01/08/96	23.50	1.34	1.95
Area 5, RWMS No. 5	01/08/96	01/16/96	22.60	0.97	1.28
Area 5, RWMS No. 5	01/16/96	01/22/96	12.50	1.04	1.70
Area 5, RWMS No. 5	01/22/96	01/29/96	11.60	0.90	1.43
Area 5, RWMS No. 5	01/29/96	02/05/96	26.20	1.10	1.41
Area 5, RWMS No. 5	02/05/96	02/12/96	26.80	1.11	1.42
Area 5, RWMS No. 5	02/12/96	02/20/96	26.60	1.03	1.29
Area 5, RWMS No. 5	02/20/96	02/26/96	13.50	1.06	1.71
Area 5, RWMS No. 5	02/26/96	03/04/96	14.20	0.97	1.52
Area 5, RWMS No. 5	03/04/96	03/11/96	11.70	0.95	1.54
Area 5, RWMS No. 5	03/11/96	03/18/96	13.00	0.94	1.46
Area 5, RWMS No. 5	03/18/96	03/25/96	15.70	0.97	1.45
Area 5, RWMS No. 5	03/25/96	04/01/96	17.10	1.02	1.51
Area 5, RWMS No. 5	04/01/96	04/08/96	17.40	1.00	1.46
Area 5, RWMS No. 5	04/08/96	04/15/96	16.10	1.01	1.51
Area 5, RWMS No. 5	04/15/96	04/24/96	13.10	0.77	1.13
Area 5, RWMS No. 5	04/24/96	05/01/96	16.50	1.01	1.51
Area 5, RWMS No. 5	05/01/96	05/08/96	18.10	1.02	1.48
Area 5, RWMS No. 5	05/08/96	05/14/96	17.90	1.35	2.16
Area 5, RWMS No. 5	05/14/96	05/22/96	16.70	0.91	1.30
Area 5, RWMS No. 5	05/22/96	05/29/96	17.70	1.04	1.53
Area 5, RWMS No. 5	05/29/96	06/04/96	22.60	1.20	1.71
Area 5, RWMS No. 5	06/04/96	06/11/96	26.20	1.16	1.56
Area 5, RWMS No. 5	06/11/96	06/18/96	23.70	1.09	1.46
Area 5, RWMS No. 5	06/18/96	06/24/96	15.30	1.09	1.73
Area 5, RWMS No. 5	06/24/96	07/01/96	18.50	1.06	1.57

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 5	07/01/96	07/09/96	20.90	0.99	1.36
Area 5, RWMS No. 5	07/09/96	07/16/96	19.50	1.04	1.50
Area 5, RWMS No. 5	07/16/96	07/23/96	21.80	1.31	1.94
Area 5, RWMS No. 5	07/23/96	07/30/96	17.70	0.91	1.28
Area 5, RWMS No. 5	07/30/96	08/06/96	20.80	1.08	1.54
Area 5, RWMS No. 5	08/06/96	08/13/96	25.80	1.16	1.53
Area 5, RWMS No. 5	08/13/96	08/20/96	24.90	1.11	1.49
Area 5, RWMS No. 5	08/20/96	08/27/96	22.40	1.14	1.60
Area 5, RWMS No. 5	08/27/96	09/04/96	20.20	0.97	1.33
Area 5, RWMS No. 5	09/04/96	09/10/96	21.60	1.23	1.82
Area 5, RWMS No. 5	09/10/96	09/17/96	18.60	1.04	1.52
Area 5, RWMS No. 5	09/17/96	09/24/96	30.20	1.23	1.58
Area 5, RWMS No. 5	09/24/96	09/30/96	27.10	1.29	1.77
Area 5, RWMS No. 5	09/30/96	10/08/96	35.60	1.19	1.40
Area 5, RWMS No. 5	10/08/96	10/15/96	27.00	1.16	1.52
Area 5, RWMS No. 5	10/15/96	10/22/96	19.70	1.07	1.57
Area 5, RWMS No. 6	12/26/95	01/03/96	22.20	1.01	1.36
Area 5, RWMS No. 6	01/03/96	01/08/96	22.80	1.39	2.07
Area 5, RWMS No. 6	01/08/96	01/16/96	26.50	1.06	1.36
Area 5, RWMS No. 6	01/16/96	01/22/96	11.30	1.08	1.82
Area 5, RWMS No. 6	01/22/96	01/29/96	11.30	0.94	1.52
Area 5, RWMS No. 6	01/29/96	02/05/96	21.70	1.11	1.54
Area 5, RWMS No. 6	02/05/96	02/12/96	25.30	1.12	1.47
Area 5, RWMS No. 6	02/12/96	02/20/96	24.00	1.01	1.30
Area 5, RWMS No. 6	02/20/96	02/26/96	10.60	1.03	1.73
Area 5, RWMS No. 6	02/26/96	03/04/96	13.90	0.98	1.55
Area 5, RWMS No. 6	03/04/96	03/11/96	11.90	0.96	1.56
Area 5, RWMS No. 6	03/11/96	03/18/96	12.20	0.93	1.48
Area 5, RWMS No. 6	03/18/96	03/25/96	17.50	1.02	1.48
Area 5, RWMS No. 6	03/25/96	04/01/96	16.70	2.06	3.65
Area 5, RWMS No. 6	04/01/96	04/08/96	14.90	0.97	1.48
Area 5, RWMS No. 6	04/08/96	04/15/96	15.90	1.32	2.15
Area 5, RWMS No. 6	04/15/96	04/24/96	12.50	0.72	1.05
Area 5, RWMS No. 6	04/24/96	05/01/96	15.90	0.95	1.41
Area 5, RWMS No. 6	05/01/96	05/08/96	16.70	0.95	1.39
Area 5, RWMS No. 6	05/08/96	05/14/96	17.50	1.14	1.74
Area 5, RWMS No. 6	05/14/96	05/22/96	14.50	0.83	1.22
Area 5, RWMS No. 6	05/22/96	05/29/96	15.20	0.94	1.42
Area 5, RWMS No. 6	05/29/96	06/04/96	17.80	0.97	1.38
Area 5, RWMS No. 6	06/04/96	06/11/96	29.90	1.40	1.93
Area 5, RWMS No. 6	06/11/96	06/18/96	13.50	0.83	1.24
Area 5, RWMS No. 6	06/18/96	06/24/96	17.80	1.10	1.67
Area 5, RWMS No. 6	06/24/96	07/01/96	21.40	5.05	9.66
Area 5, RWMS No. 6	07/01/96	07/09/96	19.20	1.03	1.48

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 6	07/09/96	07/16/96	19.90	1.01	1.44
Area 5, RWMS No. 6	07/16/96	07/23/96	11.40	0.89	1.42
Area 5, RWMS No. 6	07/23/96	07/30/96	26.60	1.16	1.54
Area 5, RWMS No. 6	07/30/96	08/06/96	20.30	1.05	1.48
Area 5, RWMS No. 6	08/06/96	08/13/96	26.80	1.13	1.46
Area 5, RWMS No. 6	08/13/96	08/20/96	22.00	1.07	1.49
Area 5, RWMS No. 6	08/20/96	08/27/96	19.70	1.04	1.50
Area 5, RWMS No. 6	08/27/96	09/04/96	21.50	0.96	1.27
Area 5, RWMS No. 6	09/04/96	09/10/96	22.20	1.21	1.76
Area 5, RWMS No. 6	09/10/96	09/17/96	18.90	1.02	1.47
Area 5, RWMS No. 6	09/17/96	09/24/96	26.60	1.16	1.53
Area 5, RWMS No. 6	09/24/96	09/30/96	22.60	1.20	1.72
Area 5, RWMS No. 6	09/30/96	10/08/96	36.50	1.23	1.45
Area 5, RWMS No. 6	10/08/96	10/15/96	25.30	1.12	1.49
Area 5, RWMS No. 6	10/15/96	10/22/96	20.60	1.07	1.53
Area 5, RWMS No. 6	10/22/96	10/29/96	14.20	1.01	1.59
Area 5, RWMS No. 6	10/29/96	11/05/96	24.20	1.11	1.50
Area 5, RWMS No. 6	11/05/96	11/12/96	21.00	1.07	1.51
Area 5, RWMS No. 6	11/12/96	11/19/96	28.60	1.36	1.87
Area 5, RWMS No. 6	11/19/96	11/26/96		Circuit Breaker Tripped	
Area 5, RWMS No. 6	11/26/96	12/03/96	10.80	2.00	3.74
Area 5, RWMS No. 6	12/03/96	12/10/96	22.00	1.00	2.19
Area 5, RWMS No. 6	12/10/96	12/17/96	8.07	0.79	2.19
Area 5, RWMS No. 6	12/17/96	12/24/96	19.40	0.98	2.22
Area 5, RWMS No. 6	12/24/96	12/31/96	19.80	0.94	2.12
Area 5, RWMS No. 7	12/26/95	01/03/96	17.90	0.85	1.17
Area 5, RWMS No. 7	01/03/96	01/08/96	21.10	1.21	1.78
Area 5, RWMS No. 7	01/08/96	01/16/96	17.60	0.85	1.18
Area 5, RWMS No. 7	01/16/96	01/22/96	10.90	0.95	1.57
Area 5, RWMS No. 7	01/22/96	01/29/96	10.60	0.82	1.30
Area 5, RWMS No. 7	01/29/96	02/05/96	22.40	0.99	1.30
Area 5, RWMS No. 7	02/05/96	02/12/96	23.00	1.00	1.32
Area 5, RWMS No. 7	02/12/96	02/20/96	13.30	0.79	1.18
Area 5, RWMS No. 7	02/20/96	02/26/96	8.34	0.88	1.51
Area 5, RWMS No. 7	02/26/96	03/04/96	11.30	0.85	1.35
Area 5, RWMS No. 7	03/04/96	03/11/96	11.00	0.86	1.39
Area 5, RWMS No. 7	03/11/96	03/18/96	10.60	0.83	1.32
Area 5, RWMS No. 7	03/18/96	03/25/96		Sample Lost	
Area 5, RWMS No. 7	03/25/96	04/01/96	12.60	0.88	1.36
Area 5, RWMS No. 7	04/01/96	04/09/96	13.00	0.81	1.21
Area 5, RWMS No. 7	04/09/96	04/15/96	13.60	0.98	1.53
Area 5, RWMS No. 7	04/15/96	04/24/96	12.60	0.71	1.03
Area 5, RWMS No. 7	04/24/96	05/01/96	14.80	0.94	1.43
Area 5, RWMS No. 7	05/01/96	05/08/96	16.30	0.95	1.39

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 7	05/08/96	05/14/96	18.10	1.10	1.67
Area 5, RWMS No. 7	05/14/96	05/22/96	12.40	0.79	1.21
Area 5, RWMS No. 7	05/22/96	05/29/96	10.50	0.86	1.39
Area 5, RWMS No. 7	05/29/96	06/04/96	21.10	1.13	1.61
Area 5, RWMS No. 7	06/04/96	06/11/96	23.60	1.09	1.50
Area 5, RWMS No. 7	06/11/96	06/18/96	19.50	0.99	1.40
Area 5, RWMS No. 7	06/18/96	06/24/96		Power Out	
Area 5, RWMS No. 7	06/24/96	07/01/96		Sample Head Missing	
Area 5, RWMS No. 7	07/01/96	07/09/96	17.30	0.88	1.25
Area 5, RWMS No. 7	07/09/96	07/16/96	18.20	0.95	1.35
Area 5, RWMS No. 7	07/16/96	07/23/96	17.10	0.94	1.35
Area 5, RWMS No. 7	07/23/96	07/30/96	25.00	1.10	1.46
Area 5, RWMS No. 7	07/30/96	08/06/96	19.40	0.99	1.41
Area 5, RWMS No. 7	08/06/96	08/13/96	22.70	1.03	1.37
Area 5, RWMS No. 7	08/13/96	08/20/96	20.20	0.98	1.36
Area 5, RWMS No. 7	08/20/96	08/27/96	16.90	0.98	1.44
Area 5, RWMS No. 7	08/27/96	09/04/96	22.00	0.93	1.20
Area 5, RWMS No. 7	09/04/96	09/10/96		Filter Head Missing	
Area 5, RWMS No. 7	09/10/96	09/17/96	14.90	0.91	1.36
Area 5, RWMS No. 7	09/17/96	09/24/96	26.40	1.10	1.44
Area 5, RWMS No. 7	09/24/96	09/30/96	23.10	1.15	1.61
Area 5, RWMS No. 7	09/30/96	10/08/96	35.10	5.77	10.60
Area 5, RWMS No. 7	10/08/96	10/15/96	22.90	1.04	1.40
Area 5, RWMS No. 7	10/15/96	10/22/96	16.40	0.96	1.43
Area 5, RWMS No. 8	12/26/95	01/03/96	26.00	1.18	1.57
Area 5, RWMS No. 8	01/03/96	01/08/96	24.10	1.57	2.39
Area 5, RWMS No. 8	01/08/96	01/16/96	27.80	1.19	1.57
Area 5, RWMS No. 8	01/16/96	01/22/96	10.30	1.17	2.06
Area 5, RWMS No. 8	01/22/96	01/29/96	13.10	1.07	1.74
Area 5, RWMS No. 8	01/29/96	02/05/96	24.90	1.26	1.75
Area 5, RWMS No. 8	02/05/96	02/12/96	22.60	1.10	1.50
Area 5, RWMS No. 8	02/12/96	02/20/96	10.20	0.83	1.33
Area 5, RWMS No. 8	02/20/96	02/26/96	11.30	1.05	1.75
Area 5, RWMS No. 8	02/26/96	03/04/96	17.20	1.04	1.57
Area 5, RWMS No. 8	03/04/96	03/11/96	12.30	0.97	1.57
Area 5, RWMS No. 8	03/11/96	03/18/96	13.70	0.96	1.49
Area 5, RWMS No. 8	03/18/96	03/25/96	15.90	0.99	1.47
Area 5, RWMS No. 8	03/25/96	04/01/96	16.30	1.02	1.54
Area 5, RWMS No. 8	04/01/96	04/09/96	15.70	0.92	1.36
Area 5, RWMS No. 8	04/09/96	04/15/96	14.80	1.09	1.71
Area 5, RWMS No. 8	04/15/96	04/24/96	13.30	0.78	1.16
Area 5, RWMS No. 8	04/24/96	05/01/96	14.30	1.00	1.57
Area 5, RWMS No. 8	05/01/96	05/08/96	19.90	1.06	1.52
Area 5, RWMS No. 8	05/08/96	05/14/96	21.70	1.24	1.82

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 8	05/14/96	05/22/96	15.70	0.91	1.32
Area 5, RWMS No. 8	05/22/96	05/29/96	16.50	1.01	1.53
Area 5, RWMS No. 8	05/29/96	06/04/96	24.40	1.31	1.85
Area 5, RWMS No. 8	06/04/96	06/11/96	24.60	1.15	1.59
Area 5, RWMS No. 8	06/11/96	06/18/96	20.20	1.06	1.49
Area 5, RWMS No. 8	06/18/96	07/01/96	14.20	1.39	2.35
Area 5, RWMS No. 8	07/01/96	07/09/96	19.10	0.98	1.41
Area 5, RWMS No. 8	07/09/96	07/16/96	20.70	1.07	1.52
Area 5, RWMS No. 8	07/16/96	07/23/96	18.10	1.03	1.51
Area 5, RWMS No. 8	07/23/96	07/30/96	11.80	0.97	1.57
Area 5, RWMS No. 8	07/30/96	08/06/96	18.90	1.06	1.54
Area 5, RWMS No. 8	08/06/96	08/13/96	25.90	1.14	1.50
Area 5, RWMS No. 8	08/13/96	08/20/96	21.50	1.07	1.51
Area 5, RWMS No. 8	08/20/96	08/27/96	19.90	1.07	1.54
Area 5, RWMS No. 8	08/27/96	09/04/96	22.00	0.99	1.32
Area 5, RWMS No. 8	09/04/96	09/10/96	23.00	1.25	1.81
Area 5, RWMS No. 8	09/10/96	09/17/96	16.10	1.00	1.51
Area 5, RWMS No. 8	09/17/96	09/24/96	24.00	1.15	1.58
Area 5, RWMS No. 8	09/24/96	09/30/96	24.70	1.26	1.77
Area 5, RWMS No. 8	09/30/96	10/08/96	31.50	1.15	1.40
Area 5, RWMS No. 8	10/08/96	10/15/96	24.30	1.12	1.53
Area 5, RWMS No. 8	10/15/96	10/22/96	21.40	1.10	1.57
Area 5, RWMS No. 8	10/22/96	10/29/96	13.80	1.02	1.62
Area 5, RWMS No. 8	10/29/96	11/05/96	21.10	1.09	1.53
Area 5, RWMS No. 8	11/05/96	11/12/96	21.30	1.10	1.55
Area 5, RWMS No. 8	11/12/96	11/19/96	25.30	1.18	1.60
Area 5, RWMS No. 8	11/19/96	11/26/96	11.90	0.98	1.59
Area 5, RWMS No. 8	11/26/96	12/03/96	14.70	1.01	1.57
Area 5, RWMS No. 8	12/03/96	12/10/96	23.80	1.14	2.55
Area 5, RWMS No. 8	12/10/96	12/17/96	Sample Head Missing		
Area 5, RWMS No. 8	12/17/96	12/24/96	24.20	1.17	2.62
Area 5, RWMS No. 8	12/24/96	12/31/96	23.70	1.16	2.64
Area 5, RWMS No. 9	12/26/95	01/03/96	18.90	0.98	1.39
Area 5, RWMS No. 9	01/03/96	01/08/96	20.40	1.38	2.11
Area 5, RWMS No. 9	01/08/96	01/16/96	24.00	1.04	1.38
Area 5, RWMS No. 9	01/16/96	01/22/96	10.40	1.07	1.85
Area 5, RWMS No. 9	01/22/96	01/29/96	9.50	0.92	1.54
Area 5, RWMS No. 9	01/29/96	02/05/96	22.20	1.10	1.52
Area 5, RWMS No. 9	02/05/96	02/12/96	22.50	1.11	1.53
Area 5, RWMS No. 9	02/12/96	02/20/96	21.90	1.01	1.36
Area 5, RWMS No. 9	02/20/96	02/26/96	8.79	1.02	1.79
Area 5, RWMS No. 9	02/26/96	03/04/96	16.10	1.05	1.61
Area 5, RWMS No. 9	03/04/96	03/11/96	11.10	0.97	1.61
Area 5, RWMS No. 9	03/11/96	03/18/96	17.50	1.04	1.55

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 9	03/18/96	03/25/96	10.70	0.93	1.51
Area 5, RWMS No. 9	03/25/96	04/01/96	16.40	1.04	1.58
Area 5, RWMS No. 9	04/01/96	04/09/96	14.30	0.92	1.39
Area 5, RWMS No. 9	04/09/96	04/15/96	17.10	1.15	1.75
Area 5, RWMS No. 9	04/15/96	04/24/96	11.70	0.78	1.19
Area 5, RWMS No. 9	04/24/96	05/01/96	13.20	1.00	1.60
Area 5, RWMS No. 9	05/01/96	05/08/96	18.40	1.07	1.56
Area 5, RWMS No. 9	05/08/96	05/14/96	18.70	1.22	1.86
Area 5, RWMS No. 9	05/14/96	05/22/96	12.20	0.87	1.35
Area 5, RWMS No. 9	05/22/96	05/29/96	13.70	1.01	1.61
Area 5, RWMS No. 9	05/29/96	06/04/96	16.60	1.15	1.78
Area 5, RWMS No. 9	06/04/96	06/11/96	25.70	1.31	1.87
Area 5, RWMS No. 9	06/11/96	06/18/96	21.20	1.03	1.41
Area 5, RWMS No. 9	06/18/96	06/24/96		Power Out	
Area 5, RWMS No. 9	06/24/96	07/01/96		Power Out	
Area 5, RWMS No. 9	07/01/96	07/09/96	19.40	0.99	1.39
Area 5, RWMS No. 9	07/09/96	07/16/96	22.70	1.16	1.63
Area 5, RWMS No. 9	07/16/96	07/23/96	18.20	1.10	1.63
Area 5, RWMS No. 9	07/23/96	07/30/96	24.30	1.23	1.73
Area 5, RWMS No. 9	07/30/96	08/06/96	21.90	1.17	1.69
Area 5, RWMS No. 9	08/06/96	08/13/96	28.30	1.25	1.66
Area 5, RWMS No. 9	08/13/96	08/20/96	28.40	1.24	1.65
Area 5, RWMS No. 9	08/20/96	08/27/96	25.80	1.26	1.75
Area 5, RWMS No. 9	08/27/96	09/04/96	22.40	1.06	1.45
Area 5, RWMS No. 9	09/04/96	09/10/96	21.30	1.32	2.00
Area 5, RWMS No. 9	09/10/96	09/17/96	12.90	1.02	1.65
Area 5, RWMS No. 9	09/17/96	09/24/96	29.50	1.30	1.74
Area 5, RWMS No. 9	09/24/96	09/30/96	26.40	1.37	1.95
Area 5, RWMS No. 9	09/30/96	10/08/96	37.90	1.30	1.54
Area 5, RWMS No. 9	10/08/96	10/15/96	28.40	1.26	1.69
Area 5, RWMS No. 9	10/15/96	10/22/96	23.50	1.21	1.73
Area 5, DOD Pad	12/26/95	01/03/96	25.10	1.03	1.33
Area 5, DOD Pad	01/03/96	01/08/96	24.10	1.40	2.08
Area 5, DOD Pad	01/08/96	01/16/96	26.30	1.04	1.33
Area 5, DOD Pad	01/16/96	01/22/96	11.20	1.03	1.72
Area 5, DOD Pad	01/22/96	01/29/96	10.20	0.90	1.48
Area 5, DOD Pad	01/29/96	02/05/96	25.80	1.12	1.47
Area 5, DOD Pad	02/05/96	02/12/96		Meter Failed	
Area 5, DOD Pad	02/12/96	02/20/96		Sample Head Missing	
Area 5, DOD Pad	02/20/96	02/26/96	9.52	1.04	1.80
Area 5, DOD Pad	02/26/96	03/04/96	17.50	1.03	1.53
Area 5, DOD Pad	03/04/96	03/11/96	10.70	0.95	1.58
Area 5, DOD Pad	03/11/96	03/18/96	12.90	0.98	1.57
Area 5, DOD Pad	03/18/96	03/25/96	17.70	1.03	1.50

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, DOD Pad	03/25/96	04/01/96	16.30	1.03	1.55
Area 5, DOD Pad	04/01/96	04/09/96	16.00	0.94	1.38
Area 5, DOD Pad	04/09/96	04/15/96	15.90	1.13	1.77
Area 5, DOD Pad	04/15/96	04/24/96	14.90	0.83	1.20
Area 5, DOD Pad	04/24/96	05/01/96	16.40	1.03	1.57
Area 5, DOD Pad	05/01/96	05/08/96	19.10	1.08	1.58
Area 5, DOD Pad	05/08/96	05/14/96	22.80	1.22	1.74
Area 5, DOD Pad	05/14/96	05/22/96	14.60	0.88	1.29
Area 5, DOD Pad	05/22/96	05/29/96	9.51	0.91	1.53
Area 5, DOD Pad	05/29/96	06/04/96	16.50	1.11	1.70
Area 5, DOD Pad	06/04/96	06/11/96	24.30	1.14	1.57
Area 5, DOD Pad	06/11/96	06/18/96	22.90	1.10	1.53
Area 5, DOD Pad	06/18/96	06/24/96	19.10	1.17	1.76
Area 5, DOD Pad	06/24/96	07/01/96	18.40	1.06	1.57
Area 5, DOD Pad	07/01/96	07/09/96	20.50	0.98	1.33
Area 5, DOD Pad	07/09/96	07/16/96	24.20	1.10	1.47
Area 5, DOD Pad	07/17/96	07/23/96	20.70	1.21	1.78
Area 5, DOD Pad	07/23/96	07/30/96	23.30	1.13	1.57
Area 5, DOD Pad	07/30/96	08/06/96	24.10	1.13	1.55
Area 5, DOD Pad	08/06/96	08/13/96	26.00	1.15	1.55
Area 5, DOD Pad	08/13/96	08/20/96	27.70	1.15	1.50
Area 5, DOD Pad	08/20/96	08/27/96	25.10	1.15	1.55
Area 5, DOD Pad	08/27/96	09/04/96	18.20	0.95	1.34
Area 5, DOD Pad	09/04/96	09/10/96	20.30	1.21	1.78
Area 5, DOD Pad	09/10/96	09/17/96	17.70	1.03	1.51
Area 5, DOD Pad	09/17/96	09/24/96	31.10	1.25	1.59
Area 5, DOD Pad	09/24/96	09/30/96	32.40	1.35	1.73
Area 5, DOD Pad	09/30/96	10/08/96	42.00	1.27	1.40
Area 5, DOD Pad	10/08/96	10/15/96	29.40	1.20	1.54
Area 5, DOD Pad	10/15/96	10/22/96	21.70	1.10	1.54
Area 5, DOD Pad	10/22/96	10/29/96	9.50	0.95	1.62
Area 5, DOD Pad	10/29/96	11/05/96	28.90	1.20	1.56
Area 5, DOD Pad	11/05/96	11/12/96	21.30	1.10	1.56
Area 5, DOD Pad	11/12/96	11/19/96	29.70	1.24	1.59
Area 5, DOD Pad	11/19/96	11/26/96	13.80	1.00	1.57
Area 5, DOD Pad	11/26/96	12/03/96	13.20	1.00	1.60
Area 5, DOD Pad	12/03/96	12/10/96	24.40	1.16	2.60
Area 5, DOD Pad	12/10/96	12/17/96	9.97	0.80	2.10
Area 5, DOD Pad	12/17/96	12/24/96	17.50	0.96	2.29
Area 5, DOD Pad	12/24/96	12/31/96	18.70	0.98	2.30
Area 5, RWMS No. 3	12/26/95	01/03/96	20.50	1.00	1.37
Area 5, RWMS No. 3	01/03/96	01/08/96	27.40	1.66	2.47
Area 5, RWMS No. 3	01/08/96	01/16/96	27.50	1.22	1.63
Area 5, RWMS No. 3	01/16/96	01/22/96	12.90	1.28	2.17

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 3	01/22/96	01/29/96	14.00	1.13	1.82
Area 5, RWMS No. 3	01/29/96	02/05/96	26.40	1.31	1.82
Area 5, RWMS No. 3	02/05/96	02/12/96	28.50	1.34	1.82
Area 5, RWMS No. 3	02/12/96	02/20/96	24.80	1.18	1.61
Area 5, RWMS No. 3	02/20/96	02/26/96	7.63	1.17	2.12
Area 5, RWMS No. 3	02/26/96	03/04/96	16.10	1.19	1.90
Area 5, RWMS No. 3	03/04/96	03/11/96	13.60	1.16	1.92
Area 5, RWMS No. 3	03/11/96	03/18/96	17.30	1.19	1.84
Area 5, RWMS No. 3	03/18/96	03/25/96	18.50	1.19	1.82
Area 5, RWMS No. 3	03/25/96	04/01/96	15.70	1.49	2.50
Area 5, RWMS No. 3	04/01/96	04/08/96	20.80	1.20	1.75
Area 5, RWMS No. 3	04/08/96	04/15/96	18.60	1.18	1.78
Area 5, RWMS No. 3	04/15/96	04/24/96	16.00	0.92	1.34
Area 5, RWMS No. 3	04/24/96	05/01/96	17.50	1.16	1.80
Area 5, RWMS No. 3	05/01/96	05/08/96	20.10	1.20	1.76
Area 5, RWMS No. 3	05/08/96	05/14/96	23.60	1.40	2.10
Area 5, RWMS No. 3	05/14/96	05/22/96	17.00	1.03	1.54
Area 5, RWMS No. 3	05/22/96	05/29/96	17.80	1.17	1.81
Area 5, RWMS No. 3	05/29/96	06/04/96	11.90	1.18	2.00
Area 5, RWMS No. 3	06/04/96	06/11/96	38.50	1.61	2.11
Area 5, RWMS No. 3	06/11/96	06/18/96	16.00	0.90	1.29
Area 5, RWMS No. 3	06/18/96	06/24/96	17.50	1.26	1.98
Area 5, RWMS No. 3	06/24/96	07/01/96	19.40	1.06	1.54
Area 5, RWMS No. 3	07/01/96	07/09/96	17.80	0.93	1.34
Area 5, RWMS No. 3	07/09/96	07/16/96	16.30	0.98	1.46
Area 5, RWMS No. 3	07/16/96	07/23/96	18.50	1.03	1.47
Area 5, RWMS No. 3	07/23/96	07/30/96	23.90	1.14	1.57
Area 5, RWMS No. 3	07/30/96	08/06/96	21.80	1.08	1.51
Area 5, RWMS No. 3	08/06/96	08/13/96	16.60	0.99	1.46
Area 5, RWMS No. 3	08/13/96	08/20/96	23.70	1.08	1.45
Area 5, RWMS No. 3	08/20/96	08/27/96	19.40	1.08	1.57
Area 5, RWMS No. 3	08/27/96	09/04/96	22.40	0.98	1.29
Area 5, RWMS No. 3	09/04/96	09/10/96	18.30	1.16	1.77
Area 5, RWMS No. 3	09/10/96	09/17/96	17.90	1.01	1.49
Area 5, RWMS No. 3	09/17/96	09/24/96	24.30	1.14	1.56
Area 5, RWMS No. 3	09/24/96	09/30/96	24.90	1.24	1.74
Area 5, RWMS No. 3	09/30/96	10/08/96	30.10	1.11	1.37
Area 5, RWMS No. 3	10/08/96	10/15/96	27.30	1.16	1.52
Area 5, RWMS No. 3	10/15/96	10/22/96	18.10	1.00	1.47
Area 5, RWMS No. 1	12/26/95	01/03/96	23.50	1.07	1.43
Area 5, RWMS No. 1	01/03/96	01/08/96	25.20	1.47	2.17
Area 5, RWMS No. 1	01/08/96	01/16/96	27.00	1.09	1.41
Area 5, RWMS No. 1	01/16/96	01/22/96	14.60	1.18	1.92
Area 5, RWMS No. 1	01/22/96	01/29/96	11.90	0.98	1.58

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 1	01/29/96	02/05/96	22.90	1.14	1.57
Area 5, RWMS No. 1	02/05/96	02/12/96	27.40	1.20	1.58
Area 5, RWMS No. 1	02/12/96	02/20/96	23.80	1.06	1.40
Area 5, RWMS No. 1	02/20/96	02/26/96	8.89	1.05	1.85
Area 5, RWMS No. 1	02/26/96	03/04/96	18.90	1.12	1.66
Area 5, RWMS No. 1	03/04/96	03/11/96	11.80	1.01	1.67
Area 5, RWMS No. 1	03/11/96	03/18/96	14.70	1.03	1.59
Area 5, RWMS No. 1	03/18/96	03/25/96	19.50	1.09	1.58
Area 5, RWMS No. 1	03/25/96	04/01/96	18.90	1.11	1.62
Area 5, RWMS No. 1	04/01/96	04/08/96		Meter Reading Error	
Area 5, RWMS No. 1	04/08/96	04/15/96	12.60	1.02	1.65
Area 5, RWMS No. 1	04/15/96	04/24/96	12.90	0.84	1.29
Area 5, RWMS No. 1	04/24/96	05/01/96	13.30	1.08	1.75
Area 5, RWMS No. 1	05/01/96	05/08/96	16.60	1.12	1.73
Area 5, RWMS No. 1	05/08/96	05/14/96	16.60	1.29	2.07
Area 5, RWMS No. 1	05/14/96	05/22/96	13.10	0.96	1.50
Area 5, RWMS No. 1	05/22/96	05/29/96	12.10	1.06	1.75
Area 5, RWMS No. 1	05/29/96	06/04/96	21.60	1.34	2.01
Area 5, RWMS No. 1	06/04/96	06/11/96	21.60	1.25	1.85
Area 5, RWMS No. 1	06/11/96	06/18/96	19.30	1.19	1.77
Area 5, RWMS No. 1	06/18/96	06/24/96	15.50	1.29	2.11
Area 5, RWMS No. 1	06/24/96	07/01/96	19.60	1.24	1.89
Area 5, RWMS No. 1	07/01/96	07/09/96	17.90	1.11	1.68
Area 5, RWMS No. 1	07/09/96	07/16/96	18.20	1.21	1.87
Area 5, RWMS No. 1	07/16/96	07/23/96	16.70	1.19	1.85
Area 5, RWMS No. 1	07/23/96	07/30/96	21.10	1.32	1.99
Area 5, RWMS No. 1	07/30/96	08/06/96	18.50	1.25	1.93
Area 5, RWMS No. 1	08/06/96	08/13/96	25.60	1.33	1.88
Area 5, RWMS No. 1	08/13/96	08/20/96	24.40	1.29	1.86
Area 5, RWMS No. 1	08/20/96	08/27/96	20.00	1.30	1.99
Area 5, RWMS No. 1	08/27/96	09/04/96	19.40	1.13	1.65
Area 5, RWMS No. 1	09/04/96	09/10/96	18.60	1.42	2.28
Area 5, RWMS No. 1	09/10/96	09/17/96	14.10	1.16	1.87
Area 5, RWMS No. 1	09/17/96	09/24/96	24.00	1.34	1.95
Area 5, RWMS No. 1	09/24/96	09/30/96	23.60	1.45	2.19
Area 5, RWMS No. 1	09/30/96	10/08/96	29.20	2.03	3.16
Area 5, RWMS No. 1	10/08/96	10/15/96	22.20	1.27	1.85
Area 5, RWMS No. 1	10/15/96	10/22/96	16.30	1.17	1.86
Area 5, RWMS No. 1	10/22/96	10/29/96	14.10	1.17	1.91
Area 5, RWMS No. 1	10/29/96	11/05/96	23.50	1.26	1.80
Area 5, RWMS No. 1	11/05/96	11/12/96	31.90	2.14	3.29
Area 5, RWMS No. 1	11/12/96	11/19/96	21.20	1.26	1.88
Area 5, RWMS No. 1	11/19/96	11/26/96	10.60	1.09	1.86
Area 5, RWMS No. 1	11/26/96	12/03/96	12.90	1.10	1.80

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS No. 1	12/03/96	12/10/96	18.90	1.20	2.97
Area 5, RWMS No. 1	12/10/96	12/17/96	8.55	1.04	2.99
Area 5, RWMS No. 1	12/17/96	12/24/96	20.40	1.22	2.97
Area 5, RWMS No. 1	12/24/96	12/31/96	18.30	1.20	3.01
Area 5, RWMS TP Building N	12/26/95	01/03/96	22.60	0.94	1.21
Area 5, RWMS TP Building N	01/03/96	01/08/96	25.50	1.31	1.85
Area 5, RWMS TP Building N	01/08/96	01/16/96	24.20	0.96	1.23
Area 5, RWMS TP Building N	01/16/96	01/22/96	8.85	0.94	1.63
Area 5, RWMS TP Building N	01/22/96	01/29/96	9.59	0.82	1.35
Area 5, RWMS TP Building N	01/29/96	02/05/96	33.30	1.14	1.34
Area 5, RWMS TP Building N	02/05/96	02/12/96	31.30	1.14	1.37
Area 5, RWMS TP Building N	02/12/96	02/20/96	25.60	0.99	1.22
Area 5, RWMS TP Building N	02/20/96	02/26/96	6.92	0.89	1.58
Area 5, RWMS TP Building N	02/26/96	03/04/96	12.60	0.89	1.40
Area 5, RWMS TP Building N	03/04/96	03/11/96	8.70	0.85	1.44
Area 5, RWMS TP Building N	03/11/96	03/18/96	12.70	0.90	1.38
Area 5, RWMS TP Building N	03/18/96	03/25/96	17.50	1.07	1.59
Area 5, RWMS TP Building N	03/25/96	04/01/96	17.40	1.09	1.63
Area 5, RWMS TP Building N	04/01/96	04/09/96	15.10	0.96	1.45
Area 5, RWMS TP Building N	04/09/96	04/15/96	9.22	1.05	1.82
Area 5, RWMS TP Building N	04/15/96	04/24/96	12.30	0.81	1.24
Area 5, RWMS TP Building N	04/24/96	04/30/96	13.90	0.95	1.48
Area 5, RWMS TP Building N	04/30/96	05/08/96	29.60	1.43	1.98
Area 5, RWMS TP Building N	05/08/96	05/14/96	21.20	1.30	1.96
Area 5, RWMS TP Building N	05/14/96	05/22/96	14.00	0.93	1.43
Area 5, RWMS TP Building N	05/22/96	05/29/96	9.70	0.98	1.68
Area 5, RWMS TP Building N	05/29/96	06/04/96	24.10	1.31	1.88
Area 5, RWMS TP Building N	06/04/96	06/11/96	31.60	1.32	1.74
Area 5, RWMS TP Building N	06/11/96	06/18/96	24.90	1.19	1.61
Area 5, RWMS TP Building N	06/18/96	06/24/96	14.20	1.16	1.90
Area 5, RWMS TP Building N	06/24/96	07/01/96	19.70	2.14	3.70
Area 5, RWMS TP Building N	07/01/96	07/09/96	22.30	1.09	1.52
Area 5, RWMS TP Building N	07/09/96	07/16/96	22.60	1.19	1.69
Area 5, RWMS TP Building N	07/16/96	07/24/96	Sample Head Missing		
Area 5, RWMS TP Building N	07/24/96	07/30/96	28.50	1.62	2.38
Area 5, RWMS TP Building N	07/30/96	08/06/96	27.80	1.27	1.73
Area 5, RWMS TP Building N	08/06/96	08/13/96	33.20	1.33	1.68
Area 5, RWMS TP Building N	08/13/96	08/20/96	25.80	1.21	1.66
Area 5, RWMS TP Building N	08/20/96	08/27/96	26.70	1.29	1.78
Area 5, RWMS TP Building N	08/27/96	09/04/96	17.20	0.99	1.45
Area 5, RWMS TP Building N	09/04/96	09/10/96	26.70	1.42	2.03
Area 5, RWMS TP Building N	09/10/96	09/17/96	20.00	1.15	1.69
Area 5, RWMS TP Building N	09/17/96	09/24/96	29.80	1.32	1.77
Area 5, RWMS TP Building N	09/24/96	09/30/96	23.10	1.33	1.95

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS TP Building N	09/30/96	10/08/96	37.90	1.30	1.55
Area 5, RWMS TP Building N	10/08/96	10/15/96	29.10	1.27	1.69
Area 5, RWMS TP Building N	10/15/96	10/22/96	20.40	1.17	1.74
Area 5, RWMS TP Building N	10/22/96	10/29/96	16.20	1.13	1.78
Area 5, RWMS TP Building N	10/29/96	11/05/96	36.50	1.37	1.68
Area 5, RWMS TP Building N	11/05/96	11/12/96	23.20	1.19	1.69
Area 5, RWMS TP Building N	11/12/96	11/19/96	44.30	1.49	1.75
Area 5, RWMS TP Building N	11/19/96	11/26/96	22.50	1.20	1.74
Area 5, RWMS TP Building N	11/26/96	12/03/96	11.10	1.02	1.71
Area 5, RWMS TP Building N	12/03/96	12/10/96	55.80	1.60	2.78
Area 5, RWMS TP Building N	12/10/96	12/17/96	13.10	1.07	2.82
Area 5, RWMS TP Building N	12/17/96	12/30/96	24.90	0.82	1.56
Area 5, RWMS TP Building S	12/26/95	01/03/96	Meter Reading Incorrect		
Area 5, RWMS TP Building S	01/03/96	01/08/96	25.60	1.34	1.91
Area 5, RWMS TP Building S	01/08/96	01/16/96	22.20	0.96	1.27
Area 5, RWMS TP Building S	01/16/96	01/22/96	9.88	0.99	1.69
Area 5, RWMS TP Building S	01/22/96	01/29/96	9.14	0.84	1.40
Area 5, RWMS TP Building S	01/29/96	02/05/96	39.50	1.24	1.38
Area 5, RWMS TP Building S	02/05/96	02/12/96	27.60	1.12	1.42
Area 5, RWMS TP Building S	02/12/96	02/20/96	26.40	1.02	1.26
Area 5, RWMS TP Building S	02/20/96	02/26/96	8.04	0.94	1.65
Area 5, RWMS TP Building S	02/26/96	03/04/96	13.90	0.94	1.46
Area 5, RWMS TP Building S	03/04/96	03/11/96	9.27	0.89	1.49
Area 5, RWMS TP Building S	03/11/96	03/18/96	13.90	0.93	1.43
Area 5, RWMS TP Building S	03/18/96	03/25/96	14.20	0.97	1.49
Area 5, RWMS TP Building S	03/25/96	04/01/96	15.70	1.03	1.58
Area 5, RWMS TP Building S	04/01/96	04/09/96	14.90	0.93	1.40
Area 5, RWMS TP Building S	04/09/96	04/15/96	15.40	1.13	1.78
Area 5, RWMS TP Building S	04/15/96	04/24/96	9.85	0.63	0.96
Area 5, RWMS TP Building S	04/24/96	04/30/96	14.50	1.06	1.68
Area 5, RWMS TP Building S	04/30/96	05/08/96	18.20	0.90	1.26
Area 5, RWMS TP Building S	05/08/96	05/14/96	21.00	1.15	1.68
Area 5, RWMS TP Building S	05/14/96	05/22/96	12.60	0.81	1.22
Area 5, RWMS TP Building S	05/22/96	05/29/96	8.33	0.84	1.44
Area 5, RWMS TP Building S	05/29/96	06/04/96	21.10	1.13	1.60
Area 5, RWMS TP Building S	06/04/96	06/11/96	26.10	1.11	1.47
Area 5, RWMS TP Building S	06/11/96	06/18/96	20.90	1.00	1.37
Area 5, RWMS TP Building S	06/18/96	06/24/96	15.50	1.05	1.61
Area 5, RWMS TP Building S	06/24/96	07/01/96	16.10	0.98	1.46
Area 5, RWMS TP Building S	07/01/96	07/09/96	17.60	0.91	1.29
Area 5, RWMS TP Building S	07/09/96	07/16/96	18.20	1.40	2.24
Area 5, RWMS TP Building S	07/16/96	07/24/96	Sample Head Missing		
Area 5, RWMS TP Building S	07/24/96	07/30/96	20.50	1.27	1.92
Area 5, RWMS TP Building S	07/30/96	08/06/96	23.20	1.03	1.39

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, RWMS TP Building S	08/06/96	08/13/96	25.40	1.05	1.35
Area 5, RWMS TP Building S	08/13/96	08/20/96	23.90	1.02	1.34
Area 5, RWMS TP Building S	08/20/96	08/27/96	22.60	1.05	1.43
Area 5, RWMS TP Building S	08/27/96	09/04/96	24.90	0.95	1.18
Area 5, RWMS TP Building S	09/04/96	09/10/96	18.00	1.08	1.62
Area 5, RWMS TP Building S	09/10/96	09/17/96	12.50	0.87	1.35
Area 5, RWMS TP Building S	09/17/96	09/24/96	25.70	1.09	1.43
Area 5, RWMS TP Building S	09/24/96	09/30/96	24.60	1.15	1.57
Area 5, RWMS TP Building S	09/30/96	10/08/96	32.90	1.07	1.25
Area 5, RWMS TP Building S	10/08/96	10/15/96	22.10	1.00	1.35
Area 5, RWMS TP Building S	10/15/96	10/22/96	16.70	0.95	1.41
Area 5, RWMS TP Building S	10/22/96	10/29/96	12.80	0.92	1.45
Area 5, RWMS TP Building S	10/29/96	11/05/96	31.90	1.13	1.36
Area 5, RWMS TP Building S	11/05/96	11/12/96	19.70	0.99	1.37
Area 5, RWMS TP Building S	11/12/96	11/19/96	37.10	1.22	1.42
Area 5, RWMS TP Building S	11/19/96	11/26/96	16.50	0.95	1.40
Area 5, RWMS TP Building S	11/26/96	12/03/96	9.32	0.84	1.39
Area 5, RWMS TP Building S	12/03/96	12/10/96	45.40	1.30	2.26
Area 5, RWMS TP Building S	12/10/96	12/17/96	9.72	0.85	2.29
Area 5, RWMS TP Building S	12/17/96	12/30/96	18.90	0.65	1.27
Area 5, Well 5B	12/26/95	01/03/96	25.50	1.02	1.29
Area 5, Well 5B	01/03/96	01/08/96	26.60	1.41	2.02
Area 5, Well 5B	01/08/96	01/16/96	25.10	1.00	1.29
Area 5, Well 5B	01/16/96	01/22/96	11.60	1.02	1.67
Area 5, Well 5B	01/22/96	01/29/96	11.00	0.89	1.43
Area 5, Well 5B	01/29/96	02/05/96	25.10	1.08	1.41
Area 5, Well 5B	02/05/96	02/12/96	28.40	1.13	1.42
Area 5, Well 5B	02/12/96	02/20/96	18.70	0.91	1.26
Area 5, Well 5B	02/20/96	02/26/96	9.39	0.99	1.70
Area 5, Well 5B	02/26/96	03/04/96	19.70	1.02	1.45
Area 5, Well 5B	03/04/96	03/11/96	13.30	0.93	1.44
Area 5, Well 5B	03/11/96	03/18/96	14.40	0.95	1.47
Area 5, Well 5B	03/18/96	03/25/96	17.10	0.96	1.39
Area 5, Well 5B	03/25/96	04/01/96	18.20	1.02	1.48
Area 5, Well 5B	04/01/96	04/08/96	15.90	0.97	1.44
Area 5, Well 5B	04/08/96	04/15/96	14.90	0.97	1.49
Area 5, Well 5B	04/15/96	04/24/96	13.10	0.76	1.12
Area 5, Well 5B	04/24/96	05/01/96	16.00	0.98	1.49
Area 5, Well 5B	05/01/96	05/08/96	20.70	1.06	1.49
Area 5, Well 5B	05/08/96	05/14/96	25.40	1.32	1.86
Area 5, Well 5B	05/14/96	05/22/96	16.10	0.95	1.40
Area 5, Well 5B	05/22/96	05/29/96	14.30	1.02	1.60
Area 5, Well 5B	05/29/96	06/04/96	17.40	1.18	1.82
Area 5, Well 5B	06/04/96	06/11/96	Sample Head Missing		

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 5, Well 5B	06/11/96	06/18/96	20.30	1.13	1.66
Area 5, Well 5B	06/18/96	06/26/96	16.40	0.96	1.40
Area 5, Well 5B	06/26/96	07/01/96	21.60	1.46	2.26
Area 5, Well 5B	07/01/96	07/09/96	21.80	1.03	1.41
Area 5, Well 5B	07/09/96	07/16/96	22.90	1.14	1.57
Area 5, Well 5B	07/16/96	07/23/96	21.10	1.13	1.60
Area 5, Well 5B	07/23/96	07/30/96	29.50	1.29	1.71
Area 5, Well 5B	07/30/96	08/06/96	21.40	1.06	1.48
Area 5, Well 5B	08/06/96	08/13/96	24.80	1.09	1.46
Area 5, Well 5B	08/13/96	08/20/96	23.90	1.09	1.47
Area 5, Well 5B	08/20/96	08/27/96	25.10	1.09	1.43
Area 5, Well 5B	08/27/96	09/04/96	22.40	0.97	1.29
Area 5, Well 5B	09/04/96	09/10/96	21.60	1.18	1.70
Area 5, Well 5B	09/10/96	09/17/96	19.70	1.00	1.40
Area 5, Well 5B	09/17/96	09/24/96	26.50	1.13	1.47
Area 5, Well 5B	09/24/96	09/30/96	29.50	1.27	1.66
Area 5, Well 5B	09/30/96	10/08/96	36.10	1.15	1.30
Area 5, Well 5B	10/08/96	10/15/96	28.50	1.12	1.41
Area 5, Well 5B	10/15/96	10/22/96	21.20	1.05	1.46
Area 5, Well 5B	10/22/96	10/29/96	16.00	1.02	1.55
Area 5, Well 5B	10/29/96	11/05/96	26.40	1.12	1.46
Area 5, Well 5B	11/05/96	11/12/96	24.10	1.09	1.47
Area 5, Well 5B	11/12/96	11/19/96	27.70	1.15	1.48
Area 5, Well 5B	11/19/96	11/26/96	15.80	0.98	1.47
Area 5, Well 5B	11/26/96	12/03/96	11.10	0.92	1.50
Area 5, Well 5B	12/03/96	12/10/96	24.70	1.11	2.44
Area 5, Well 5B	12/10/96	12/17/96	11.00	0.92	2.45
Area 5, Well 5B	12/17/96	12/24/96	21.80	1.09	2.51
Area 5, Well 5B	12/24/96	12/31/96	25.30	1.12	2.46
Area 6, Yucca	12/26/95	01/02/96	20.30	0.94	1.27
Area 6, Yucca	01/02/96	01/08/96	16.90	1.01	1.50
Area 6, Yucca	01/08/96	01/16/96	20.80	0.89	1.17
Area 6, Yucca	01/16/96	01/22/96	14.50	1.03	1.61
Area 6, Yucca	01/22/96	01/29/96	11.80	0.87	1.37
Area 6, Yucca	01/29/96	02/06/96	22.30	0.94	1.21
Area 6, Yucca	02/06/96	02/12/96	25.10	1.17	1.58
Area 6, Yucca	02/12/96	02/20/96	21.90	0.93	1.21
Area 6, Yucca	02/20/96	02/27/96	9.73	0.84	1.38
Area 6, Yucca	02/27/96	03/05/96	13.70	0.91	1.39
Area 6, Yucca	03/05/96	03/12/96	13.90	0.90	1.37
Area 6, Yucca	03/12/96	03/19/96	14.30	0.94	1.44
Area 6, Yucca	03/19/96	03/25/96	15.30	0.92	1.37
Area 6, Yucca	03/25/96	04/02/96	16.70	0.95	1.38
Area 6, Yucca	04/02/96	04/09/96	16.00	0.93	1.36

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 6, Yucca	04/09/96	04/16/96	13.00	0.92	1.45
Area 6, Yucca	04/16/96	04/25/96	9.86	0.68	1.06
Area 6, Yucca	04/25/96	05/02/96	14.30	0.96	1.48
Area 6, Yucca	05/02/96	05/08/96	17.10	1.06	1.60
Area 6, Yucca	05/08/96	05/14/96	22.50	1.21	1.74
Area 6, Yucca	05/14/96	05/22/96		Power Out	
Area 6, Yucca	05/22/96	05/29/96		Power Out	
Area 6, Yucca	05/29/96	06/04/96	23.30	1.03	1.36
Area 6, Yucca	06/04/96	06/11/96	25.80	1.09	1.44
Area 6, Yucca	06/11/96	06/18/96	32.30	1.60	2.26
Area 6, Yucca	06/18/96	06/24/96	10.70	0.74	1.15
Area 6, Yucca	06/24/96	07/16/96		Power Out	
Area 6, Yucca	07/16/96	07/23/96	20.80	1.33	2.02
Area 6, Yucca	07/23/96	07/30/96	21.70	1.05	1.45
Area 6, Yucca	07/30/96	08/06/96	20.20	1.03	1.45
Area 6, Yucca	08/06/96	08/13/96	22.50	1.07	1.47
Area 6, Yucca	08/13/96	08/20/96	20.50	1.04	1.46
Area 6, Yucca	08/20/96	08/27/96	23.00	1.05	1.40
Area 6, Yucca	08/27/96	09/04/96	19.00	0.92	1.27
Area 6, Yucca	09/04/96	09/10/96	20.50	1.15	1.67
Area 6, Yucca	09/10/96	09/17/96	15.10	0.94	1.42
Area 6, Yucca	09/17/96	09/24/96	26.50	1.11	1.42
Area 6, Yucca	09/24/96	09/30/96	26.40	1.21	1.63
Area 6, Yucca	09/30/96	10/08/96		Filter Head Missing	
Area 6, Yucca	10/08/96	10/15/96	26.00	1.09	1.42
Area 6, Yucca	10/15/96	10/22/96	19.70	1.02	1.45
Area 6, Yucca	10/22/96	10/29/96	15.20	0.95	1.45
Area 6, Yucca	10/29/96	11/05/96	24.00	1.09	1.46
Area 6, Yucca	11/05/96	11/12/96	19.30	1.00	1.42
Area 6, Yucca	11/12/96	11/19/96	26.30	1.22	1.65
Area 6, Yucca	11/19/96	11/26/96	11.40	0.97	1.59
Area 6, Yucca	11/26/96	12/03/96	11.30	0.98	1.62
Area 6, Yucca	12/03/96	12/10/96	20.70	1.14	2.69
Area 6, Yucca	12/10/96	12/17/96	10.80	1.01	2.76
Area 6, Yucca	12/17/96	12/24/96	20.30	1.20	2.89
Area 6, Yucca	12/24/96	12/31/96	22.00	1.21	2.86
Area 6, CP 6	12/26/95	01/02/96	21.90	1.04	1.42
Area 6, CP 6	01/02/96	01/08/96	19.10	1.14	1.68
Area 6, CP 6	01/08/96	01/16/96		Pump Failure	
Area 6, CP 6	01/16/96	01/22/96	11.10	1.04	1.75
Area 6, CP 6	01/22/96	01/29/96	10.70	0.91	1.48
Area 6, CP 6	01/29/96	02/06/96	22.50	0.99	1.30
Area 6, CP 6	02/06/96	02/12/96	22.90	1.19	1.69
Area 6, CP 6	02/12/96	02/20/96	21.30	0.97	1.29

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 6, CP 6	02/20/96	02/27/96	8.47	0.87	1.48
Area 6, CP 6	02/27/96	03/05/96	15.60	0.99	1.50
Area 6, CP 6	03/05/96	03/12/96	12.20	0.92	1.46
Area 6, CP 6	03/12/96	03/19/96	7.82	1.04	1.88
Area 6, CP 6	03/19/96	03/26/96	15.40	0.97	1.46
Area 6, CP 6	03/26/96	04/02/96	14.90	0.98	1.48
Area 6, CP 6	04/02/96	04/09/96	15.50	0.96	1.44
Area 6, CP 6	04/09/96	04/16/96	13.50	0.98	1.55
Area 6, CP 6	04/16/96	04/25/96	13.70	0.77	1.12
Area 6, CP 6	04/25/96	05/02/96	14.90	1.01	1.58
Area 6, CP 6	05/02/96	05/08/96	Volume Meter Failed		
Area 6, CP 6	05/08/96	05/14/96	19.20	1.26	1.92
Area 6, CP 6	05/14/96	05/22/96	10.30	0.89	1.47
Area 6, CP 6	05/22/96	05/29/96	8.60	0.98	1.70
Area 6, CP 6	05/29/96	06/04/96	21.20	1.28	1.91
Area 6, CP 6	06/04/96	06/11/96	20.50	1.18	1.74
Area 6, CP 6	06/11/96	06/18/96	22.70	1.18	1.70
Area 6, CP 6	06/18/96	06/24/96	17.60	1.28	2.02
Area 6, CP 6	06/24/96	07/01/96	15.00	1.08	1.71
Area 6, CP 6	07/01/96	07/09/96	17.40	1.01	1.47
Area 6, CP 6	07/09/96	07/16/96	22.30	1.18	1.67
Area 6, CP 6	07/16/96	07/23/96	20.90	1.15	1.66
Area 6, CP 6	07/23/96	07/30/96	25.00	1.24	1.74
Area 6, CP 6	07/30/96	08/06/96	24.50	1.22	1.70
Area 6, CP 6	08/06/96	08/13/96	24.20	1.25	1.77
Area 6, CP 6	08/13/96	08/20/96	22.70	1.20	1.73
Area 6, CP 6	08/20/96	08/27/96	22.60	1.19	1.68
Area 6, CP 6	08/27/96	09/04/96	20.10	1.05	1.50
Area 6, CP 6	09/04/96	09/10/96	20.80	1.34	2.04
Area 6, CP 6	09/10/96	09/17/96	21.80	1.19	1.69
Area 6, CP 6	09/17/96	09/24/96	31.70	1.33	1.72
Area 6, CP 6	09/24/96	09/30/96	28.20	1.38	1.91
Area 6, CP 6	09/30/96	10/08/96	36.30	1.28	1.53
Area 6, CP 6	10/08/96	10/15/96	26.20	1.24	1.70
Area 6, CP 6	10/15/96	10/22/96	18.90	1.17	1.75
Area 6, CP 6	10/22/96	10/29/96	12.60	1.06	1.73
Area 6, CP 6	10/29/96	11/05/96	26.50	1.27	1.76
Area 6, CP 6	11/05/96	11/12/96	20.10	1.16	1.71
Area 6, CP 6	11/12/96	11/19/96	24.40	1.26	1.76
Area 6, CP 6	11/19/96	11/26/96	8.76	0.98	1.71
Area 6, CP 6	11/26/96	12/03/96	10.40	1.03	1.77
Area 6, CP 6	12/03/96	12/10/96	17.80	1.15	2.85
Area 6, CP 6	12/10/96	12/17/96	12.70	1.07	2.88
Area 6, CP 6	12/17/96	12/24/96	20.30	1.21	2.94

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 6, CP 6	12/24/96	12/31/96	19.50	1.18	2.90
Area 6, Well 3	12/26/95	01/02/96	18.50	0.91	1.25
Area 6, Well 3	01/02/96	01/08/96	16.40	1.00	1.49
Area 6, Well 3	01/08/96	01/16/96	20.40	0.87	1.15
Area 6, Well 3	01/16/96	01/22/96	11.00	0.96	1.59
Area 6, Well 3	01/22/96	01/29/96	9.49	0.77	1.25
Area 6, Well 3	01/29/96	02/06/96	18.90	0.85	1.13
Area 6, Well 3	02/06/96	02/12/96	21.00	1.07	1.49
Area 6, Well 3	02/12/96	02/20/96	20.90	0.88	1.15
Area 6, Well 3	02/20/96	02/27/96	8.24	0.76	1.26
Area 6, Well 3	02/27/96	03/05/96	12.50	0.85	1.32
Area 6, Well 3	03/05/96	03/12/96	11.60	0.84	1.33
Area 6, Well 3	03/12/96	03/19/96	9.09	0.81	1.35
Area 6, Well 3	03/19/96	03/26/96	14.40	0.86	1.28
Area 6, Well 3	03/26/96	04/02/96	12.50	0.86	1.34
Area 6, Well 3	04/02/96	04/09/96	16.00	0.90	1.29
Area 6, Well 3	04/09/96	04/16/96	13.70	0.90	1.37
Area 6, Well 3	04/16/96	04/25/96	12.80	0.69	0.98
Area 6, Well 3	04/25/96	05/02/96	14.70	0.93	1.42
Area 6, Well 3	05/02/96	05/08/96	16.40	1.03	1.55
Area 6, Well 3	05/08/96	05/14/96	19.50	1.08	1.56
Area 6, Well 3	05/14/96	05/22/96	9.76	0.74	1.19
Area 6, Well 3	05/22/96	05/29/96	9.30	0.81	1.35
Area 6, Well 3	05/29/96	06/04/96	15.40	1.02	1.54
Area 6, Well 3	06/04/96	06/11/96	26.70	1.08	1.37
Area 6, Well 3	06/11/96	06/18/96	20.30	1.00	1.41
Area 6, Well 3	06/18/96	06/24/96	Sample Head Missing		
Area 6, Well 3	06/24/96	07/01/96	15.90	0.93	1.39
Area 6, Well 3	07/01/96	07/09/96	19.80	0.91	1.22
Area 6, Well 3	07/09/96	07/16/96	20.70	1.02	1.41
Area 6, Well 3	07/16/96	07/23/96	19.30	0.97	1.35
Area 6, Well 3	07/23/96	07/30/96	25.90	1.08	1.41
Area 6, Well 3	07/30/96	08/06/96	21.70	1.03	1.41
Area 6, Well 3	08/06/96	08/13/96	25.10	1.09	1.46
Area 6, Well 3	08/13/96	08/20/96	21.90	1.04	1.43
Area 6, Well 3	08/20/96	08/27/96	20.00	0.98	1.34
Area 6, Well 3	08/27/96	09/04/96	18.40	0.90	1.25
Area 6, Well 3	09/04/96	09/10/96	20.00	1.11	1.61
Area 6, Well 3	09/10/96	09/17/96	17.10	1.01	1.48
Area 6, Well 3	09/17/96	09/24/96	28.40	1.15	1.46
Area 6, Well 3	09/24/96	09/30/96	28.10	1.25	1.66
Area 6, Well 3	09/30/96	10/08/96	39.60	1.16	1.25
Area 6, Well 3	10/08/96	10/15/96	27.20	1.15	1.49
Area 6, Well 3	10/15/96	10/22/96	20.70	1.05	1.47

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 6, Well 3	10/22/96	10/29/96	13.70	0.95	1.48
Area 6, Well 3	10/29/96	11/05/96	25.40	1.13	1.51
Area 6, Well 3	11/05/96	11/12/96	19.70	1.05	1.52
Area 6, Well 3	11/12/96	11/19/96	22.40	1.09	1.50
Area 6, Well 3	11/19/96	11/26/96	11.80	0.93	1.49
Area 6, Well 3	11/26/96	12/03/96	9.12	0.90	1.53
Area 6, Well 3	12/03/96	12/10/96	19.60	1.05	2.46
Area 6, Well 3	12/10/96	12/17/96	10.90	0.93	2.48
Area 6, Well 3	12/17/96	12/24/96	18.10	1.05	2.54
Area 6, Well 3	12/24/96	12/31/96	19.10	1.05	2.49
Area 7, UE-7ns	12/26/95	01/02/96	20.10	1.07	1.51
Area 7, UE-7ns	01/02/96	01/08/96	15.80	1.11	1.72
Area 7, UE-7ns	01/08/96	01/16/96	22.20	1.00	1.35
Area 7, UE-7ns	01/16/96	01/22/96	10.00	1.05	1.82
Area 7, UE-7ns	01/22/96	01/29/96	8.87	0.88	1.49
Area 7, UE-7ns	01/29/96	02/06/96	21.40	0.99	1.33
Area 7, UE-7ns	02/06/96	02/12/96	22.30	1.20	1.73
Area 7, UE-7ns	02/12/96	02/20/96	21.40	0.99	1.33
Area 7, UE-7ns	02/20/96	02/27/96	8.91	0.90	1.52
Area 7, UE-7ns	02/27/96	03/05/96	12.90	0.97	1.56
Area 7, UE-7ns	03/05/96	03/12/96	12.70	0.97	1.56
Area 7, UE-7ns	03/12/96	03/19/96	12.60	0.98	1.57
Area 7, UE-7ns	03/19/96	03/26/96	15.80	1.00	1.52
Area 7, UE-7ns	03/26/96	04/02/96	13.80	0.99	1.57
Area 7, UE-7ns	04/02/96	04/09/96	16.00	1.00	1.50
Area 7, UE-7ns	04/09/96	04/16/96	14.10	1.01	1.59
Area 7, UE-7ns	04/16/96	04/25/96	14.90	0.80	1.15
Area 7, UE-7ns	04/25/96	05/02/96	17.90	1.07	1.60
Area 7, UE-7ns	05/02/96	05/09/96	17.60	1.06	1.59
Area 7, UE-7ns	05/09/96	05/15/96	20.20	1.22	1.84
Area 7, UE-7ns	05/15/96	05/23/96	16.20	0.92	1.33
Area 7, UE-7ns	05/23/96	05/30/96	14.40	0.98	1.52
Area 7, UE-7ns	05/30/96	06/05/96	13.10	1.11	1.82
Area 7, UE-7ns	06/05/96	06/12/96	16.80	1.05	1.60
Area 7, UE-7ns	06/12/96	06/19/96	21.90	1.09	1.52
Area 7, UE-7ns	06/19/96	06/26/96	10.90	0.93	1.53
Area 7, UE-7ns	06/26/96	07/02/96	19.50	1.21	1.83
Area 7, UE-7ns	07/02/96	07/10/96	18.10	0.97	1.37
Area 7, UE-7ns	07/10/96	07/17/96	21.90	1.09	1.52
Area 7, UE-7ns	07/17/96	07/24/96	21.10	1.10	1.54
Area 7, UE-7ns	07/24/96	07/31/96	27.00	1.18	1.58
Area 7, UE-7ns	07/31/96	08/07/96	19.80	1.01	1.43
Area 7, UE-7ns	08/07/96	08/13/96	29.40	4.20	7.59
Area 7, UE-7ns	08/13/96	08/20/96	Filter Head Missing		

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 7, UE-7ns	08/20/96	08/28/96	19.10	0.92	1.26
Area 7, UE-7ns	08/28/96	09/04/96	13.50	0.92	1.44
Area 7, UE-7ns	09/04/96	09/10/96	19.60	1.14	1.67
Area 7, UE-7ns	09/10/96	09/18/96	18.00	0.89	1.24
Area 7, UE-7ns	09/18/96	09/24/96	26.10	1.21	1.64
Area 7, UE-7ns	09/24/96	09/30/96	25.80	1.20	1.61
Area 7, UE-7ns	09/30/96	10/08/96	35.30	1.10	1.23
Area 7, UE-7ns	10/08/96	10/15/96	19.70	1.00	1.41
Area 7, UE-7ns	10/15/96	10/22/96	18.50	0.98	1.40
Area 7, UE-7ns	10/22/96	10/29/96	12.10	0.90	1.43
Area 7, UE-7ns	10/29/96	11/05/96	22.80	1.05	1.43
Area 7, UE-7ns	11/05/96	11/12/96	16.50	0.96	1.41
Area 7, UE-7ns	11/12/96	11/19/96	20.60	1.01	1.39
Area 7, UE-7ns	11/19/96	11/26/96	6.57	0.80	1.40
Area 7, UE-7ns	11/26/96	12/03/96	10.40	0.87	1.43
Area 7, UE-7ns	12/03/96	12/10/96	10.90	0.87	2.30
Area 7, UE-7ns	12/10/96	12/17/96	9.81	0.86	2.32
Area 7, UE-7ns	12/17/96	12/26/96	16.50	0.80	1.83
Area 9, 9-300	12/26/95	01/02/96	15.90	1.01	1.52
Area 9, 9-300	01/02/96	01/08/96	11.80	1.08	1.81
Area 9, 9-300	01/08/96	01/16/96	17.10	0.96	1.39
Area 9, 9-300	01/16/96	01/22/96	8.28	1.04	1.85
Area 9, 9-300	01/22/96	01/29/96	9.93	0.91	1.51
Area 9, 9-300	01/29/96	02/06/96	20.50	0.99	1.36
Area 9, 9-300	02/06/96	02/12/96	20.00	1.22	1.81
Area 9, 9-300	02/12/96	02/20/96	18.60	0.98	1.38
Area 9, 9-300	02/20/96	02/27/96	8.56	0.89	1.53
Area 9, 9-300	02/27/96	03/05/96	11.10	0.96	1.58
Area 9, 9-300	03/05/96	03/12/96	11.10	0.98	1.62
Area 9, 9-300	03/12/96	03/19/96	10.90	0.97	1.62
Area 9, 9-300	03/19/96	03/26/96	11.80	0.97	1.57
Area 9, 9-300	03/26/96	04/02/96	11.60	0.99	1.62
Area 9, 9-300	04/02/96	04/09/96	12.40	0.98	1.57
Area 9, 9-300	04/09/96	04/15/96	10.40	0.98	1.65
Area 9, 9-300	04/15/96	04/24/96	9.97	0.84	1.37
Area 9, 9-300	04/24/96	05/02/96	14.30	0.82	1.22
Area 9, 9-300	05/02/96	05/09/96	16.10	0.94	1.40
Area 9, 9-300	05/09/96	05/15/96	17.30	1.08	1.63
Area 9, 9-300	05/15/96	05/23/96	15.50	0.83	1.17
Area 9, 9-300	05/23/96	05/30/96	6.11	0.75	1.33
Area 9, 9-300	05/30/96	06/05/96	11.80	0.61	0.85
Area 9, 9-300	06/05/96	06/12/96	28.70	1.32	1.81
Area 9, 9-300	06/12/96	06/19/96	21.40	0.99	1.33
Area 9, 9-300	06/19/96	06/26/96	15.10	0.94	1.41

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 9, 9-300	06/26/96	07/03/96	17.70	0.98	1.43
Area 9, 9-300	07/03/96	07/10/96	16.90	0.96	1.40
Area 9, 9-300	07/10/96	07/17/96	17.70	0.96	1.37
Area 9, 9-300	07/17/96	07/24/96	18.20	0.97	1.38
Area 9, 9-300	07/24/96	07/31/96	24.20	1.08	1.45
Area 9, 9-300	07/31/96	08/07/96	22.10	1.05	1.45
Area 9, 9-300	08/07/96	08/13/96	27.50	1.25	1.69
Area 9, 9-300	08/13/96	08/20/96	25.30	1.09	1.45
Area 9, 9-300	08/20/96	08/28/96	21.50	0.94	1.24
Area 9, 9-300	08/28/96	09/04/96	20.50	1.04	1.46
Area 9, 9-300	09/04/96	09/10/96	19.40	1.14	1.69
Area 9, 9-300	09/10/96	09/18/96	15.50	0.86	1.24
Area 9, 9-300	09/18/96	09/24/96	24.30	1.20	1.66
Area 9, 9-300	09/24/96	09/30/96	24.60	1.21	1.67
Area 9, 9-300	09/30/96	10/08/96	33.80	3.63	6.27
Area 9, 9-300	10/08/96	10/15/96	24.50	1.09	1.45
Area 9, 9-300	10/15/96	10/22/96	18.30	0.98	1.40
Area 9, 9-300	10/22/96	10/29/96	11.30	0.87	1.39
Area 9, 9-300	10/29/96	11/05/96	21.70	1.03	1.42
Area 9, 9-300	11/05/96	11/12/96	17.90	0.98	1.43
Area 9, 9-300	11/12/96	11/19/96	18.60	0.99	1.40
Area 9, 9-300	11/19/96	11/26/96	10.50	0.86	1.40
Area 9, 9-300	11/26/96	12/03/96	9.59	0.85	1.42
Area 9, 9-300	12/03/96	12/10/96	18.10	0.96	2.26
Area 9, 9-300	12/10/96	12/17/96	10.80	0.87	2.29
Area 9, 9-300	12/17/96	12/24/96	15.80	0.95	2.31
Area 9, 9-300	12/24/96	12/31/96	17.30	0.96	2.29
Area 10, Gate 700 South	12/26/95	01/02/96	16.50	0.92	1.33
Area 10, Gate 700 South	01/02/96	01/08/96	15.40	1.03	1.58
Area 10, Gate 700 South	01/08/96	01/16/96	21.00	0.91	1.21
Area 10, Gate 700 South	01/16/96	01/22/96	11.10	0.99	1.65
Area 10, Gate 700 South	01/22/96	01/29/96	10.10	0.84	1.35
Area 10, Gate 700 South	01/29/96	02/06/96	21.70	0.93	1.21
Area 10, Gate 700 South	02/06/96	02/12/96	21.60	1.12	1.58
Area 10, Gate 700 South	02/12/96	02/20/96	21.10	0.92	1.20
Area 10, Gate 700 South	02/20/96	02/27/96	8.67	0.83	1.39
Area 10, Gate 700 South	02/27/96	03/05/96	13.10	0.92	1.43
Area 10, Gate 700 South	03/05/96	03/12/96	11.20	0.88	1.44
Area 10, Gate 700 South	03/12/96	03/19/96	13.20	0.92	1.46
Area 10, Gate 700 South	03/19/96	03/25/96	13.60	0.92	1.41
Area 10, Gate 700 South	03/25/96	04/02/96	12.30	0.92	1.46
Area 10, Gate 700 South	04/02/96	04/09/96	18.20	0.97	1.39
Area 10, Gate 700 South	04/09/96	04/16/96	14.00	0.95	1.48
Area 10, Gate 700 South	04/16/96	04/25/96	12.70	0.73	1.07

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 10, Gate 700 South	04/25/96	05/02/96	15.60	0.95	1.43
Area 10, Gate 700 South	05/02/96	05/09/96		Meter Broken	
Area 10, Gate 700 South	05/09/96	05/15/96	18.70	1.10	1.64
Area 10, Gate 700 South	05/15/96	05/23/96	8.32	0.71	1.15
Area 10, Gate 700 South	05/23/96	05/30/96	13.40	0.86	1.32
Area 10, Gate 700 South	05/30/96	06/05/96	21.30	1.14	1.62
Area 10, Gate 700 South	06/05/96	06/12/96		Sample Head Missing	
Area 10, Gate 700 South	06/12/96	06/19/96	20.20	0.97	1.33
Area 10, Gate 700 South	06/19/96	06/26/96	16.10	0.95	1.41
Area 10, Gate 700 South	06/26/96	07/03/96	18.00	0.98	1.42
Area 10, Gate 700 South	07/03/96	07/10/96	18.40	0.99	1.41
Area 10, Gate 700 South	07/10/96	07/17/96	20.30	0.99	1.37
Area 10, Gate 700 South	07/17/96	07/25/96	20.80	1.01	1.38
Area 10, Gate 700 South	07/25/96	07/31/96	22.00	1.06	1.46
Area 10, Gate 700 South	07/31/96	08/07/96	20.90	1.06	1.48
Area 10, Gate 700 South	08/07/96	08/13/96	25.00	1.21	1.68
Area 10, Gate 700 South	08/13/96	08/20/96	25.50	1.10	1.44
Area 10, Gate 700 South	08/20/96	08/28/96	21.40	0.94	1.23
Area 10, Gate 700 South	08/28/96	09/04/96	18.10	1.00	1.44
Area 10, Gate 700 South	09/04/96	09/10/96	8.95	0.95	1.63
Area 10, Gate 700 South	09/10/96	09/18/96	16.00	0.85	1.21
Area 10, Gate 700 South	09/18/96	09/24/96	24.20	1.17	1.61
Area 10, Gate 700 South	09/24/96	09/30/96	20.80	1.11	1.59
Area 10, Gate 700 South	09/30/96	10/08/96	32.80	1.07	1.22
Area 10, Gate 700 South	10/08/96	10/15/96	23.50	1.05	1.40
Area 10, Gate 700 South	10/15/96	10/22/96	18.80	0.97	1.36
Area 10, Gate 700 South	10/22/96	10/29/96	12.70	0.88	1.37
Area 10, Gate 700 South	10/29/96	11/05/96	21.80	1.02	1.39
Area 10, Gate 700 South	11/05/96	11/12/96	16.50	0.94	1.38
Area 10, Gate 700 South	11/12/96	11/19/96	20.10	0.98	1.36
Area 10, Gate 700 South	11/19/96	11/26/96	8.76	0.82	1.37
Area 10, Gate 700 South	11/26/96	12/03/96	7.92	0.80	1.36
Area 10, Gate 700 South	12/03/96	12/10/96	16.30	0.93	2.23
Area 10, Gate 700 South	12/10/96	12/17/96	9.27	0.83	2.23
Area 10, Gate 700 South	12/17/96	12/26/96	8.30	0.93	2.65
Area 10, SEDAN Crater	12/26/95	01/02/96	18.50	0.97	1.38
Area 10, SEDAN Crater	01/02/96	01/08/96	15.60	1.07	1.65
Area 10, SEDAN Crater	01/08/96	01/16/96	20.70	0.93	1.26
Area 10, SEDAN Crater	01/16/96	01/22/96	8.89	0.98	1.70
Area 10, SEDAN Crater	01/22/96	01/29/96	10.10	0.86	1.40
Area 10, SEDAN Crater	01/29/96	02/06/96	21.80	0.95	1.24
Area 10, SEDAN Crater	02/06/96	02/12/96	22.80	1.25	1.80
Area 10, SEDAN Crater	02/12/96	02/20/96	19.00	0.92	1.27
Area 10, SEDAN Crater	02/20/96	02/27/96	7.73	0.84	1.45

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 10, SEDAN Crater	02/27/96	03/05/96	14.70	0.96	1.49
Area 10, SEDAN Crater	03/05/96	03/12/96	10.60	0.91	1.50
Area 10, SEDAN Crater	03/12/96	03/19/96	12.90	0.95	1.51
Area 10, SEDAN Crater	03/19/96	03/26/96	13.90	0.94	1.45
Area 10, SEDAN Crater	03/26/96	04/02/96	15.00	0.98	1.51
Area 10, SEDAN Crater	04/02/96	04/09/96	16.20	0.97	1.44
Area 10, SEDAN Crater	04/09/96	04/16/96	13.00	0.96	1.52
Area 10, SEDAN Crater	04/16/96	04/25/96	13.60	0.77	1.11
Area 10, SEDAN Crater	04/25/96	05/02/96	14.60	0.98	1.51
Area 10, SEDAN Crater	05/02/96	05/09/96	16.90	1.01	1.50
Area 10, SEDAN Crater	05/09/96	05/15/96	22.60	1.22	1.75
Area 10, SEDAN Crater	05/15/96	05/23/96	17.00	0.89	1.26
Area 10, SEDAN Crater	05/23/96	05/30/96	7.88	0.84	1.45
Area 10, SEDAN Crater	05/30/96	06/05/96	24.40	1.24	1.75
Area 10, SEDAN Crater	06/05/96	06/12/96	24.50	1.13	1.53
Area 10, SEDAN Crater	06/12/96	06/19/96	21.90	1.07	1.49
Area 10, SEDAN Crater	06/19/96	06/26/96	16.20	1.00	1.51
Area 10, SEDAN Crater	06/26/96	07/03/96	16.70	1.02	1.53
Area 10, SEDAN Crater	07/03/96	07/10/96	17.00	1.00	1.48
Area 10, SEDAN Crater	07/10/96	07/17/96	17.50	0.99	1.44
Area 10, SEDAN Crater	07/17/96	07/24/96	19.00	1.04	1.47
Area 10, SEDAN Crater	07/24/96	07/31/96	22.90	1.04	1.41
Area 10, SEDAN Crater	07/31/96	08/07/96	20.60	1.02	1.42
Area 10, SEDAN Crater	08/07/96	08/13/96	21.80	1.14	1.63
Area 10, SEDAN Crater	08/13/96	08/20/96	21.20	1.01	1.40
Area 10, SEDAN Crater	08/20/96	08/28/96	22.10	0.93	1.20
Area 10, SEDAN Crater	08/28/96	09/04/96	16.90	0.95	1.39
Area 10, SEDAN Crater	09/04/96	09/10/96	19.50	1.10	1.62
Area 10, SEDAN Crater	09/10/96	09/18/96	18.30	0.88	1.21
Area 10, SEDAN Crater	09/18/96	09/24/96	24.70	1.18	1.60
Area 10, SEDAN Crater	09/24/96	09/30/96	20.40	1.10	1.58
Area 10, SEDAN Crater	09/30/96	10/08/96	34.20	1.08	1.21
Area 10, SEDAN Crater	10/08/96	10/15/96	25.60	1.09	1.42
Area 10, SEDAN Crater	10/15/96	10/22/96	20.20	1.01	1.41
Area 10, SEDAN Crater	10/22/96	10/29/96	15.40	0.95	1.44
Area 10, SEDAN Crater	10/29/96	11/05/96	24.00	1.09	1.46
Area 10, SEDAN Crater	11/05/96	11/12/96	17.80	0.99	1.43
Area 10, SEDAN Crater	11/12/96	11/19/96	20.60	1.02	1.42
Area 10, SEDAN Crater	11/19/96	11/26/96	6.16	0.80	1.43
Area 10, SEDAN Crater	11/26/96	12/03/96	8.24	0.80	1.36
Area 10, SEDAN Crater	12/03/96	12/10/96	16.30	0.97	2.36
Area 10, SEDAN Crater	12/10/96	12/17/96	9.08	0.87	2.38
Area 10, SEDAN Crater	12/17/96	12/26/96	14.70	0.79	1.85
Area 11, Gate 293	12/26/95	01/02/96	25.30	1.12	1.48

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 11, Gate 293	01/02/96	01/08/96	20.00	1.19	1.77
Area 11, Gate 293	01/08/96	01/16/96	27.00	1.07	1.36
Area 11, Gate 293	01/16/96	01/22/96	10.20	1.04	1.76
Area 11, Gate 293	01/22/96	01/29/96	10.90	0.93	1.51
Area 11, Gate 293	01/29/96	02/06/96	27.00	1.07	1.34
Area 11, Gate 293	02/06/96	02/12/96	26.80	1.28	1.75
Area 11, Gate 293	02/12/96	02/20/96	25.40	1.05	1.34
Area 11, Gate 293	02/20/96	02/27/96	11.20	0.94	1.53
Area 11, Gate 293	02/27/96	03/05/96	18.00	1.05	1.55
Area 11, Gate 293	03/05/96	03/12/96	13.10	0.96	1.52
Area 11, Gate 293	03/12/96	03/19/96	13.10	1.00	1.60
Area 11, Gate 293	03/19/96	03/25/96	16.10	1.01	1.52
Area 11, Gate 293	03/25/96	04/02/96	19.30	1.07	1.54
Area 11, Gate 293	04/02/96	04/09/96	18.50	1.05	1.53
Area 11, Gate 293	04/09/96	04/16/96	18.00	1.09	1.63
Area 11, Gate 293	04/16/96	04/25/96	13.40	0.80	1.19
Area 11, Gate 293	04/25/96	05/02/96	19.90	1.13	1.67
Area 11, Gate 293	05/02/96	05/08/96	19.10	1.19	1.81
Area 11, Gate 293	05/08/96	05/14/96	53.00	3.15	4.66
Area 11, Gate 293	05/14/96	05/22/96	12.80	0.81	1.22
Area 11, Gate 293	05/22/96	05/29/96	12.90	0.91	1.42
Area 11, Gate 293	05/29/96	06/04/96	21.40	1.11	1.57
Area 11, Gate 293	06/04/96	06/11/96	23.90	1.06	1.43
Area 11, Gate 293	06/11/96	06/18/96	18.50	0.97	1.41
Area 11, Gate 293	06/18/96	06/24/96	18.70	1.11	1.67
Area 11, Gate 293	06/24/96	07/01/96	18.90	0.99	1.41
Area 11, Gate 293	07/01/96	07/09/96	18.90	0.92	1.26
Area 11, Gate 293	07/09/96	07/16/96	Sampler Not Runnung		
Area 11, Gate 293	07/16/96	07/23/96	13.50	0.95	1.48
Area 11, Gate 293	07/23/96	07/30/96	19.20	0.97	1.37
Area 11, Gate 293	07/30/96	08/06/96	23.70	2.94	5.20
Area 11, Gate 293	08/06/96	08/13/96	25.20	1.35	1.95
Area 11, Gate 293	08/13/96	08/20/96	25.60	1.32	1.88
Area 11, Gate 293	08/20/96	08/27/96	19.40	0.96	1.32
Area 11, Gate 293	08/27/96	09/04/96	18.40	0.88	1.22
Area 11, Gate 293	09/04/96	09/10/96	14.70	1.02	1.58
Area 11, Gate 293	09/10/96	09/17/96	18.90	0.97	1.37
Area 11, Gate 293	09/17/96	09/24/96	25.10	1.06	1.38
Area 11, Gate 293	09/24/96	09/30/96	28.40	1.20	1.56
Area 11, Gate 293	09/30/96	10/08/96	35.50	1.08	1.19
Area 11, Gate 293	10/08/96	10/15/96	27.40	1.09	1.38
Area 11, Gate 293	10/15/96	10/22/96	20.10	0.98	1.36
Area 11, Gate 293	10/22/96	10/29/96	13.10	0.90	1.40
Area 11, Gate 293	10/29/96	11/05/96	25.20	1.07	1.41

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 11, Gate 293	11/05/96	11/12/96	18.50	0.96	1.37
Area 11, Gate 293	11/12/96	11/19/96	22.20	1.03	1.39
Area 11, Gate 293	11/19/96	11/26/96	12.60	0.89	1.39
Area 11, Gate 293	11/26/96	12/03/96	10.70	0.86	1.39
Area 11, Gate 293	12/03/96	12/10/96	15.40	0.93	2.28
Area 11, Gate 293	12/10/96	12/17/96	9.25	0.85	2.29
Area 11, Gate 293	12/17/96	12/24/96	20.20	1.02	2.35
Area 11, Gate 293	12/24/96	12/31/96	18.30	0.99	2.33
Area 12, Camp	12/26/95	01/02/96	12.50	0.89	1.39
Area 12, Camp	01/02/96	01/08/96	12.00	1.01	1.66
Area 12, Camp	01/08/96	01/16/96	19.00	0.92	1.28
Area 12, Camp	01/16/96	01/22/96	10.40	1.00	1.70
Area 12, Camp	01/22/96	01/29/96	9.05	0.80	1.32
Area 12, Camp	01/29/96	02/06/96	17.20	0.84	1.16
Area 12, Camp	02/06/96	02/12/96	20.50	1.12	1.61
Area 12, Camp	02/12/96	02/20/96	15.00	0.81	1.16
Area 12, Camp	02/20/96	02/27/96	8.14	0.78	1.30
Area 12, Camp	02/27/96	03/05/96	12.70	0.85	1.32
Area 12, Camp	03/05/96	03/12/96	12.30	0.86	1.35
Area 12, Camp	03/12/96	03/19/96	12.10	0.85	1.32
Area 12, Camp	03/19/96	03/26/96	13.90	0.89	1.35
Area 12, Camp	03/26/96	04/02/96	11.10	0.85	1.37
Area 12, Camp	04/02/96	04/09/96	14.40	0.89	1.35
Area 12, Camp	04/09/96	04/16/96	13.40	0.88	1.34
Area 12, Camp	04/16/96	04/25/96	12.50	0.71	1.04
Area 12, Camp	04/25/96	05/02/96	0.34	0.66	1.35
Area 12, Camp	05/02/96	05/09/96	28.20	1.10	1.38
Area 12, Camp	05/09/96	05/15/96	13.10	0.77	1.14
Area 12, Camp	05/15/96	05/23/96	22.20	1.20	1.70
Area 12, Camp	05/23/96	05/30/96	11.60	0.84	1.34
Area 12, Camp	05/30/96	06/05/96	22.60	1.18	1.68
Area 12, Camp	06/05/96	06/12/96	Sample Head Missing		
Area 12, Camp	06/12/96	06/19/96	18.40	0.97	1.39
Area 12, Camp	06/19/96	06/26/96	14.60	0.85	1.24
Area 12, Camp	06/26/96	07/03/96	17.80	1.09	1.63
Area 12, Camp	07/03/96	07/10/96	17.30	0.94	1.35
Area 12, Camp	07/10/96	07/17/96	15.60	0.93	1.36
Area 12, Camp	07/17/96	07/25/96	19.60	0.93	1.25
Area 12, Camp	07/25/96	07/31/96	20.40	1.11	1.61
Area 12, Camp	07/31/96	08/07/96	22.50	1.05	1.44
Area 12, Camp	08/07/96	08/13/96	25.10	1.22	1.69
Area 12, Camp	08/13/96	08/20/96	22.40	1.05	1.44
Area 12, Camp	08/20/96	08/28/96	21.50	0.94	1.23
Area 12, Camp	08/28/96	09/04/96	15.40	0.95	1.43

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 12, Camp	09/04/96	09/10/96	20.00	1.13	1.64
Area 12, Camp	09/10/96	09/18/96	17.10	0.86	1.21
Area 12, Camp	09/18/96	09/24/96	27.30	1.21	1.61
Area 12, Camp	09/24/96	09/30/96	23.80	1.16	1.60
Area 12, Camp	09/30/96	10/08/96	29.20	1.02	1.20
Area 12, Camp	10/08/96	10/15/96	20.60	1.02	1.41
Area 12, Camp	10/15/96	10/22/96	19.90	0.98	1.35
Area 12, Camp	10/22/96	10/29/96	10.80	0.84	1.36
Area 12, Camp	10/29/96	11/05/96	23.40	1.04	1.40
Area 12, Camp	11/05/96	11/12/96	15.60	0.92	1.37
Area 12, Camp	11/12/96	11/19/96	21.40	1.00	1.36
Area 12, Camp	11/19/96	11/26/96	12.40	1.26	2.13
Area 12, Camp	11/26/96	12/03/96	11.50	0.85	1.36
Area 12, Camp	12/03/96	12/10/96	15.40	0.89	2.16
Area 12, Camp	12/10/96	12/17/96	9.81	0.84	2.24
Area 12, Camp	12/17/96	12/26/96	13.60	0.73	1.72
Area 13, Project 57	12/27/95	01/03/96	17.00	1.00	1.48
Area 13, Project 57	01/03/96	01/10/96	20.40	1.06	1.51
Area 13, Project 57	01/10/96	01/17/96	20.30	1.06	1.50
Area 13, Project 57	01/17/96	01/24/96	8.35	0.87	1.48
Area 13, Project 57	01/24/96	01/31/96	13.90	0.95	1.45
Area 13, Project 57	01/31/96	02/07/96	20.10	1.05	1.46
Area 13, Project 57	02/07/96	02/12/96	23.80	1.40	2.09
Area 13, Project 57	02/12/96	02/22/96	16.20	0.81	1.12
Area 13, Project 57	02/22/96	02/27/96	10.40	1.30	2.30
Area 13, Project 57	02/27/96	03/06/96	11.60	0.87	1.37
Area 13, Project 57	03/06/96	03/13/96	12.20	1.01	1.63
Area 13, Project 57	03/13/96	03/19/96	13.20	1.12	1.83
Area 13, Project 57	03/19/96	03/28/96	16.10	0.89	1.29
Area 13, Project 57	03/28/96	04/04/96	11.80	1.01	1.67
Area 13, Project 57	04/04/96	04/10/96	16.10	1.19	1.88
Area 13, Project 57	04/10/96	04/17/96	15.40	1.05	1.61
Area 13, Project 57	04/17/96	04/25/96	12.70	0.91	1.44
Area 13, Project 57	04/25/96	05/02/96	16.00	1.06	1.60
Area 13, Project 57	05/02/96	05/09/96	13.80	0.93	1.43
Area 13, Project 57	05/09/96	05/16/96	14.70	0.96	1.47
Area 13, Project 57	05/16/96	05/23/96	12.00	0.94	2.47
Area 13, Project 57	05/23/96	06/03/96	14.20	0.69	1.56
Area 13, Project 57	06/03/96	06/10/96	22.70	1.09	2.45
Area 13, Project 57	06/10/96	06/18/96	18.30	0.96	1.37
Area 13, Project 57	06/18/96	06/25/96	16.30	0.96	1.42
Area 13, Project 57	06/25/96	07/02/96	16.60	1.02	1.53
Area 13, Project 57	07/02/96	07/09/96	18.30	1.03	1.49
Area 13, Project 57	07/09/96	07/16/96	19.30	1.04	1.49

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 13, Project 57	07/16/96	07/23/96	19.20	1.07	1.53
Area 13, Project 57	07/23/96	07/31/96	22.60	0.99	1.31
Area 13, Project 57	07/31/96	08/06/96	19.70	1.20	1.81
Area 13, Project 57	08/06/96	08/13/96	25.40	1.15	1.55
Area 13, Project 57	08/13/96	08/20/96	24.20	1.12	1.53
Area 13, Project 57	08/20/96	08/27/96	21.40	1.08	1.51
Area 13, Project 57	08/27/96	09/04/96	19.20	0.96	1.34
Area 13, Project 57	09/04/96	09/10/96	20.20	1.18	1.73
Area 13, Project 57	09/10/96	09/17/96	17.60	1.02	1.49
Area 13, Project 57	09/17/96	09/24/96	21.70	0.99	1.33
Area 13, Project 57	09/24/96	10/01/96	28.00	1.18	1.52
Area 13, Project 57	10/01/96	10/08/96	36.70	1.25	2.38
Area 13, Project 57	10/08/96	10/16/96	25.40	1.04	1.33
Area 13, Project 57	10/16/96	10/23/96	17.00	1.04	1.55
Area 13, Project 57	10/23/96	10/29/96	15.10	1.10	1.75
Area 13, Project 57	10/29/96	11/05/96	28.90	1.18	1.51
Area 13, Project 57	11/05/96	11/12/96		Sample Lost	
Area 13, Project 57	11/12/96	11/19/96	18.40	1.06	1.54
Area 13, Project 57	11/19/96	11/27/96	14.50	0.88	1.32
Area 13, Project 57	11/27/96	12/03/96	9.09	1.08	1.89
Area 13, Project 57	12/03/96	12/10/96	19.30	1.05	2.50
Area 13, Project 57	12/10/96	12/17/96	10.10	0.94	2.56
Area 13, Project 57	12/17/96	12/23/96	18.90	1.19	2.95
Area 13, Project 57	12/23/96	12/30/96	15.60	0.92	2.22
Area 15, EPA Farm	12/26/95	01/02/96	16.50	0.94	1.37
Area 15, EPA Farm	01/02/96	01/08/96	14.40	1.04	1.63
Area 15, EPA Farm	01/08/96	01/16/96	20.60	0.93	1.26
Area 15, EPA Farm	01/16/96	01/22/96	8.85	0.97	1.69
Area 15, EPA Farm	01/22/96	01/29/96	9.65	0.84	1.39
Area 15, EPA Farm	01/29/96	02/06/96	19.40	0.91	1.24
Area 15, EPA Farm	02/06/96	02/12/96	20.00	1.11	1.61
Area 15, EPA Farm	02/12/96	02/20/96	18.20	0.89	1.23
Area 15, EPA Farm	02/20/96	02/27/96	9.72	0.85	1.40
Area 15, EPA Farm	02/27/96	03/05/96	13.20	0.92	1.44
Area 15, EPA Farm	03/05/96	03/12/96	10.20	0.87	1.44
Area 15, EPA Farm	03/12/96	03/19/96	12.50	0.90	1.42
Area 15, EPA Farm	03/19/96	03/25/96	15.30	0.95	1.42
Area 15, EPA Farm	03/25/96	04/02/96	15.00	0.96	1.46
Area 15, EPA Farm	04/02/96	04/09/96	17.00	0.98	1.44
Area 15, EPA Farm	04/09/96	04/16/96	13.80	0.93	1.44
Area 15, EPA Farm	04/16/96	04/25/96	12.30	0.73	1.08
Area 15, EPA Farm	04/25/96	05/02/96	15.70	0.97	1.47
Area 15, EPA Farm	05/02/96	05/09/96	15.20	0.96	1.45
Area 15, EPA Farm	05/09/96	05/15/96	19.10	1.15	1.71

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 15, EPA Farm	05/15/96	05/23/96	12.00	0.80	1.23
Area 15, EPA Farm	05/23/96	05/30/96	13.80	0.92	1.44
Area 15, EPA Farm	05/30/96	06/05/96	21.30	1.18	1.70
Area 15, EPA Farm	06/05/96	06/12/96		Sample Head Missing	
Area 15, EPA Farm	06/12/96	06/19/96	19.30	1.00	1.45
Area 15, EPA Farm	06/19/96	06/26/96	17.20	0.97	1.42
Area 15, EPA Farm	06/26/96	07/03/96	19.50	1.03	1.48
Area 15, EPA Farm	07/03/96	07/10/96	16.70	0.99	1.45
Area 15, EPA Farm	07/10/96	07/18/96	16.80	0.88	1.25
Area 15, EPA Farm	07/18/96	07/24/96	19.70	1.11	1.63
Area 15, EPA Farm	07/24/96	07/31/96	26.00	1.13	1.50
Area 15, EPA Farm	07/31/96	08/07/96	22.00	1.08	1.50
Area 15, EPA Farm	08/07/96	08/13/96	21.80	1.19	1.72
Area 15, EPA Farm	08/13/96	08/20/96	25.80	1.12	1.48
Area 15, EPA Farm	08/20/96	08/28/96	25.00	1.00	1.27
Area 15, EPA Farm	08/28/96	09/04/96	18.20	1.01	1.47
Area 15, EPA Farm	09/04/96	09/10/96	19.70	1.16	1.71
Area 15, EPA Farm	09/10/96	09/18/96	18.40	0.92	1.28
Area 15, EPA Farm	09/18/96	09/24/96	25.90	1.24	1.69
Area 15, EPA Farm	09/24/96	09/30/96	26.50	1.24	1.68
Area 15, EPA Farm	09/30/96	10/08/96	33.70	1.11	1.28
Area 15, EPA Farm	10/08/96	10/15/96	25.10	1.11	1.48
Area 15, EPA Farm	10/15/96	10/22/96	21.10	1.05	1.46
Area 15, EPA Farm	10/22/96	10/29/96	13.10	0.95	1.51
Area 15, EPA Farm	10/29/96	11/05/96	24.50	1.07	1.43
Area 15, EPA Farm	11/05/96	11/12/96	16.50	0.95	1.40
Area 15, EPA Farm	11/12/96	11/19/96	21.10	1.01	1.39
Area 15, EPA Farm	11/19/96	11/26/96	10.60	0.87	1.41
Area 15, EPA Farm	11/26/96	12/03/96	9.26	0.94	1.60
Area 15, EPA Farm	12/03/96	12/10/96	15.70	0.94	2.30
Area 15, EPA Farm	12/10/96	12/17/96	8.36	0.84	2.32
Area 15, EPA Farm	12/17/96	12/26/96	10.70	0.71	1.80
Area 16, 3545 Substation	12/26/95	01/02/96		Pump Failure	
Area 16, 3545 Substation	01/02/96	01/08/96	12.90	1.09	1.78
Area 16, 3545 Substation	01/08/96	01/16/96	16.60	0.82	1.15
Area 16, 3545 Substation	01/16/96	01/22/96	7.85	0.88	1.52
Area 16, 3545 Substation	01/22/96	01/29/96	7.73	0.74	1.24
Area 16, 3545 Substation	01/29/96	02/06/96	17.30	0.82	1.12
Area 16, 3545 Substation	02/06/96	02/12/96	17.30	1.02	1.53
Area 16, 3545 Substation	02/12/96	02/20/96	17.20	0.83	1.13
Area 16, 3545 Substation	02/20/96	02/27/96	8.18	0.75	1.25
Area 16, 3545 Substation	02/27/96	03/05/96	12.70	0.83	1.27
Area 16, 3545 Substation	03/05/96	03/12/96	10.20	0.82	1.32
Area 16, 3545 Substation	03/12/96	03/20/96	10.40	0.74	1.15

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 16, 3545 Substation	03/20/96	04/08/96	13.20	0.42	0.47
Area 16, 3545 Substation	04/08/96	04/16/96	12.20	0.76	1.13
Area 16, 3545 Substation	04/16/96	04/25/96	10.60	0.67	1.01
Area 16, 3545 Substation	04/25/96	05/02/96	12.90	0.88	1.37
Area 16, 3545 Substation	05/02/96	05/09/96	13.80	0.89	1.36
Area 16, 3545 Substation	05/09/96	05/15/96	19.90	1.10	1.59
Area 16, 3545 Substation	05/15/96	05/23/96	14.20	0.80	1.15
Area 16, 3545 Substation	05/23/96	05/30/96	7.00	0.76	1.32
Area 16, 3545 Substation	05/30/96	06/06/96	20.70	1.05	1.48
Area 16, 3545 Substation	06/06/96	06/13/96	21.20	0.99	1.33
Area 16, 3545 Substation	06/13/96	06/20/96	17.50	0.97	1.42
Area 16, 3545 Substation	06/20/96	06/27/96	21.50	1.03	1.42
Area 16, 3545 Substation	06/27/96	07/03/96	19.10	1.11	1.63
Area 16, 3545 Substation	07/03/96	07/10/96	16.60	0.94	1.36
Area 16, 3545 Substation	07/10/96	07/17/96	14.50	0.91	1.36
Area 16, 3545 Substation	07/17/96	07/25/96	18.50	0.90	1.24
Area 16, 3545 Substation	07/25/96	08/01/96	24.30	1.08	1.44
Area 16, 3545 Substation	08/01/96	08/07/96	19.90	1.11	1.62
Area 16, 3545 Substation	08/07/96	08/13/96		Filter Head Missing	
Area 16, 3545 Substation	08/13/96	08/20/96	24.00	1.07	1.44
Area 16, 3545 Substation	08/20/96	08/28/96	21.30	0.93	1.23
Area 16, 3545 Substation	08/28/96	09/04/96	18.30	1.00	1.45
Area 16, 3545 Substation	09/04/96	09/10/96	19.10	1.11	1.63
Area 16, 3545 Substation	09/10/96	09/18/96	16.20	0.86	1.22
Area 16, 3545 Substation	09/18/96	09/24/96	27.30	1.22	1.62
Area 16, 3545 Substation	09/24/96	09/30/96	22.30	1.14	1.60
Area 16, 3545 Substation	09/30/96	10/08/96	31.70	1.05	1.21
Area 16, 3545 Substation	10/08/96	10/15/96	18.40	0.99	1.42
Area 16, 3545 Substation	10/15/96	10/22/96	17.20	0.95	1.36
Area 16, 3545 Substation	10/22/96	10/29/96	9.09	0.82	1.37
Area 16, 3545 Substation	10/29/96	11/05/96	23.60	1.06	1.43
Area 16, 3545 Substation	11/05/96	11/12/96	19.00	1.00	1.41
Area 16, 3545 Substation	11/12/96	11/19/96	18.50	0.98	1.39
Area 16, 3545 Substation	11/19/96	11/26/96	6.30	0.80	1.43
Area 16, 3545 Substation	11/26/96	12/03/96	9.34	0.87	1.45
Area 16, 3545 Substation	12/03/96	12/10/96	12.80	0.92	2.36
Area 16, 3545 Substation	12/10/96	12/17/96	9.00	0.87	2.38
Area 16, 3545 Substation	12/17/96	12/26/96	14.60	0.79	1.85
Area 18, Well UE-18t	12/26/95	01/02/96	14.40	1.01	1.56
Area 18, Well UE-18t	01/02/96	01/08/96	14.30	1.15	1.85
Area 18, Well UE-18t	01/08/96	01/16/96	18.80	1.00	1.42
Area 18, Well UE-18t	01/16/96	01/22/96	8.55	1.08	1.92
Area 18, Well UE-18t	01/22/96	01/29/96	9.87	0.94	1.57
Area 18, Well UE-18t	01/29/96	02/06/96	18.40	0.98	1.40

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 18, Well UE-18t	02/06/96	02/12/96	22.20	1.28	1.88
Area 18, Well UE-18t	02/12/96	02/20/96	19.60	1.00	1.40
Area 18, Well UE-18t	02/20/96	02/27/96	9.09	0.93	1.59
Area 18, Well UE-18t	02/27/96	03/05/96	12.20	0.99	1.62
Area 18, Well UE-18t	03/05/96	03/12/96	11.50	0.99	1.64
Area 18, Well UE-18t	03/12/96	03/19/96	11.90	0.98	1.60
Area 18, Well UE-18t	03/19/96	03/28/96	16.40	0.91	1.33
Area 18, Well UE-18t	03/28/96	04/08/96	15.30	0.74	1.03
Area 18, Well UE-18t	04/08/96	04/16/96	15.50	0.94	1.39
Area 18, Well UE-18t	04/16/96	04/25/96	11.90	0.82	1.25
Area 18, Well UE-18t	04/25/96	05/02/96	17.10	1.08	1.63
Area 18, Well UE-18t	05/02/96	05/09/96	17.20	1.08	1.65
Area 18, Well UE-18t	05/09/96	05/15/96	21.90	1.29	1.90
Area 18, Well UE-18t	05/15/96	05/23/96	17.00	0.96	1.40
Area 18, Well UE-18t	05/23/96	06/03/96	14.00	0.74	1.05
Area 18, Well UE-18t	06/03/96	06/06/96		Power Out	
Area 18, Well UE 18t	06/06/96	06/20/96	22.90	1.08	1.47
Area 18, Well UE-18t	06/20/96	06/27/96	17.70	1.08	1.62
Area 18, Well UE-18t	06/27/96	07/03/96	20.70	1.19	1.74
Area 18, Well UE-18t	07/03/96	07/10/96	17.70	0.99	1.43
Area 18, Well UE-18t	07/10/96	07/16/96	19.40	1.03	1.46
Area 18, Well UE-18t	07/16/96	07/25/96	18.10	0.93	1.31
Area 18, Well UE-18t	07/25/96	08/01/96	19.70	1.05	1.52
Area 18, Well UE-18t	08/01/96	08/07/96	19.20	1.15	1.72
Area 18, Well UE-18t	08/07/96	08/13/96	24.90	1.26	1.76
Area 18, Well UE-18t	08/13/96	08/20/96	24.10	1.11	1.51
Area 18, Well UE-18t	08/20/96	08/28/96	21.10	0.97	1.29
Area 18, Well UE-18t	08/28/96	09/04/96	15.50	0.99	1.52
Area 18, Well UE-18t	09/04/96	09/10/96	20.50	1.18	1.73
Area 18, Well UE-18t	09/10/96	09/18/96	16.30	0.90	1.31
Area 18, Well UE-18t	09/18/96	09/24/96	28.80	1.30	1.73
Area 18, Well UE-18t	09/24/96	09/30/96	25.60	1.24	1.70
Area 18, Well UE-18t	09/30/96	10/08/96	32.50	1.10	1.29
Area 18, Well UE-18t	10/08/96	10/15/96	17.50	1.02	1.50
Area 18, Well UE-18t	10/15/96	10/22/96	18.30	1.02	1.48
Area 18, Well UE-18t	10/22/96	10/29/96	12.60	0.95	1.51
Area 18, Well UE-18t	10/29/96	11/05/96	25.00	1.14	1.55
Area 18, Well UE-18t	11/05/96	11/12/96	18.70	1.04	1.51
Area 18, Well UE-18t	11/12/96	11/19/96	19.10	1.03	1.49
Area 18, Well UE-18t	11/19/96	11/26/96	11.10	0.93	1.53
Area 18, Well UE-18t	11/26/96	12/03/96	9.08	0.90	1.53
Area 18, Well UE-18t	12/03/96	12/10/96	6.83	0.86	2.50
Area 18, Well UE-18t	12/10/96	12/17/96	9.29	0.91	2.52
Area 18, Well UE-18t	12/17/96	12/26/96	11.90	0.76	1.87

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 20, SCHOONER	12/26/95	01/02/96	18.00	1.03	1.50
Area 20, SCHOONER	01/02/96	01/08/96	15.00	1.13	1.80
Area 20, SCHOONER	01/08/96	01/16/96	24.70	1.04	1.37
Area 20, SCHOONER	01/16/96	01/22/96	9.24	1.06	1.86
Area 20, SCHOONER	01/22/96	01/29/96	9.68	0.91	1.52
Area 20, SCHOONER	01/29/96	02/06/96	16.50	0.94	1.37
Area 20, SCHOONER	02/06/96	02/12/96	20.00	1.21	1.83
Area 20, SCHOONER	02/12/96	02/20/96	21.70	1.00	1.35
Area 20, SCHOONER	02/20/96	02/27/96	9.81	0.94	1.57
Area 20, SCHOONER	02/27/96	03/05/96	15.80	1.03	1.58
Area 20, SCHOONER	03/05/96	03/12/96	12.40	0.99	1.60
Area 20, SCHOONER	03/12/96	03/20/96	18.30	0.99	1.41
Area 20, SCHOONER	03/20/96	03/28/96	13.50	0.91	1.41
Area 20, SCHOONER	03/28/96	04/08/96	21.30	0.81	1.02
Area 20, SCHOONER	04/08/96	04/16/96	15.10	0.91	1.36
Area 20, SCHOONER	04/16/96	04/25/96	13.70	0.83	1.22
Area 20, SCHOONER	04/25/96	05/02/96	15.90	1.04	1.60
Area 20, SCHOONER	05/02/96	05/09/96		Breaker Tripped	
Area 20, SCHOONER	05/09/96	05/15/96	22.90	1.28	1.85
Area 20, SCHOONER	05/15/96	05/23/96	13.00	0.88	1.34
Area 20, SCHOONER	05/23/96	06/03/96	19.20	0.80	1.04
Area 20, SCHOONER	06/03/96	06/20/96	21.50	0.67	0.74
Area 20, SCHOONER	06/20/96	06/27/96	18.90	1.12	1.65
Area 20, SCHOONER	06/27/96	07/03/96	18.80	1.23	1.89
Area 20, SCHOONER	07/03/96	07/10/96	20.90	1.09	1.54
Area 20, SCHOONER	07/10/96	07/18/96	22.10	1.05	1.42
Area 20, SCHOONER	07/18/96	07/25/96	17.50	1.05	1.56
Area 20, SCHOONER	07/25/96	08/01/96	24.50	1.18	1.64
Area 20, SCHOONER	08/01/96	08/07/96	20.60	1.23	1.83
Area 20, SCHOONER	08/07/96	08/13/96	27.20	1.37	1.94
Area 20, SCHOONER	08/13/96	08/21/96	27.40	1.12	1.45
Area 20, SCHOONER	08/21/96	08/28/96	21.50	1.13	1.59
Area 20, SCHOONER	08/28/96	09/04/96	18.50	1.10	1.65
Area 20, SCHOONER	09/04/96	09/10/96	21.80	1.28	1.87
Area 20, SCHOONER	09/10/96	09/18/96	21.20	1.04	1.42
Area 20, SCHOONER	09/18/96	09/24/96	29.80	1.39	1.88
Area 20, SCHOONER	09/24/96	09/30/96	28.60	1.36	1.86
Area 20, SCHOONER	09/30/96	10/08/96	36.40	1.22	1.41
Area 20, SCHOONER	10/08/96	10/15/96	27.20	1.23	1.65
Area 20, SCHOONER	10/15/96	10/22/96	20.50	1.13	1.62
Area 20, SCHOONER	10/22/96	10/29/96	14.10	1.03	1.64
Area 20, SCHOONER	10/29/96	11/05/96	30.30	1.28	1.68
Area 20, SCHOONER	11/05/96	11/12/96	21.30	1.15	1.65
Area 20, SCHOONER	11/12/96	11/19/96	19.50	1.10	1.61

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 20, SCHOONER	11/19/96	11/26/96	8.76	0.97	1.68
Area 20, SCHOONER	11/26/96	12/03/96	12.10	1.03	1.69
Area 20, SCHOONER	12/03/96	12/10/96	14.70	1.07	2.76
Area 20, SCHOONER	12/10/96	12/17/96	12.50	1.06	2.82
Area 20, SCHOONER	12/17/96	12/26/96	20.80	0.97	2.17
Area 20, Camp	12/26/95	01/02/96	11.20	0.97	1.60
Area 20, Camp	01/02/96	01/08/96	11.40	1.14	1.93
Area 20, Camp	01/08/96	01/16/96	14.50	0.96	1.47
Area 20, Camp	01/16/96	01/22/96	8.23	1.09	1.95
Area 20, Camp	01/22/96	01/29/96	6.32	0.89	1.61
Area 20, Camp	01/29/96	02/06/96	15.20	0.96	1.44
Area 20, Camp	02/06/96	02/12/96	17.10	1.24	1.96
Area 20, Camp	02/12/96	02/20/96	15.10	0.98	1.49
Area 20, Camp	02/20/96	02/27/96	5.89	0.97	1.77
Area 20, Camp	02/27/96	03/05/96	12.50	1.06	1.74
Area 20, Camp	03/05/96	03/12/96	9.80	1.05	1.82
Area 20, Camp	03/12/96	03/19/96	13.00	1.16	1.91
Area 20, Camp	03/19/96	03/28/96	10.50	1.04	1.78
Area 20, Camp	03/28/96	04/02/96	8.45	1.94	3.71
Area 20, Camp	04/02/96	04/09/96	15.70	1.64	2.82
Area 20, Camp	04/09/96	04/16/96	7.58	2.64	5.19
Area 20, Camp	04/16/96	04/25/96	10.90	0.70	1.06
Area 20, Camp	04/25/96	05/02/96	11.90	0.87	1.40
Area 20, Camp	05/02/96	05/09/96	13.10	0.90	1.41
Area 20, Camp	05/09/96	05/15/96	15.10	1.06	1.68
Area 20, Camp	05/15/96	05/23/96	11.60	0.77	1.17
Area 20, Camp	05/23/96	05/30/96	12.10	0.87	1.37
Area 20, Camp	05/30/96	06/05/96	22.60	1.20	1.72
Area 20, Camp	06/05/96	06/12/96	23.20	1.06	1.41
Area 20, Camp	06/12/96	06/20/96	17.80	0.91	1.29
Area 20, Camp	06/20/96	06/26/96	16.30	0.98	1.46
Area 20, Camp	06/26/96	07/03/96	17.30	1.09	1.66
Area 20, Camp	07/03/96	07/10/96	15.20	0.93	1.40
Area 20, Camp	07/10/96	07/17/96	18.10	0.90	1.25
Area 20, Camp	07/17/96	07/25/96	13.20	0.92	1.41
Area 20, Camp	07/25/96	08/01/96	11.80	0.91	1.47
Area 20, Camp	08/01/96	08/07/96	20.70	1.14	1.65
Area 20, Camp	08/07/96	08/13/96	25.30	1.42	2.07
Area 20, Camp	08/13/96	08/20/96	22.80	1.08	1.48
Area 20, Camp	08/20/96	08/28/96	19.40	0.93	1.26
Area 20, Camp	08/28/96	09/04/96	15.40	0.98	1.49
Area 20, Camp	09/04/96	09/10/96	19.80	1.19	1.75
Area 20, Camp	09/10/96	09/18/96	16.30	0.87	1.25
Area 20, Camp	09/18/96	09/24/96	27.90	1.25	1.66

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 20, Camp	09/24/96	09/30/96	23.20	1.17	1.64
Area 20, Camp	09/30/96	10/08/96	29.50	1.04	1.23
Area 20, Camp	10/08/96	10/15/96	18.40	0.99	1.43
Area 20, Camp	10/15/96	10/22/96	16.70	0.95	1.38
Area 20, Camp	10/22/96	10/29/96	12.40	0.88	1.38
Area 20, Camp	10/29/96	11/05/96	22.70	1.04	1.41
Area 20, Camp	11/05/96	11/12/96	16.00	0.94	1.39
Area 20, Camp	11/12/96	11/19/96	15.00	0.91	1.35
Area 20, Camp	11/19/96	11/26/96	6.77	0.80	1.40
Area 20, Camp	11/26/96	12/03/96	7.35	0.80	1.38
Area 20, Camp	12/03/96	12/10/96	3.27	0.73	2.25
Area 20, Camp	12/10/96	12/17/96	8.73	0.83	2.27
Area 20, Camp	12/17/96	12/26/96	14.20	0.75	1.73
Area 20, CABRIOLET	08/29/96	09/30/96	17.50	0.77	1.02
Area 20, CABRIOLET	09/30/96	11/05/96	17.70	0.72	0.92
Area 20, CABRIOLET	11/05/96	12/03/96	8.30	0.72	1.19
Area 23, Building 790 No. 2	12/26/95	01/03/96	26.20	1.06	1.34
Area 23, Building 790 No. 2	01/03/96	01/08/96	20.40	1.40	2.16
Area 23, Building 790 No. 2	01/08/96	01/16/96	22.90	1.03	1.38
Area 23, Building 790 No. 2	01/16/96	01/22/96	10.40	1.08	1.85
Area 23, Building 790 No. 2	01/22/96	01/29/96	9.16	0.91	1.53
Area 23, Building 790 No. 2	01/29/96	02/05/96	19.90	1.07	1.54
Area 23, Building 790 No. 2	02/05/96	02/12/96	24.80	1.13	1.52
Area 23, Building 790 No. 2	02/12/96	02/20/96	21.50	1.00	1.37
Area 23, Building 790 No. 2	02/20/96	02/26/96	9.03	1.03	1.80
Area 23, Building 790 No. 2	02/26/96	03/04/96	12.80	0.99	1.59
Area 23, Building 790 No. 2	03/04/96	03/11/96	8.64	0.92	1.58
Area 23, Building 790 No. 2	03/11/96	03/18/96	12.80	0.99	1.60
Area 23, Building 790 No. 2	03/18/96	03/25/96	13.20	0.96	1.52
Area 23, Building 790 No. 2	03/25/96	04/01/96	13.70	1.01	1.60
Area 23, Building 790 No. 2	04/01/96	04/08/96	12.80	0.99	1.59
Area 23, Building 790 No. 2	04/08/96	04/15/96	14.40	1.02	1.59
Area 23, Building 790 No. 2	04/15/96	04/24/96	15.40	1.97	3.49
Area 23, Building 790 No. 2	04/24/96	05/01/96	14.70	0.93	1.41
Area 23, Building 790 No. 2	05/01/96	05/08/96	18.70	1.01	1.45
Area 23, Building 790 No. 2	05/08/96	05/14/96	21.70	1.16	1.65
Area 23, Building 790 No. 2	05/14/96	05/22/96	14.60	0.87	1.29
Area 23, Building 790 No. 2	05/22/96	05/29/96	12.50	0.91	1.43
Area 23, Building 790 No. 2	05/29/96	06/04/96	20.00	1.16	1.73
Area 23, Building 790 No. 2	06/04/96	06/11/96	24.60	1.08	1.42
Area 23, Building 790 No. 2	06/11/96	06/18/96	18.00	1.01	1.49
Area 23, Building 790 No. 2	06/18/96	06/24/96	9.41	0.97	1.68
Area 23, Building 790 No. 2	06/24/96	07/01/96	18.10	1.02	1.50
Area 23, Building 790 No. 2	07/01/96	07/09/96	17.80	0.90	1.25

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 23, Building 790 No. 2	07/09/96	07/16/96	22.00	1.05	1.43
Area 23, Building 790 No. 2	07/16/96	07/23/96	18.40	0.98	1.38
Area 23, Building 790 No. 2	07/23/96	07/30/96	21.30	1.11	1.57
Area 23, Building 790 No. 2	07/30/96	08/06/96	18.10	1.01	1.48
Area 23, Building 790 No. 2	08/06/96	08/13/96	20.40	1.04	1.48
Area 23, Building 790 No. 2	08/13/96	08/20/96	18.50	0.98	1.40
Area 23, Building 790 No. 2	08/20/96	08/27/96	18.50	1.05	1.52
Area 23, Building 790 No. 2	08/27/96	09/04/96	21.00	0.96	1.31
Area 23, Building 790 No. 2	09/04/96	09/10/96	20.20	1.17	1.71
Area 23, Building 790 No. 2	09/10/96	09/17/96	17.70	0.97	1.40
Area 23, Building 790 No. 2	09/17/96	09/24/96	19.30	1.02	1.46
Area 23, Building 790 No. 2	09/24/96	09/30/96	28.70	1.27	1.68
Area 23, Building 790 No. 2	09/30/96	10/08/96	36.00	1.17	1.34
Area 23, Building 790 No. 2	10/08/96	10/15/96	26.90	1.14	1.48
Area 23, Building 790 No. 2	10/15/96	10/22/96	21.50	1.07	1.48
Area 23, Building 790 No. 2	10/22/96	10/29/96	13.80	0.96	1.51
Area 23, Building 790 No. 2	10/29/96	11/05/96	13.80	0.92	1.43
Area 23, Building 790 No. 2	11/05/96	11/12/96	19.60	0.97	1.36
Area 23, Building 790 No. 2	11/12/96	11/19/96	25.40	1.12	1.47
Area 23, Building 790 No. 2	11/19/96	11/26/96	9.64	0.86	1.42
Area 23, Building 790 No. 2	11/26/96	12/03/96	10.60	0.85	1.39
Area 23, Building 790 No. 2	12/03/96	12/10/96	16.30	0.99	2.44
Area 23, Building 790 No. 2	12/10/96	12/17/96	9.87	0.88	2.37
Area 23, Building 790 No. 2	12/17/96	12/24/96	16.50	0.96	2.32
Area 23, Building 790 No. 2	12/24/96	12/31/96	17.20	1.01	2.46
Area 23, H & S Building	12/26/95	01/03/96	29.70	1.27	1.66
Area 23, H & S Building	01/03/96	01/08/96	19.60	1.32	2.04
Area 23, H & S Building	01/08/96	01/16/96	19.40	1.12	1.66
Area 23, H & S Building	01/16/96	01/22/96	12.30	1.22	2.06
Area 23, H & S Building	01/22/96	01/29/96	12.20	1.07	1.76
Area 23, H & S Building	01/29/96	02/05/96	26.20	1.28	1.75
Area 23, H & S Building	02/05/96	02/12/96	26.20	1.29	1.77
Area 23, H & S Building	02/12/96	02/20/96	27.50	1.16	1.52
Area 23, H & S Building	02/20/96	02/26/96	8.89	1.12	1.98
Area 23, H & S Building	02/26/96	03/04/96	16.10	1.13	1.76
Area 23, H & S Building	03/04/96	03/11/96	13.10	1.07	1.76
Area 23, H & S Building	03/11/96	03/18/96	15.20	1.12	1.78
Area 23, H & S Building	03/18/96	03/26/96	18.40	1.02	1.48
Area 23, H & S Building	03/26/96	04/01/96	16.60	1.22	1.94
Area 23, H & S Building	04/01/96	04/08/96	17.00	1.18	1.85
Area 23, H & S Building	04/08/96	04/15/96	17.50	1.09	1.67
Area 23, H & S Building	04/15/96	04/24/96	13.00	0.82	1.24
Area 23, H & S Building	04/24/96	05/01/96	20.60	1.26	1.87
Area 23, H & S Building	05/01/96	05/08/96	22.10	1.26	1.85

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 23, H & S Building	05/08/96	05/14/96	19.70	1.31	2.01
Area 23, H & S Building	05/14/96	05/22/96	17.30	1.04	1.55
Area 23, H & S Building	05/22/96	05/29/96	17.10	1.13	1.73
Area 23, H & S Building	05/29/96	06/04/96	19.10	1.33	2.09
Area 23, H & S Building	06/04/96	06/13/96	30.10	1.11	1.35
Area 23, H & S Building	06/13/96	06/18/96	25.70	1.68	2.61
Area 23, H & S Building	06/18/96	06/25/96	19.80	1.19	1.78
Area 23, H & S Building	06/25/96	07/01/96	19.20	1.43	2.29
Area 23, H & S Building	07/01/96	07/09/96	20.20	1.07	1.51
Area 23, H & S Building	07/09/96	07/16/96	27.70	1.31	1.77
Area 23, H & S Building	07/16/96	07/23/96	23.30	1.26	1.80
Area 23, H & S Building	07/23/96	07/30/96	29.50	1.35	1.84
Area 23, H & S Building	07/30/96	08/06/96	20.80	1.05	1.48
Area 23, H & S Building	08/06/96	08/13/96	17.50	1.03	1.54
Area 23, H & S Building	08/13/96	08/20/96	21.20	1.06	1.49
Area 23, H & S Building	08/20/96	08/27/96	22.30	1.10	1.52
Area 23, H & S Building	08/27/96	09/04/96	18.80	0.90	1.25
Area 23, H & S Building	09/04/96	09/10/96	17.70	1.18	1.80
Area 23, H & S Building	09/10/96	09/17/96	13.70	0.91	1.39
Area 23, H & S Building	09/17/96	09/24/96	18.50	1.04	1.49
Area 23, H & S Building	09/24/96	09/30/96	25.80	1.18	1.59
Area 23, H & S Building	09/30/96	10/08/96	33.40	1.10	1.27
Area 23, H & S Building	10/08/96	10/15/96	24.20	1.09	1.45
Area 23, H & S Building	10/15/96	10/22/96	18.90	1.05	1.52
Area 23, H & S Building	10/22/96	10/29/96	13.40	0.91	1.42
Area 23, H & S Building	10/29/96	11/05/96	25.50	1.11	1.47
Area 23, H & S Building	11/05/96	11/12/96	17.70	1.03	1.52
Area 23, H & S Building	11/12/96	11/19/96	22.60	1.07	1.46
Area 23, H & S Building	11/19/96	11/26/96	11.60	0.91	1.46
Area 23, H & S Building	11/26/96	12/03/96	11.60	0.89	1.42
Area 23, H & S Building	12/03/96	12/10/96	19.60	1.03	2.39
Area 23, H & S Building	12/10/96	12/17/96	8.33	1.02	2.94
Area 23, H & S Building	12/17/96	12/24/96	15.20	0.92	2.25
Area 23, H & S Building	12/24/96	12/31/96	14.60	0.93	2.29
Area 25, E-MAD North	12/26/95	01/03/96	21.40	0.97	1.29
Area 25, E-MAD North	01/03/96	01/08/96	18.20	1.32	2.07
Area 25, E-MAD North	01/08/96	01/16/96	21.10	0.98	1.34
Area 25, E-MAD North	01/16/96	01/22/96	9.39	1.00	1.73
Area 25, E-MAD North	01/22/96	01/29/96	8.27	0.86	1.47
Area 25, E-MAD North	01/29/96	02/05/96	17.40	1.01	1.48
Area 25, E-MAD North	02/05/96	02/12/96	23.50	1.10	1.49
Area 25, E-MAD North	02/12/96	02/20/96	22.30	1.00	1.35
Area 25, E-MAD North	02/20/96	02/26/96	6.89	0.95	1.72
Area 25, E-MAD North	02/26/96	03/04/96	12.40	0.95	1.52

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 25, E-MAD North	03/04/96	03/11/96	11.50	0.94	1.54
Area 25, E-MAD North	03/11/96	03/18/96	17.50	1.04	1.56
Area 25, E-MAD North	03/18/96	03/25/96	15.10	1.18	1.87
Area 25, E-MAD North	03/25/96	03/27/96		Motor Failed	
Area 25, E-MAD North	03/27/96	04/01/96	17.00	1.33	2.16
Area 25, E-MAD North	04/01/96	04/08/96	12.70	0.97	1.54
Area 25, E-MAD North	04/08/96	04/15/96	14.20	0.99	1.55
Area 25, E-MAD North	04/15/96	04/24/96	13.10	0.78	1.15
Area 25, E-MAD North	04/24/96	05/01/96	15.90	0.99	1.49
Area 25, E-MAD North	05/01/96	05/08/96	19.10	1.06	1.55
Area 25, E-MAD North	05/08/96	05/14/96	21.30	1.19	1.73
Area 25, E-MAD North	05/14/96	05/22/96	15.20	0.90	1.36
Area 25, E-MAD North	05/22/96	05/29/96		Sample Head Missing	
Area 25, E-MAD North	05/29/96	06/04/96	25.10	1.29	1.85
Area 25, E-MAD North	06/04/96	06/11/96	23.50	1.13	1.54
Area 25, E-MAD North	06/11/96	06/18/96	20.30	1.11	1.60
Area 25, E-MAD North	06/18/96	06/24/96	13.80	1.12	1.81
Area 25, E-MAD North	06/24/96	07/01/96	19.10	1.09	1.61
Area 25, E-MAD North	07/01/96	07/09/96	18.60	0.97	1.37
Area 25, E-MAD North	07/09/96	07/17/96	18.60	0.98	1.38
Area 25, E-MAD North	07/17/96	07/24/96	18.50	1.06	1.56
Area 25, E-MAD North	07/24/96	07/30/96	28.30	1.38	1.91
Area 25, E-MAD North	07/30/96	08/06/96	21.10	1.09	1.54
Area 25, E-MAD North	08/06/96	08/13/96	20.90	1.06	1.48
Area 25, E-MAD North	08/13/96	08/20/96	23.10	1.34	1.98
Area 25, E-MAD North	08/20/96	08/27/96	24.30	1.32	1.89
Area 25, E-MAD North	08/27/96	09/04/96	18.00	0.87	1.20
Area 25, E-MAD North	09/04/96	09/10/96	19.30	1.07	1.55
Area 25, E-MAD North	09/10/96	09/17/96	16.60	0.93	1.34
Area 25, E-MAD North	09/17/96	09/24/96	25.90	1.05	1.33
Area 25, E-MAD North	09/24/96	09/30/96	24.80	1.15	1.55
Area 25, E-MAD North	09/30/96	10/08/96	36.80	1.10	1.19
Area 25, E-MAD North	10/08/96	10/15/96	22.30	1.00	1.34
Area 25, E-MAD North	10/15/96	10/22/96	18.90	0.95	1.34
Area 25, E-MAD North	10/22/96	10/29/96	13.10	0.88	1.36
Area 25, E-MAD North	10/29/96	11/05/96	21.70	1.01	1.37
Area 25, E-MAD North	11/05/96	11/12/96	18.00	0.95	1.36
Area 25, E-MAD North	11/12/96	11/19/96	20.50	0.99	1.35
Area 25, E-MAD North	11/19/96	11/26/96	10.50	0.84	1.35
Area 25, E-MAD North	11/26/96	12/03/96	9.98	0.84	1.37
Area 25, E-MAD North	12/03/96	12/10/96	14.50	0.90	2.22
Area 25, E-MAD North	12/10/96	12/17/96	8.02	0.81	2.24
Area 25, E-MAD North	12/17/96	12/24/96	14.80	0.91	2.24
Area 25, E-MAD North	12/24/96	12/31/96	14.10	0.90	2.25

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 25, NRDS	12/26/95	01/03/96	17.30	0.84	1.16
Area 25, NRDS	01/03/96	01/08/96	15.00	1.16	1.86
Area 25, NRDS	01/08/96	01/16/96	20.70	0.92	1.23
Area 25, NRDS	01/16/96	01/22/96	9.25	0.90	1.51
Area 25, NRDS	01/22/96	01/29/96	8.05	0.78	1.31
Area 25, NRDS	01/29/96	02/05/96	18.50	0.95	1.33
Area 25, NRDS	02/05/96	02/12/96	21.30	1.00	1.34
Area 25, NRDS	02/12/96	02/20/96	21.70	0.93	1.22
Area 25, NRDS	02/20/96	02/26/96	6.83	0.87	1.53
Area 25, NRDS	02/26/96	03/04/96	14.00	0.90	1.37
Area 25, NRDS	03/04/96	03/11/96	10.50	0.85	1.39
Area 25, NRDS	03/11/96	03/18/96	10.60	0.86	1.40
Area 25, NRDS	03/18/96	03/25/96	14.30	0.89	1.34
Area 25, NRDS	03/25/96	04/01/96	13.90	0.91	1.40
Area 25, NRDS	04/01/96	04/08/96	14.30	0.92	1.41
Area 25, NRDS	04/08/96	04/15/96	11.70	0.88	1.41
Area 25, NRDS	04/15/96	04/24/96	13.30	0.72	1.04
Area 25, NRDS	04/24/96	05/01/96	15.10	0.92	1.38
Area 25, NRDS	05/01/96	05/08/96	18.00	0.98	1.42
Area 25, NRDS	05/08/96	05/14/96	23.00	1.16	1.63
Area 25, NRDS	05/14/96	05/22/96	12.60	0.82	1.25
Area 25, NRDS	05/22/96	05/29/96	15.70	0.93	1.37
Area 25, NRDS	05/29/96	06/04/96	21.90	1.17	1.69
Area 25, NRDS	06/04/96	06/11/96	30.00	1.15	1.43
Area 25, NRDS	06/11/96	06/18/96	18.80	1.01	1.46
Area 25, NRDS	06/18/96	06/24/96	13.30	1.03	1.66
Area 25, NRDS	06/24/96	07/01/96	15.90	0.97	1.46
Area 25, NRDS	07/01/96	07/09/96	16.20	0.87	1.25
Area 25, NRDS	07/09/96	07/17/96	22.00	0.96	1.26
Area 25, NRDS	07/17/96	07/24/96	15.60	0.96	1.43
Area 25, NRDS	07/24/96	07/30/96	14.30	1.08	1.72
Area 25, NRDS	07/30/96	08/06/96	22.90	1.08	1.49
Area 25, NRDS	08/06/96	08/13/96	23.80	1.09	1.49
Area 25, NRDS	08/13/96	08/20/96	25.10	1.09	1.44
Area 25, NRDS	08/20/96	08/27/96	23.80	1.11	1.49
Area 25, NRDS	08/27/96	09/04/96	20.60	0.96	1.31
Area 25, NRDS	09/04/96	09/10/96	22.40	1.19	1.69
Area 25, NRDS	09/10/96	09/17/96	16.30	0.95	1.39
Area 25, NRDS	09/17/96	09/24/96	28.10	1.10	1.38
Area 25, NRDS	09/24/96	09/30/96	26.10	1.20	1.61
Area 25, NRDS	09/30/96	10/08/96	35.70	1.11	1.24
Area 25, NRDS	10/08/96	10/15/96	25.30	1.07	1.39
Area 25, NRDS	10/15/96	10/22/96	14.70	0.92	1.38
Area 25, NRDS	10/22/96	10/29/96	14.00	0.94	1.45

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 25, NRDS	10/29/96	11/05/96	23.60	1.07	1.45
Area 25, NRDS	11/05/96	11/12/96	19.90	1.00	1.40
Area 25, NRDS	11/12/96	11/19/96	22.80	1.04	1.39
Area 25, NRDS	11/19/96	11/26/96	8.93	0.83	1.39
Area 25, NRDS	11/26/96	12/03/96	9.81	0.86	1.42
Area 25, NRDS	12/03/96	12/10/96	17.40	0.97	2.29
Area 25, NRDS	12/10/96	12/17/96	9.44	0.85	2.31
Area 25, NRDS	12/17/96	12/24/96	15.50	0.93	2.28
Area 25, NRDS	12/24/96	12/31/96	16.00	0.97	2.37
Area 27, Camp	12/22/95	01/03/96		No Access to Site	
Area 27, Camp	01/03/96	01/08/96	19.10	1.36	2.11
Area 27, Camp	01/08/96	01/16/96	21.60	1.27	1.91
Area 27, Camp	01/16/96	01/22/96	7.52	0.89	1.56
Area 27, Camp	01/22/96	01/29/96	7.15	0.94	1.67
Area 27, Camp	01/29/96	02/05/96	17.10	1.13	1.72
Area 27, Camp	02/05/96	02/12/96	23.20	1.22	1.73
Area 27, Camp	02/12/96	02/20/96	16.80	1.13	1.75
Area 27, Camp	02/20/96	02/26/96	8.55	1.13	2.01
Area 27, Camp	02/26/96	03/04/96	11.60	1.05	1.76
Area 27, Camp	03/04/96	03/11/96	8.26	1.01	1.78
Area 27, Camp	03/11/96	03/18/96	11.40	1.08	1.81
Area 27, Camp	03/18/96	03/25/96	11.20	1.03	1.71
Area 27, Camp	03/25/96	04/01/96	13.40	1.11	1.81
Area 27, Camp	04/01/96	04/08/96	13.00	1.10	1.81
Area 27, Camp	04/08/96	04/15/96	12.00	1.08	1.81
Area 27, Camp	04/15/96	04/24/96	10.50	0.83	1.35
Area 27, Camp	04/24/96	05/01/96	16.80	1.14	1.77
Area 27, Camp	05/01/96	05/08/96	14.90	1.15	1.84
Area 27, Camp	05/08/96	05/14/96	19.10	1.36	2.12
Area 27, Camp	05/14/96	05/22/96	12.30	1.00	1.61
Area 27, Camp	05/22/96	05/29/96	14.10	1.11	1.79
Area 27, Camp	05/29/96	06/04/96	17.80	1.38	2.22
Area 27, Camp	06/04/96	06/11/96	28.30	1.37	1.87
Area 27, Camp	06/11/96	06/18/96	18.40	1.25	1.95
Area 27, Camp	06/18/96	06/24/96	18.00	1.39	2.25
Area 27, Camp	06/24/96	07/01/96	13.40	1.19	1.98
Area 27, Camp	07/01/96	07/09/96	17.00	1.12	1.71
Area 27, Camp	07/09/96	07/17/96	21.00	2.35	4.08
Area 27, Camp	07/17/96	07/23/96	14.80	1.26	2.06
Area 27, Camp	07/23/96	07/30/96	21.10	1.32	1.99
Area 27, Camp	07/30/96	08/06/96	19.70	1.25	1.90
Area 27, Camp	08/06/96	08/13/96	25.00	1.34	1.93
Area 27, Camp	08/13/96	08/20/96	21.10	1.24	1.84
Area 27, Camp	08/20/96	09/04/96	15.90	0.68	0.90

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 27, Camp	09/04/96	09/10/96	19.40	1.35	2.10
Area 27, Camp	09/10/96	09/17/96	17.10	1.21	1.87
Area 27, Camp	09/17/96	09/24/96	25.20	1.31	1.84
Area 27, Camp	09/24/96	09/30/96	22.60	1.44	2.16
Area 27, Camp	09/30/96	10/08/96	32.60	1.32	1.67
Area 27, Camp	10/08/96	10/15/96	24.80	1.30	1.86
Area 27, Camp	10/15/96	10/22/96	14.70	1.15	1.83
Area 27, Camp	10/22/96	10/29/96	11.50	1.05	1.76
Area 27, Camp	10/29/96	11/05/96	20.80	1.28	1.92
Area 27, Camp	11/05/96	11/12/96	13.50	1.21	2.03
Area 27, Camp	11/12/96	11/19/96		No Power	
Area 27, Camp	11/19/96	11/26/96		No Power	
Area 27, Camp	11/26/96	12/03/96		No Power	
Area 27, Camp	12/03/96	12/10/96	14.40	1.14	3.00
Area 27, Camp	12/10/96	12/17/96	9.29	1.08	3.07
Area 27, Camp	12/17/96	12/31/96	11.90	0.64	1.53
Area 52, DOUBLE TRACKS	12/22/95	01/04/96		Pump Failed	
Area 52, DOUBLE TRACKS	01/04/96	01/11/96	15.00	1.04	1.63
Area 52, DOUBLE TRACKS	01/11/96	01/18/96	19.20	1.08	1.57
Area 52, DOUBLE TRACKS	01/18/96	01/23/96	8.67	1.21	2.18
Area 52, DOUBLE TRACKS	01/23/96	02/01/96	12.40	0.81	1.23
Area 52, DOUBLE TRACKS	02/01/96	02/08/96	19.70	1.09	1.58
Area 52, DOUBLE TRACKS	02/08/96	02/15/96	25.70	1.16	1.58
Area 52, DOUBLE TRACKS	02/15/96	02/22/96	19.40	1.13	1.67
Area 52, DOUBLE TRACKS	02/22/96	02/29/96	9.67	0.95	1.61
Area 52, DOUBLE TRACKS	02/29/96	03/07/96	13.40	1.00	1.57
Area 52, DOUBLE TRACKS	03/07/96	03/14/96	13.90	1.01	1.57
Area 52, DOUBLE TRACKS	03/14/96	03/21/96	14.00	1.00	1.56
Area 52, DOUBLE TRACKS	03/21/96	03/28/96	15.30	1.04	1.62
Area 52, DOUBLE TRACKS	03/28/96	04/04/96	15.20	1.05	1.63
Area 52, DOUBLE TRACKS	04/04/96	04/11/96	15.70	1.05	1.62
Area 52, DOUBLE TRACKS	04/11/96	04/18/96	12.00	0.99	1.62
Area 52, DOUBLE TRACKS	04/18/96	04/25/96	11.70	0.98	1.61
Area 52, DOUBLE TRACKS	04/25/96	05/02/96	13.50	1.02	1.62
Area 52, DOUBLE TRACKS	05/02/96	05/09/96	12.40	0.97	1.56
Area 52, DOUBLE TRACKS	05/09/96	05/16/96	21.00	1.20	1.74
Area 52, DOUBLE TRACKS	05/16/96	05/23/96	10.50	0.94	1.54
Area 52, DOUBLE TRACKS	05/23/96	05/30/96	15.60	1.03	1.57
Area 52, DOUBLE TRACKS	05/30/96	06/06/96	21.90	1.13	2.59
Area 52, DOUBLE TRACKS	06/06/96	06/13/96	17.30	1.09	1.65
Area 52, DOUBLE TRACKS	06/13/96	06/21/96	16.70	1.07	1.62
Area 52, DOUBLE TRACKS	06/21/96	06/27/96	14.20	0.99	1.53
Area 52, DOUBLE TRACKS	06/27/96	07/03/96	17.70	1.24	1.95
Area 52, DOUBLE TRACKS	07/03/96	07/11/96	14.70	0.92	1.37

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 52, DOUBLE TRACKS	07/11/96	07/18/96	17.60	1.08	1.61
Area 52, DOUBLE TRACKS	07/18/96	07/25/96	18.80	1.08	1.57
Area 52, DOUBLE TRACKS	07/25/96	08/02/96	20.90	1.02	1.42
Area 52, DOUBLE TRACKS	08/02/96	08/08/96	15.50	1.17	1.86
Area 52, DOUBLE TRACKS	08/08/96	08/15/96	21.80	1.17	1.68
Area 52, DOUBLE TRACKS	08/15/96	08/22/96	15.70	1.05	1.62
Area 52, DOUBLE TRACKS	08/22/96	08/29/96	17.10	1.04	1.55
Area 52, DOUBLE TRACKS	08/29/96	09/05/96	15.30	1.07	1.67
Area 52, DOUBLE TRACKS	09/05/96	09/12/96	15.40	1.04	1.60
Area 52, DOUBLE TRACKS	09/12/96	09/19/96	14.00	1.01	1.60
Area 52, DOUBLE TRACKS	09/19/96	09/27/96	20.80	1.00	1.38
Area 52, DOUBLE TRACKS	09/27/96	10/03/96	16.10	1.21	1.91
Area 52, DOUBLE TRACKS	10/03/96	10/10/96	23.40	1.15	1.59
Area 52, DOUBLE TRACKS	10/10/96	10/17/96	22.40	1.16	1.66
Area 52, DOUBLE TRACKS	10/17/96	10/24/96	11.60	0.99	1.63
Area 52, DOUBLE TRACKS	10/24/96	10/31/96		Counter Malfunction	
Area 52, DOUBLE TRACKS	10/31/96	11/07/96	18.80	1.12	1.66
Area 52, DOUBLE TRACKS	11/07/96	11/13/96	19.90	3.79	7.10
Area 52, DOUBLE TRACKS	11/13/96	11/21/96		System Shut Down	
Area 52, DOUBLE TRACKS	11/21/96	11/28/96	9.07	0.91	1.54
Area 52, DOUBLE TRACKS	11/28/96	12/06/96	11.30	0.84	1.33
Area 52, DOUBLE TRACKS	12/06/96	12/12/96	7.43	0.98	2.87
Area 52, DOUBLE TRACKS	12/12/96	12/20/96	19.60	0.97	2.22
Area 52, DOUBLE TRACKS	12/20/96	12/27/96	19.30	1.04	2.46
Area 52, CLEAN SLATE III	12/28/95	01/03/96	13.50	1.04	1.65
Area 52, CLEAN SLATE III	01/03/96	01/11/96	18.50	0.93	1.30
Area 52, CLEAN SLATE III	01/11/96	01/18/96	29.20	1.17	1.47
Area 52, CLEAN SLATE III	01/18/96	01/25/96	9.85	0.86	1.41
Area 52, CLEAN SLATE III	01/25/96	02/01/96	12.80	0.94	1.47
Area 52, CLEAN SLATE III	02/01/96	02/08/96	21.60	1.06	1.45
Area 52, CLEAN SLATE III	02/08/96	02/15/96	27.70	1.12	1.45
Area 52, CLEAN SLATE III	02/15/96	02/22/96	14.30	0.94	1.45
Area 52, CLEAN SLATE III	02/22/96	02/29/96	9.44	0.87	1.46
Area 52, CLEAN SLATE III	02/29/96	03/07/96	11.40	0.89	1.43
Area 52, CLEAN SLATE III	03/07/96	03/14/96	13.10	0.92	1.44
Area 52, CLEAN SLATE III	03/14/96	03/21/96	15.90	0.95	1.42
Area 52, CLEAN SLATE III	03/21/96	03/28/96	15.40	0.98	1.50
Area 52, CLEAN SLATE III	03/28/96	04/04/96	13.70	0.95	1.47
Area 52, CLEAN SLATE III	04/04/96	04/11/96	19.80	1.04	1.49
Area 52, CLEAN SLATE III	04/11/96	04/18/96	12.10	0.92	1.48
Area 52, CLEAN SLATE III	04/18/96	04/25/96	11.60	0.91	1.46
Area 52, CLEAN SLATE III	04/25/96	05/02/96	13.40	0.93	1.46
Area 52, CLEAN SLATE III	05/02/96	05/09/96	12.10	0.89	1.40
Area 52, CLEAN SLATE III	05/09/96	05/16/96	18.10	0.98	1.40

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	Standard Deviation (s)	Detection Limit
Area 52, CLEAN SLATE III	05/16/96	05/23/96	14.00	0.93	1.41
Area 52, CLEAN SLATE III	05/23/96	05/30/96	16.50	0.97	1.42
Area 52, CLEAN SLATE III	05/30/96	06/06/96	20.80	1.04	2.39
Area 52, CLEAN SLATE III	06/06/96	06/13/96	19.90	1.02	1.46
Area 52, CLEAN SLATE III	06/13/96	06/20/96	18.40	1.00	1.45
Area 52, CLEAN SLATE III	06/20/96	06/27/96	14.10	0.92	1.39
Area 52, CLEAN SLATE III	06/27/96	07/03/96	19.10	1.19	1.80
Area 52, CLEAN SLATE III	07/03/96	07/11/96	13.70	0.82	1.21
Area 52, CLEAN SLATE III	07/11/96	07/18/96	21.60	1.09	1.51
Area 52, CLEAN SLATE III	07/18/96	07/25/96	20.20	1.01	1.40
Area 52, CLEAN SLATE III	07/25/96	08/01/96	22.50	1.07	1.47
Area 52, CLEAN SLATE III	08/01/96	08/08/96	19.90	1.06	1.53
Area 52, CLEAN SLATE III	08/08/96	08/15/96	28.10	1.15	1.48
Area 52, CLEAN SLATE III	08/15/96	08/22/96	21.20	1.06	1.49
Area 52, CLEAN SLATE III	08/22/96	08/29/96	20.30	1.05	1.48
Area 52, CLEAN SLATE III	08/29/96	09/05/96	19.60	1.03	1.46
Area 52, CLEAN SLATE III	09/05/96	09/11/96	18.30	1.15	1.74
Area 52, CLEAN SLATE III	09/11/96	09/19/96	16.50	0.88	1.27
Area 52, CLEAN SLATE III	09/19/96	09/26/96	26.40	1.07	1.36
Area 52, CLEAN SLATE III	09/26/96	10/03/96	24.60	1.11	1.47
Area 52, CLEAN SLATE III	10/03/96	10/10/96	32.30	1.15	1.37
Area 52, CLEAN SLATE III	10/10/96	10/17/96	28.30	1.15	1.46
Area 52, CLEAN SLATE III	10/17/96	10/24/96	18.10	0.98	1.41
Area 52, CLEAN SLATE III	10/24/96	10/31/96	14.60	0.93	1.43
Area 52, CLEAN SLATE III	10/31/96	11/07/96	25.10	1.10	1.47
Area 52, CLEAN SLATE III	11/07/96	11/14/96	29.80	1.13	1.40
Area 52, CLEAN SLATE III	11/14/96	11/21/96	12.90	0.91	1.41
Area 52, CLEAN SLATE III	11/21/96	11/28/96	14.10	0.97	1.48
Area 52, CLEAN SLATE III	11/28/96	12/06/96	15.10	0.87	1.28
Area 52, CLEAN SLATE III	12/06/96	12/12/96	12.60	1.05	2.79
Area 52, CLEAN SLATE III	12/12/96	12/20/96	15.90	0.88	2.09
Area 52, CLEAN SLATE III	12/20/96	12/27/96	24.50	1.09	2.38
Area 52, CLEAN SLATE I	08/08/96	08/15/96	26.20	1.10	1.45
Area 52, CLEAN SLATE I	08/15/96	08/22/96	24.00	1.07	2.33
Area 52, CLEAN SLATE I	08/22/96	08/29/96	20.20	1.02	2.34
Area 52, CLEAN SLATE I	08/29/96	09/05/96	23.30	1.06	1.42
Area 52, CLEAN SLATE I	09/05/96	09/11/96	22.00	1.19	1.69
Area 52, CLEAN SLATE I	09/11/96	09/19/96	20.10	0.92	1.24
Area 52, CLEAN SLATE I	09/19/96	09/26/96	30.90	1.14	1.38
Area 52, CLEAN SLATE I	09/26/96	10/03/96	27.70	1.14	1.47
Area 52, CLEAN SLATE I	10/03/96	10/10/96	36.70	1.23	1.42
Area 52, CLEAN SLATE I	10/10/96	10/17/96		Counter Malfunction	
Area 52, CLEAN SLATE I	10/17/96	10/24/96	18.20	0.99	1.43
Area 52, CLEAN SLATE I	10/24/96	10/31/96	12.60	0.92	1.44

Attachment 2.1 (Gross Beta in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-15} Concentration	µCi/mL x 10^{-15} Standard Deviation (s)	µCi/mL x 10^{-15} Detection Limit
Area 52, CLEAN SLATE I	10/31/96	11/07/96	25.20	1.12	1.49
Area 52, CLEAN SLATE I	11/07/96	11/14/96	21.80	1.05	1.43
Area 52, CLEAN SLATE I	11/14/96	11/28/96	10.70	0.53	0.74
Area 52, CLEAN SLATE I	11/28/96	12/06/96	14.10	0.87	1.31
Area 52, CLEAN SLATE I	12/06/96	12/12/96	11.40	1.04	2.86
Area 52, CLEAN SLATE I	12/12/96	12/20/96	13.50	0.86	2.15
Area 52, CLEAN SLATE I	12/20/96	12/27/96	24.60	1.11	2.45

3.0 ONSITE ^{238}PU AND $^{239+240}$PU IN AIR

Forty-seven air sampling units on the Nevada Test Site (NTS) were used to determine plutonium in air concentrations in 1996. Figure 3.1 shows the locations of these air sampling stations. Not shown on this map are an additional three sampling locations in Area 52. This area is about 30 miles north of the northwest corner of the NTS. The locations used for monitoring plutonium in air concentrations are divided into four types: (1) monitoring the perimeter of Radiological Waste Management Sites (RWMS), (2) monitoring inside RWMSs, (3) preoperational monitoring of the Waste Examination Facility (WEF), and (4) routine environmental monitoring locations. Table 3.1 gives the names of the locations for types 1, 2, and 3. Locations not listed in this table are environmental monitoring locations.

Preoperational monitoring at the WEF began in the third quarter of 1996. Monitoring at Area 4 Bunker T-4 commenced at the beginning of 1996 in order to include Area 4 in the plutonium network. Monitoring in Area 20, in the extreme northwest of the NTS, was increased in 1996. In previous years, air monitoring was only done at the Area 20 base camp. At the beginning of 1996, air monitoring was initiated adjacent to the SCHOONER event location, a cratering event detonated in December of 1968. Monitoring in Area 20 adjacent to the CABRIOLET event location began at the beginning of the fourth quarter of 1996. At the beginning of 1996, Area 52 environmental monitoring was included with the NTS environmental monitoring program. The DOUBLE TRACKS and CLEAN SLATE III air sampling locations were established in Area 52 in December of 1995. The CLEAN SLATE I air sampling location was established in August of 1996. Monitoring at locations RWMS Nos. 3, 5, 7, and 9 was discontinued, beginning with the fourth quarter of 1996. These four locations are in the middle of the sides of the RWMS perimeter fence. The remaining RWMS sampling locations are at the corners of this complex.

The air sampling units were equipped with glass-fiber filters and had a nominal air flow rate of 140 L/min (5cfm). The filters were changed after one week of operation. After a 5 to 7 day delay for radon progeny decay, the glass-fiber filter was analyzed by gamma spectroscopy and for gross alpha and gross beta activity. These filters were then composited on a monthly or quarterly basis and analyzed for plutonium. Environmental monitoring locations were composited for each quarter. Radiological operations locations were composited monthly for the first three quarters of 1996, then quarterly for the last quarter. Attachment 3.1 gives the data for ^{238}Pu, and Attachment 3.2 gives the data for $^{239+240}$Pu. (All figures, tables, and attachments are at the end of the chapter.) Negative values in the attachments indicate samples in which the count was less than the corresponding analytical background.

PLUTONIUM-238

Descriptive statistics for ^{238}Pu in air by type of sampling location are given in Table 3.2. There is no column for the WEF locations because there were only two data values for these locations, which are included in the all types combined column. The most striking item to note in this table is that most of the ^{238}Pu concentrations are less than their individual detection limits. Eighty-seven percent of all observed concentrations are less than their individual detection limits, indicating that very little ^{238}Pu was actually detected in air. Also, 46 percent of the observed concentrations are negative; thus, essentially half the data is negative, and half is positive, which suggest that the median is virtually zero. A review of Table 3.2 indicates that there is no distinction of the data by type of monitoring location; thus, all data is included in the following discussion and analysis. Table 3.4 presents descriptive statistics for each sampling location.

Figure 3.2 is a probability plot of all the positive ^{238}Pu data values. This figure suggests that the data have a lognormal statistical distribution. Perhaps some statistical test could be done using the logarithms of the data values, but then almost half of the data, the negative values, would have to be discarded. In view of this, a comprehensive statistical analysis would be of little value. This would be mostly an analysis of background levels and detection limits.

Those locations that have concentrations above detection limits tend to consistently show higher levels for several quarters of the year and also are locations that have historically shown above detection limit concentrations, or are new air sampling locations. Two locations, Area 4 Bunker T-4 and Area 9 9-300 Bunker had all four quarter values above detection limits. The Area 4 location is a new sampling location that is about 200 feet southwest of the T-4 tower location. Four atmospheric test were conducted on towers at this site in the 1950's (FOX on May 25, 1952, NANCY on March 24 1953, APPLE-1 on March 29, 1955, and KEPLER on July 24, 1957). The 9-300 Bunker has historically shown above detection limit concentrations. An additional six air sampling locations have at least half of their quarterly ^{238}Pu values above detection limits. The Area 3 Mud Plant (a concrete batch plant) and the SEDAN Crater location had three quarters of data above detection limits. The UE-7ns location and the EPA Farm location have historically shown concentrations above detection limits. The Area 20 SCHOONER location and the Area 52 DOUBLE TRACKS location are new air sampling stations with no historical record.

Some sense of the variability within and between operational areas can be obtained from simple descriptive statistical summaries of ^{238}Pu concentrations grouped by NTS operational area. Table 3.3 presents summary statistics by operational area, and Figure 3.3 presents boxplots of the data for each operational area. Boxplots, also called box and whisker diagrams, are simple graphical representations of the data. Horizontal lines are drawn at the 25th and 75th percentiles of the data to form the top and bottom of the box. The horizontal line in the middle of the boxes is at the 50th percentile, which is the median of the data. Whiskers extend to the furthest data value that is within one and one-half times the interquartile range from the ends of the box. Values outside the whiskers are indicated by asterisks. Figure 3.3 clearly shows the higher values for the T-4 Bunker in Area 4 and the 9-300 Bunker in Area 9. The large number of asterisks for Area 5 can be attributed to the large number of near zero data values from this area, causing the interquartile range to be comparatively small.

In Figure 3.4, concentrations of ^{238}Pu from all sampling locations are plotted versus the date that sample collection began. The clustering of the data values around zero is evident in this figure. The fewer number of values, as concentrations increase, is characteristic of lognormally distributed data. The dotted line in this figure is approximately at the median detection limit of 2.75×10^{-18} µCi/mL. The solid line in this figure is a "locally weighted scatterplot smoother" line. This is a statistical tool for detecting trend in data plots. In Figure 3.4, the scatterplot smoother line shows very little trend and is obviously below the detection limit line. The three highest data values are listed from highest to lowest: (1) U-3ah/at north for sampling starting August 7, 1996; (2) Bunker T-4 for sampling starting July 3, 1996; and (3) U-3ah/at north for sampling starting June 5, 1996.

A sense of the accuracy of the ^{238}Pu in air measurements can be obtained from the empirical coefficients of variation, also called relative errors. These are defined as the analytic standard deviation divided by the measured concentration. Figure 3.5 is a histogram of the empirical coefficients of variation from the 1996 ^{238}Pu data. It can be readily seen that analytical standard deviations are usually as large or larger than the corresponding concentrations. The most frequent value seems to be a standard deviation about 1.5 times the concentration. This suggest that statistical "noise" from normal laboratory procedures is the primary constituent of the ^{238}Pu in air data. In addition to this source of errors, this data contains sampling errors caused by

statistical variation in the glass-fiber filters; these sources of error are not quantified by the current sample collection procedures.

PLUTONIUM-239+240

Descriptive statistics for $^{239+240}Pu$ in air by type of sampling location are given in Table 3.5. There is no column for the WEF locations because there were only two data values for these locations; they are included in the all types combined column. The most striking item in this table is the great differences between the means and the corresponding medians, the large standard deviations, and the large maximum values. This pattern of statistics is characteristic of extremely skewed data. Histograms and probability plots of the data indicated that the data has approximately a lognormal distribution. Figure 3.6 is a lognormal probability plot of the data values with the 16 negative values deleted. This data fails a statistical test for normality (of the logarithms of the data), but the data plots as a smooth curve, indicating it belongs to a single statistical distribution. The straight line in this plot indicates where the data points would plot if the data had exactly a lognormal statistical distribution. The data is somewhat close to this line. The shape of the tails of the data plot indicate that the very large values seen in the data are not outliers. However, the large values do have a great effect on the means and standard deviations; thus, these statistics should be used with reservations.

An examination of the data, displayed in Attachment 3.2, shows that the largest values occur erratically. For example, BJY is the first location in the attachment. It has one value that is an order of magnitude higher than the values for the other three quarters. This pattern of values occurs for several sampling locations, such as the Yucca Complex, the UE-7ns location, the EPA Farm, and the DOUBLE TRACKS location.

Table 3.6 summarizes the $^{239+240}Pu$ data values by operational area, and Table 3.7 gives individual sampling location statistics. These tables highlight the wide range of values between locations and within some locations. This is a historical characteristic of this data.

Subtraction of analytical instrument background can result in reported concentrations that have non-positive values. Of the reported $^{239+240}Pu$ concentrations, 6 percent were negative. This is about the same as in previous years. In 1995, 9 percent were negative; in 1994, 10 percent were negative; and in 1993, 14 percent were negative. Unlike ^{238}Pu, for which almost all observed concentrations were below detection limits, 41 percent of the $^{239+240}Pu$ concentrations were below detection limits. This is also about the same as in previous years. In 1995, 44 percent were below detection limits. In 1996, the median detection limit was 3.2×10^{-18} µCi/mL.

Figures 3.7 and 3.8 display the data for a visual evaluation of differences between operational areas. Figure 3.7 presents boxplots of the concentrations, scaled by 10^{-18}, and Figure 3.8 is the same except natural logarithms of the data values are used. The logarithm plot is better for comparing the areas with all concentration values close to zero. These two figures highlight the large differences in variability between the operational areas. This variability is also evident in the standard deviation column of Table 3.6.

In previous years, time series trends and differences between stations were tested for statistical significance using analysis of variance (ANOVA) on the logarithms of the concentrations. The statistical assumptions underlying the ANOVA are that the data are normally distributed and that the groups of data values have the same variance. The 1996 data does not satisfy either of these assumptions. Figure 3.6 shows that the data are not lognormally distributed, and a transformation that would achieve normality could not be found. Figures 3.7 and 3.8 obviously

show that the variances of the data for each area are not close to being equal. Thus an ANOVA would not be valid for the 1996 data. However, Figures 3.7 and 3.8 do show such considerable differences between areas that a formal statistical analysis is not necessary to conclude that the differences are significant, even though the significance cannot be measured statistically. The areas with the higher $^{239+240}$Pu concentrations are the operational areas that have been extensively used for nuclear testing.

Perhaps of more interest than differences between operational areas is an evaluation of trend in $^{239+240}$Pu concentrations over time. The 1996 data have a further characteristic that makes a formal test for trend difficult. The sampling frequency varies between locations and over the year. The results from environmental locations were reported quarterly. The results from the waste management locations were reported monthly for the first three quarters of the year, then quarterly for the fourth quarter. Again, graphical presentations can be used, and they carry no underlying assumptions that have to be satisfied to make the results valid. Figures 3.9 and 3.10 are time series plots of the $^{239+240}$Pu concentrations and the logarithms of those concentrations. The abscissa in these plots is the date that sample collection began for each plotted sample. The lack of any plotting after October 10, 1996, results from the cessation of monthly sampling at the beginning of the fourth quarter. The solid line passing through the data is a "locally weighted scatterplot smoother" line. This line is essentially horizontal, suggesting no trend with time over the year. If a formal statistical test of trend could be done, one would not anticipate finding any significant trend. In Figure 3.10, with the logarithmic ordinate, it is easy to see that the line passes approximately through the center of the data values at a value of about two. The antilog of two represents a $^{239+240}$Pu concentration of 7.4×18^{-18} µCi/mL.

A sense of the accuracy of the individual measured values can be obtained from the coefficients of variation which is the analytic standard deviation divided by the absolute value of the concentrations. This is a measure of the analytical or counting errors. The errors considered are variability due do differences between sampling location and time of sampling. Empirical coefficients of variation for 1996 $^{239+240}$Pu analyses are presented in Figure 3.10. It can be seen from this figure that the analytic errors are typically smaller than the measured concentrations. The largest coefficients of variation are from the lowest concentration values, those close to zero. The third quartile of the coefficients of variation is 0.745. This means that 75 percent of the results have a standard deviation that is 75 percent or less of the measured concentration.

HISTORICAL TRENDS

In 1996, there were 47 air sampling locations in use, and over the years 71 different locations have been used for various lengths of time. Placement of air sampling stations is determined from health physics considerations, not to give a uniform coverage of the NTS. Hence, in some years, samplers were removed from some locations and moved to other locations which, at that time, were judged to be of greater concern. Were a complete analysis of historical trends done for all air sampling locations, in addition to current year results, the resulting document would be cumbersome. Accordingly, the historical data were searched for a few representative locations. It was found that there are only 11 locations which have data available from all the years that plutonium in air has been assayed, and these were chosen for this presentation of historical trends. Plutonium in air was first reported in the 1971 annual report. From 1971 to 1989 no distinction was made between ^{238}Pu and $^{239+240}$Pu, but it is known from the analytical methods used that $^{239+240}$Pu was being measured. Then in 1989 ^{238}Pu assays began. The 11 chosen locations are identified in Tables 3.8 and 3.9 which present the historical data from 1989, when the distinction between isotopes commenced, to the present. Figures 3.12 and 3.13 present the same data graphically. The two figures contain "locally weighted scatterplot smoother" lines. These give the overall trend of the data and limit the influence of outliers.

Table 3.8 and Figure 3.12 present the historical data from the last eight years for $^{239+240}Pu$. The trend appears to be increasing until 1993 then decreasing. However, the 1993 and 1994 values are somewhat influenced by the values in those years that are close to 100×10^{-18} µCi/mL. There is no pattern of locations that show the higher values. Each of the values that appear to be outliers is from a different location and can be identified from Table 3.5. No statistical analysis of trend was performed because of the very low concentrations of plutonium. The highest values in Table 3.8 and Figure 3.12 are just under 100×10^{-18} µCi/mL and the public derived concentration guide (DCG) is over an order of magnitude higher at 2×10^{-15} µCi/mL. Most of the values are less than 10×10^{-18} µCi/mL or over two orders of magnitude less than the public DCG.

Table 3.9 and Figure 3.13 present the historical annual averages for ^{238}Pu at the selected locations. These data show an exponential shaped decline from a level of about 4×10^{-18} µCi/mL in 1989 to almost zero in 1996. Again, no formal analysis of trend was performed because of the extremely low concentrations.

CONCLUSIONS

Plutonium 238 and 239+240 measurements are continuing to be made on the NTS, although less frequently than in previous years because observed concentrations are low and, except for the RWMS, there are no new sources of environmental plutonium. At the beginning of 1996, plutonium was assayed quarterly at all locations except the RWMS, and for the fourth quarter, the assay frequency at the RWMS was also changed to quarterly. Perhaps the most significant statistics for plutonium concentrations from 1996 are the very low levels; 87 percent of the ^{238}Pu measurements and 41 percent of the $^{239+240}Pu$ measurements are below detection limits. This pattern of less than detection limits has been seen for a number of years. The plutonium measurements have approximately a lognormal statistical distribution, as has been seen in previous years. Except for a few monitoring locations in known areas of contamination, the $^{239+240}Pu$ levels are close to zero and are over two orders of magnitude less than the derived concentration guide.

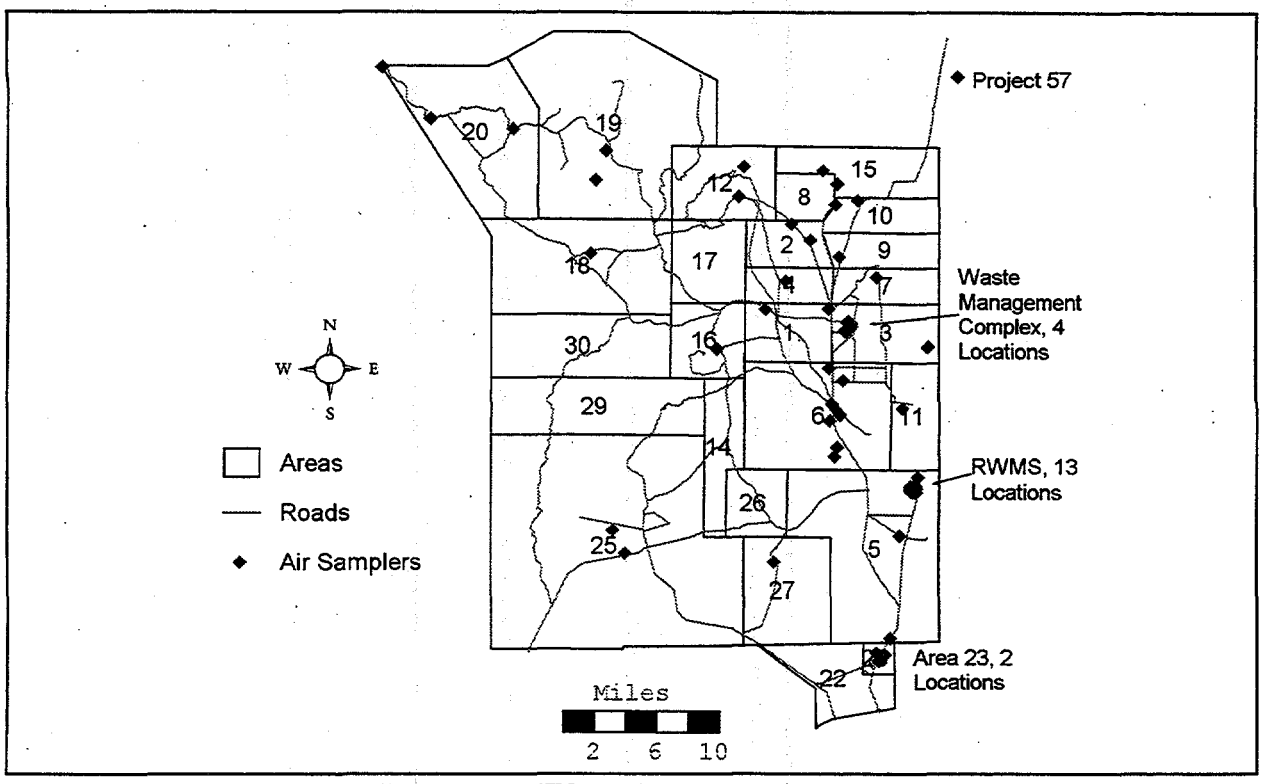


Figure 3.1 NTS Air Sampling Locations

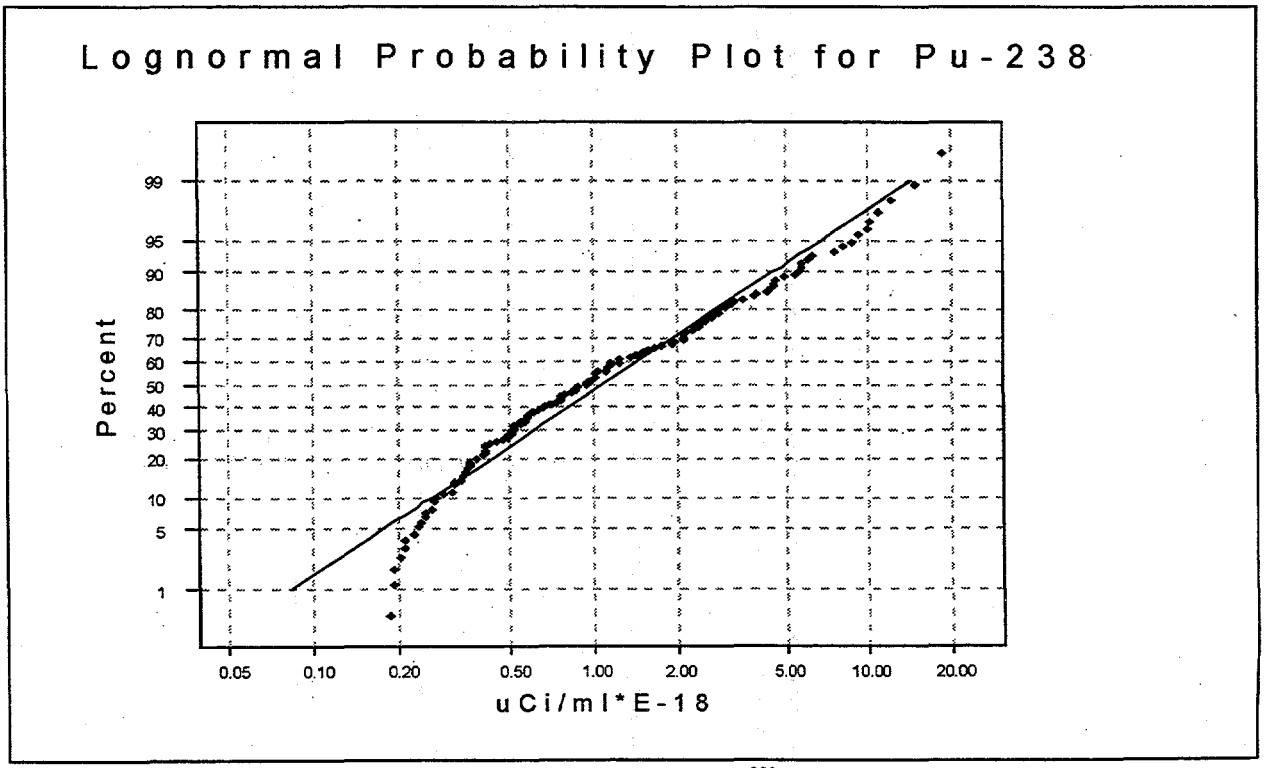


Figure 3.2 Probability Plot of Positive ^{238}Pu Concentrations

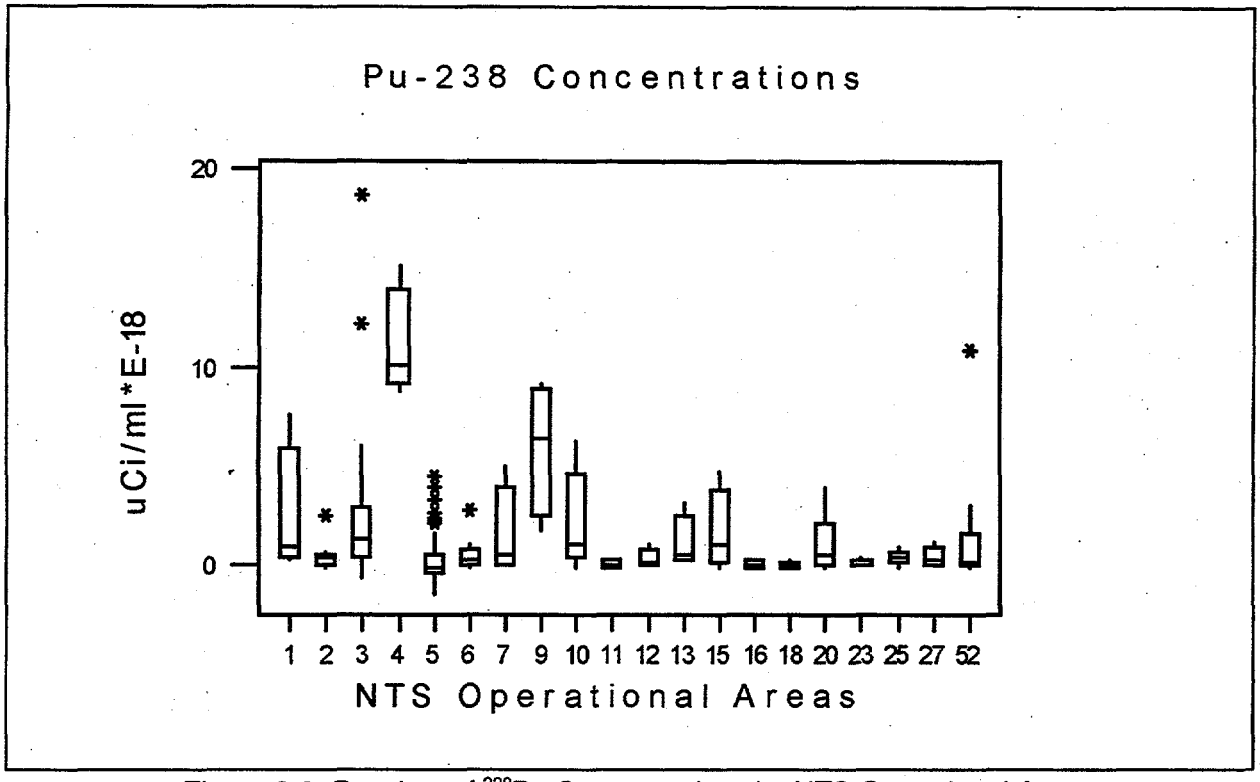


Figure 3.3 Boxplots of ^{238}Pu Concentrations by NTS Operational Area

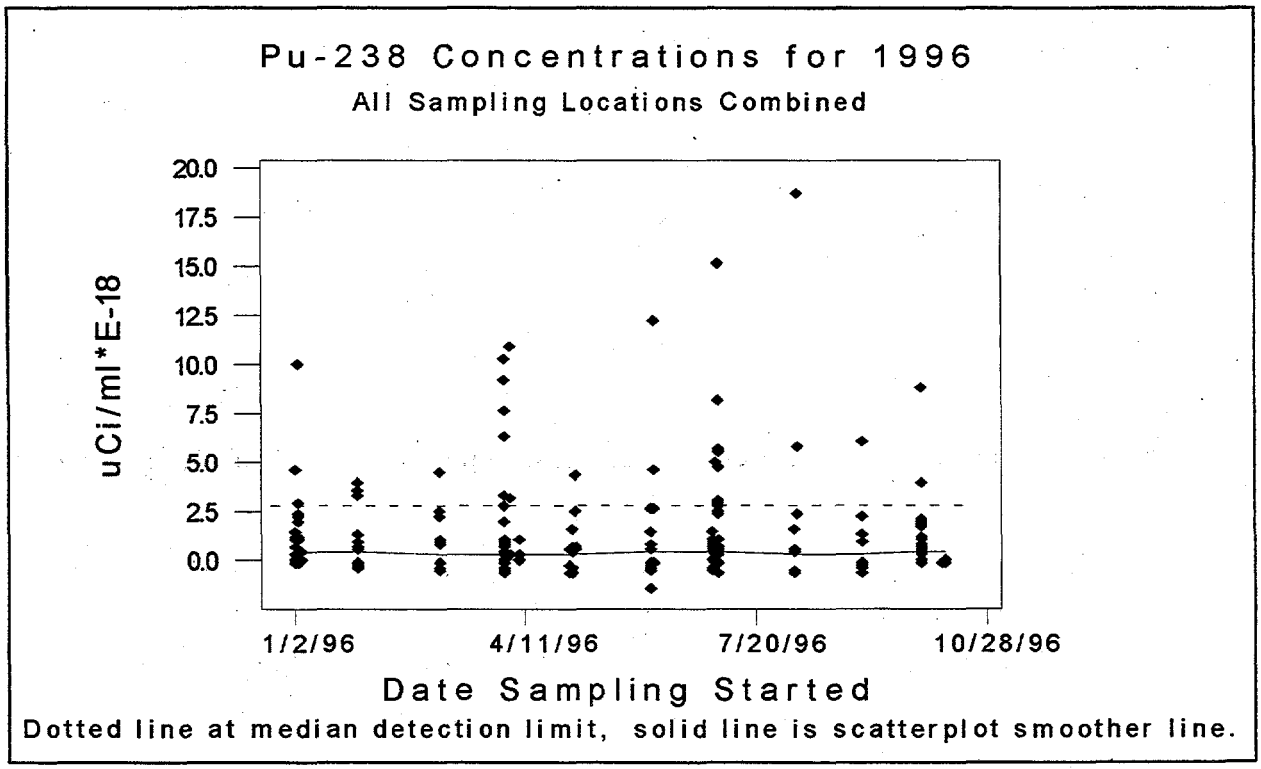


Figure 3.4 Time Series Plot of ^{238}Pu Concentrations for 1996

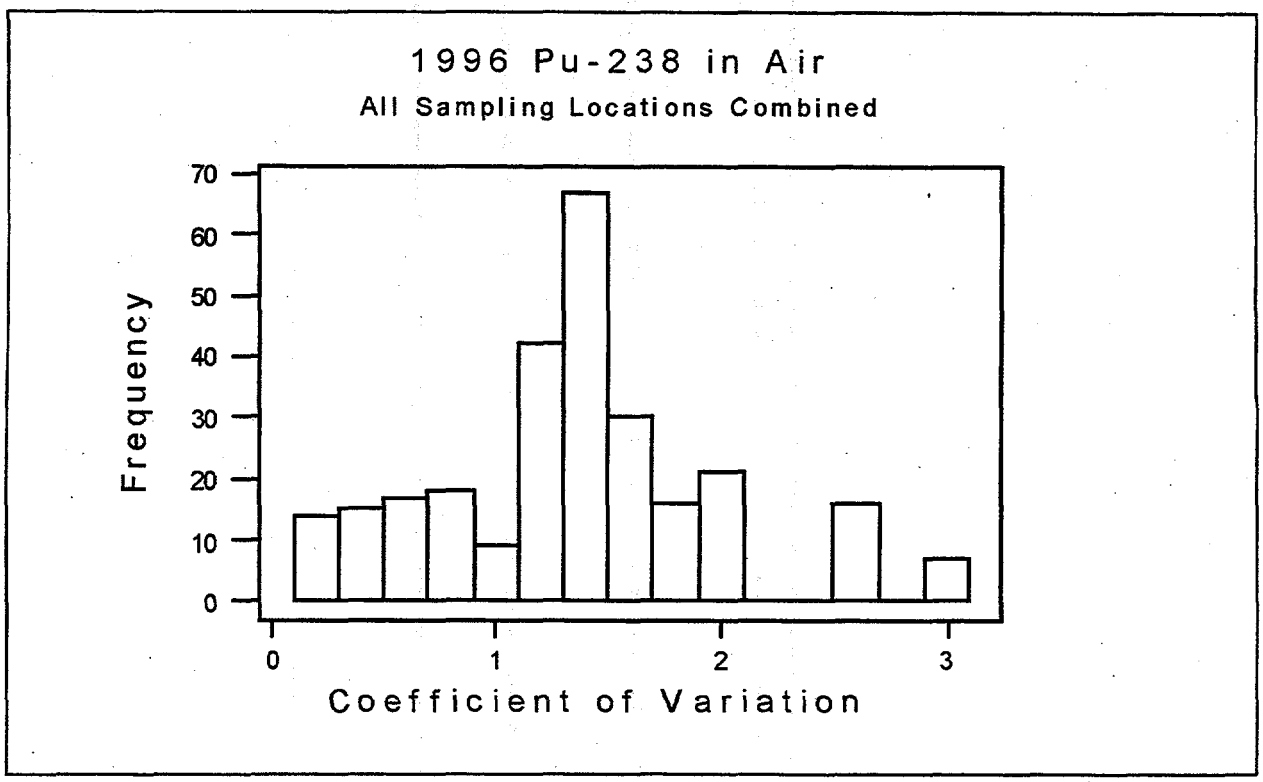


Figure 3.5 Histogram of Empirical Coefficients of Variation

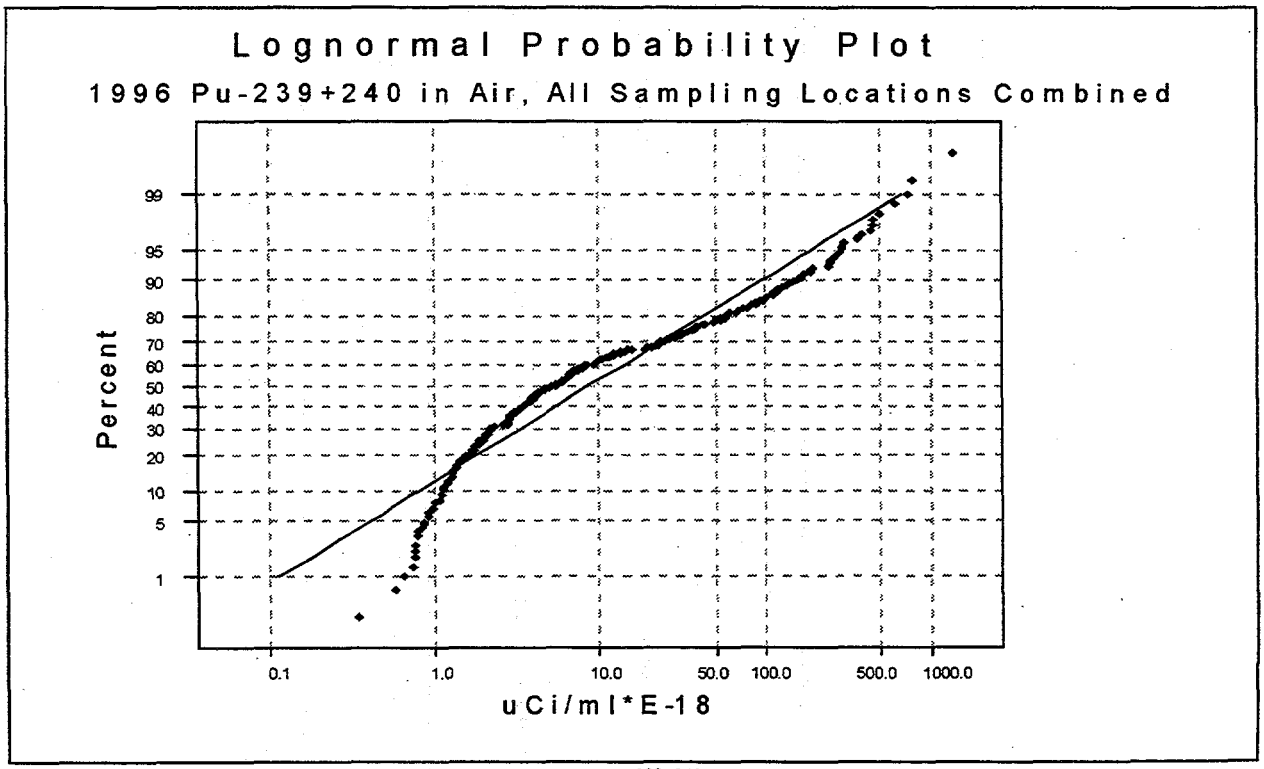


Figure 3.6 Probability Plot of $^{239+240}$Pu in Air Concentrations

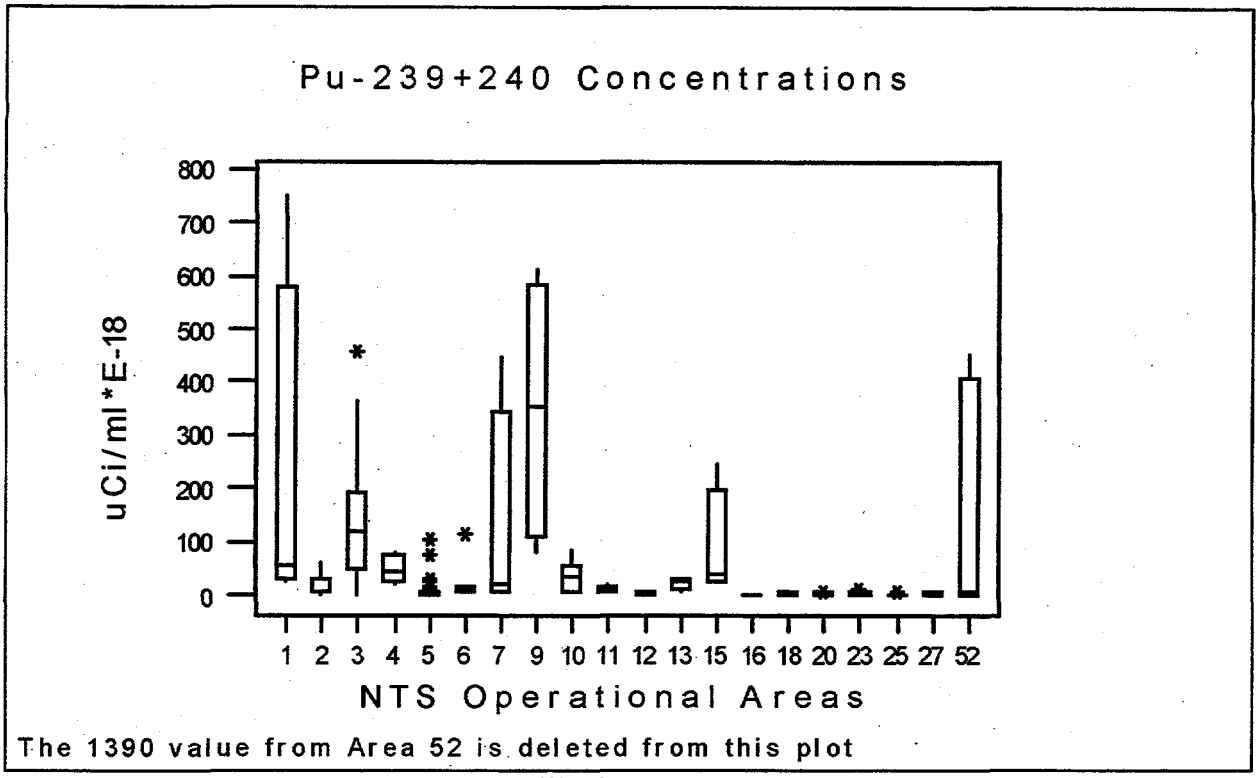


Figure 3.7 Boxplots of $^{239+240}$Pu Concentrations by NTS Area

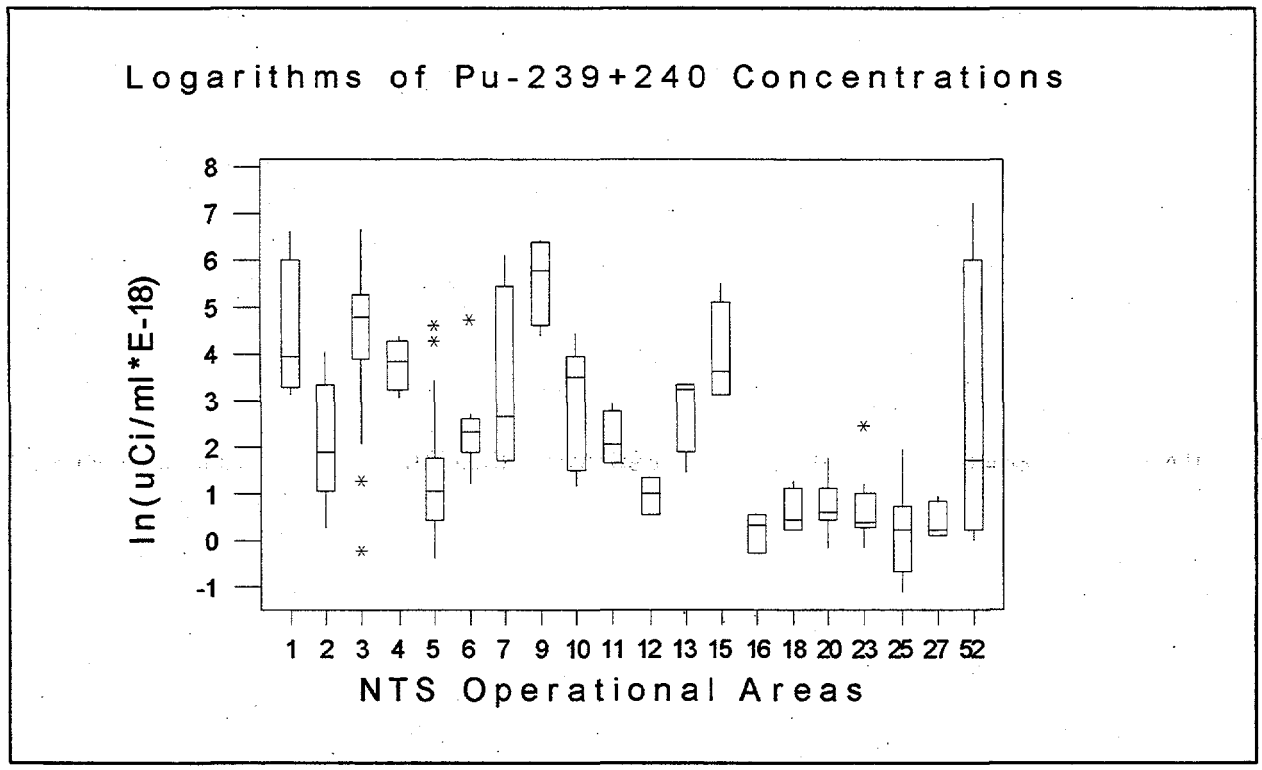


Figure 3.8 Boxplots of Natural Logarithms of $^{239+240}$Pu Concentrations by NTS Area

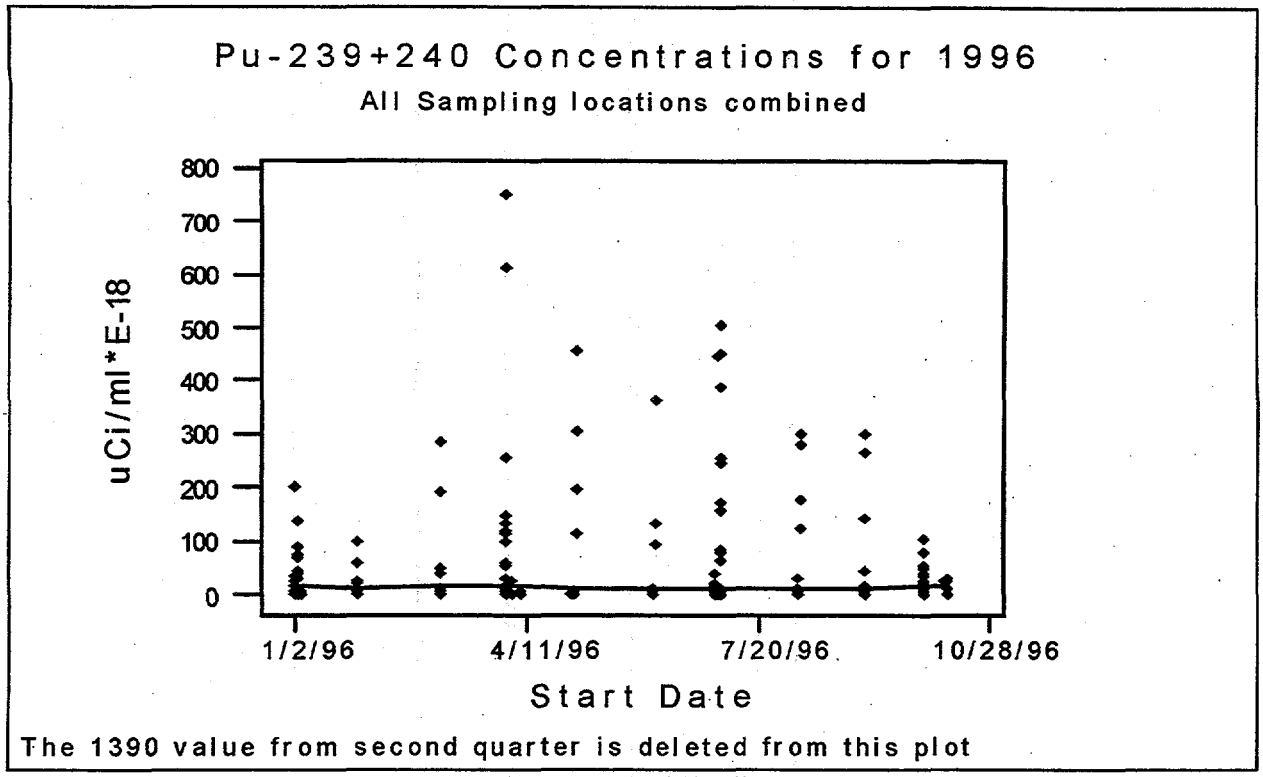


Figure 3.9 Time Series Plot of $^{239+240}$Pu Concentrations

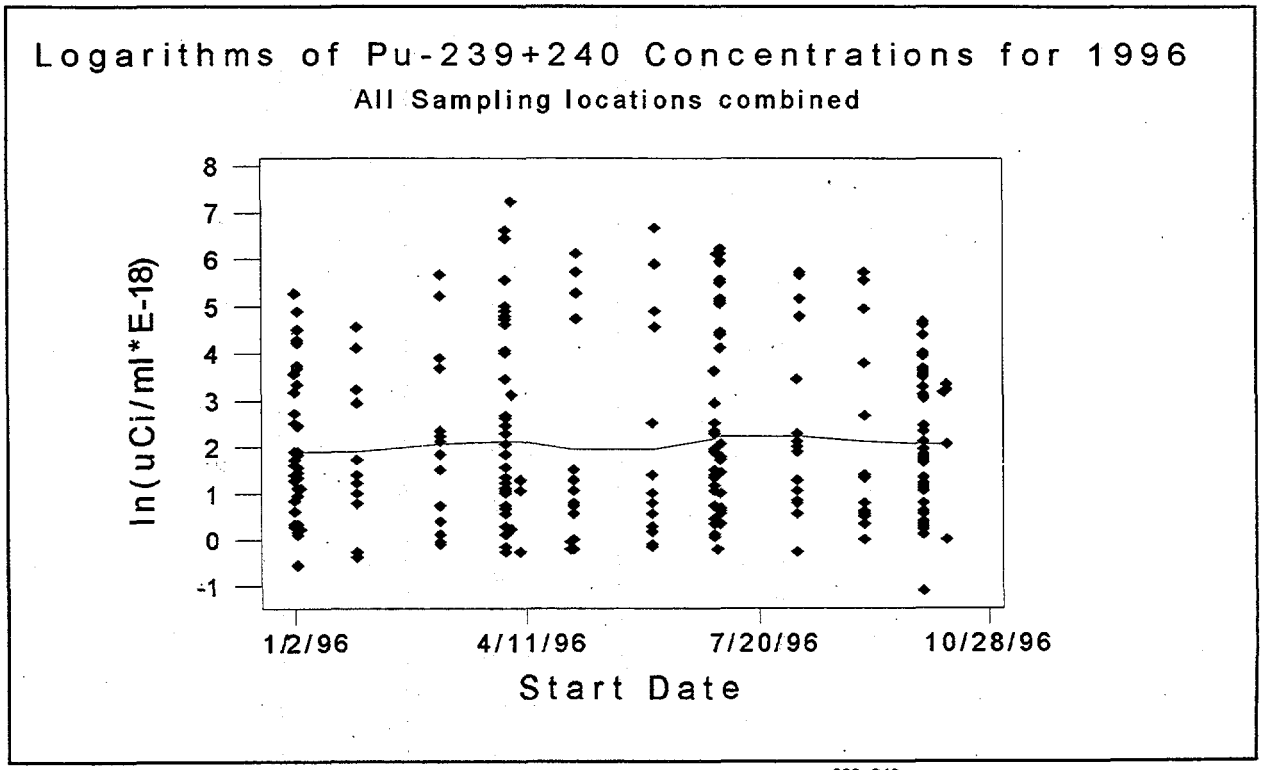


Figure 3.10 Time Series Plot of Natural Logarithms of $^{239+240}$Pu Concentrations

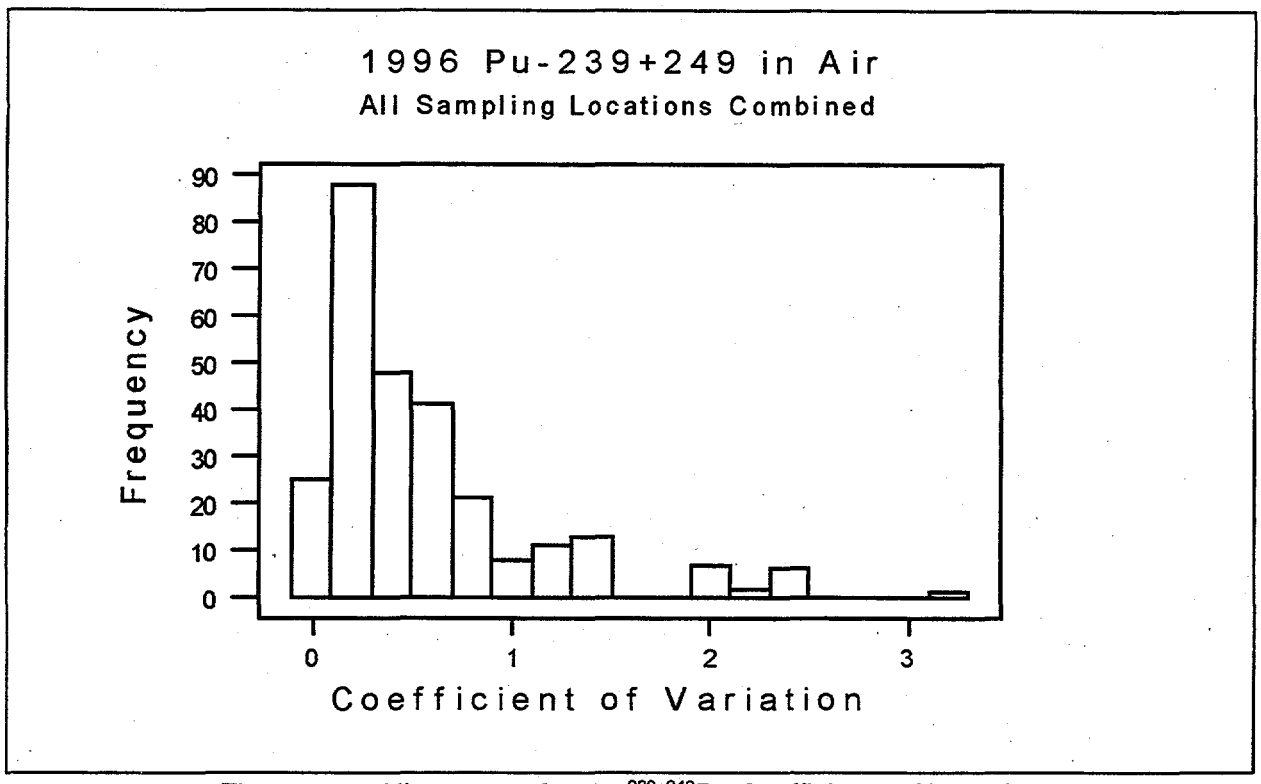


Figure 3.11 Histogram of 1996 $^{239+240}$Pu Coefficients of Variation

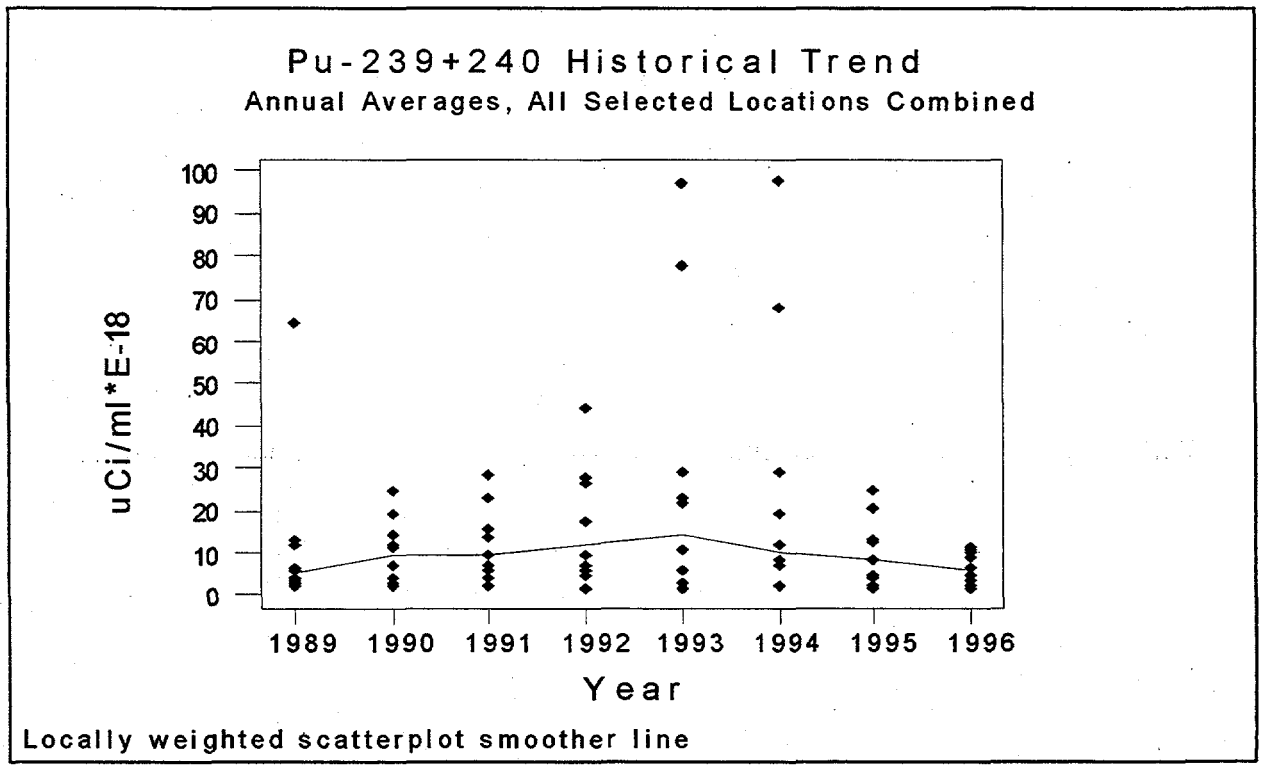


Figure 3.12 Time Series Plot of $^{239+240}$Pu Annual Averages

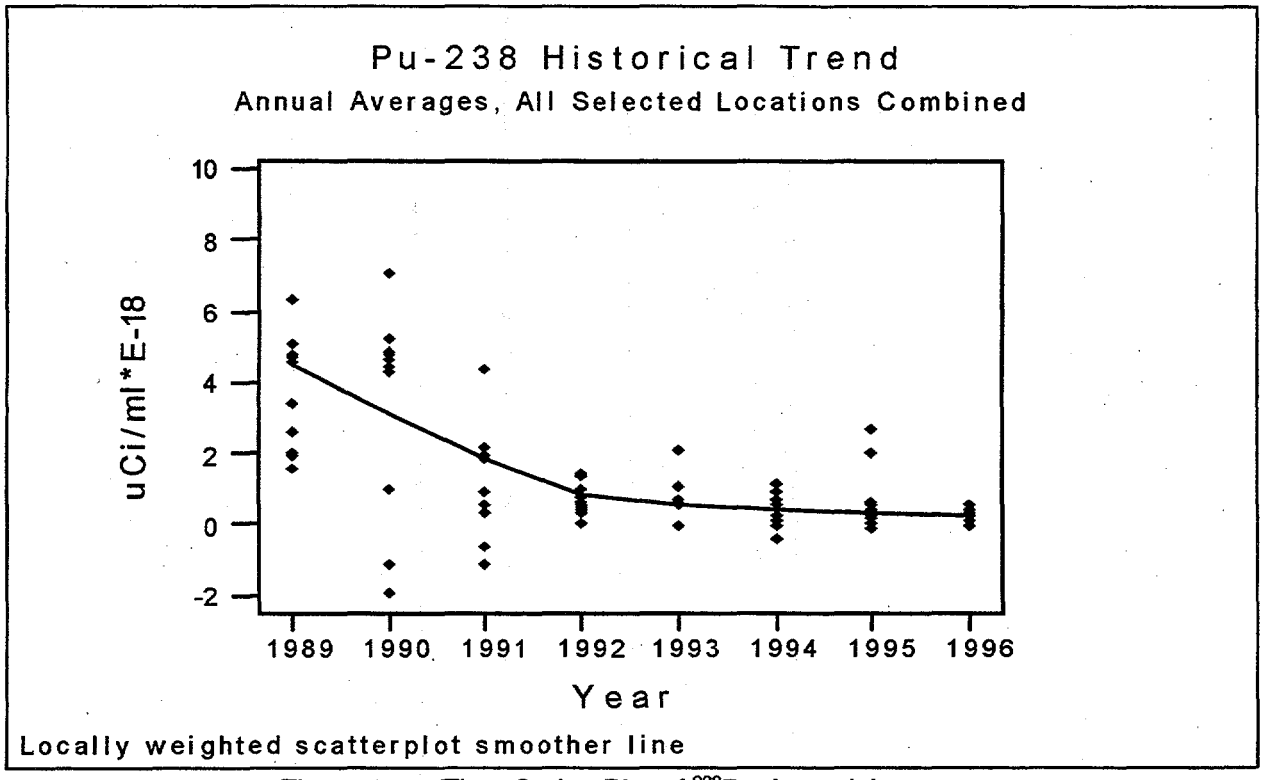


Figure 3.13 Time Series Plot of ^{238}Pu Annual Averages

Table 3.1 Radiological Waste Operations Monitoring Locations

Waste Operations Monitoring, Perimeter

U-3ah/at North	U-3ah/at East	U-3ah/at South	U-3ah/at West
RWNS No. 1	RWMS No. 3	RWMS No. 4	RWMS No. 5
RWMS No. 6	RWMS No. 7	RWMS No. 8	RWMS No. 9

Waste Operations Monitoring, Inside

RWMS Pit 5
RWMS Transuranic Pad Building North RWMS Transuranic Pad Building South

Waste Examination Facility

WEF North WEF South

Table 3.2 Descriptive Statistics for ^{238}Pu in Air by Location Type, µCi/mL x 10^{-18}

Statistic	Environmental	Waste Operations Perimeter	Waste Operations Inside	All Types Combined
Number of Data Values	123	116	30	271
Arithmetic Mean	1.27	0.96	0.28	1.02
Median	0.27	0.16	0.17	0.26
Standard Deviation	2.68	2.53	0.82	2.47
Minimum Value	-0.24	-1.55	-0.65	-1.55
Maximum Value	15.10	18.70	2.15	18.70
Median Mean Detection Limit	1.50	5.17	5.53	2.76
Results > Detection Limit	24%	5%	3%	13%

Table 3.3 Summary Statistics for ^{238}Pu Concentrations Compared Among NTS Operational Areas µCi/mL x 10^{-18}

Operational Area	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	4	2.27	0.82	3.48	0.25	7.57
2	8	0.45	0.29	0.84	-0.14	2.42
3	48	2.22	1.26	3.39	-0.76	18.70
4	4	11.04	10.10	2.78	8.84	15.10

Table 3.3 (Summary Statistics for ^{238}Pu Concentrations Compared Among NTS Operational Areas μCi/mL x 10^{-18}, cont.)

Operational Area	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
5	117	0.18	-0.13	0.94	-1.55	4.43
6	12	0.49	0.27	0.82	-0.14	2.76
7	4	1.47	0.50	2.34	-0.06	4.95
8	0					
9	4	5.90	6.36	3.45	1.68	9.20
10	8	2.04	1.04	2.45	-0.13	6.29
11	4	-0.01	-0.05	0.18	-0.18	0.25
12	4	0.28	0.08	0.50	-0.06	1.00
13	4	1.04	0.45	1.36	0.19	3.06
14	0					
15	4	1.60	0.96	2.11	-0.19	4.65
16	4	-0.03	-0.06	0.17	-0.19	0.21
17	0					
18	4	-0.02	-0.05	0.15	-0.17	0.19
19	0					
20	9	1.01	0.52	1.43	-0.18	3.86
22	0					
23	8	0.03	-0.05	0.16	-0.08	0.32
25	8	0.32	0.33	0.34	-0.17	0.83
26	0					
27	4	0.40	0.26	0.52	-0.09	1.14
29	0					
30	0					
52	10	1.51	0.10	3.44	-0.21	10.9
All Areas Combined	272	1.02	0.26	3.47	-1.55	18.70

Table 3.4 Descriptive Statistics for ^{238}Pu Concentrations by Sampling Location, μCi/mL x 10^{-18}

Sampling Location	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
Area 1, BJY	4	2.37	0.82	3.48	0.25	7.57
Area 2, Complex	4	0.27	0.33	0.30	-0.14	0.58
Area 2, 2-1 Substation	4	0.63	0.10	1.21	-0.12	2.42
Area 3, U-3ah/at South	10	2.11	1.63	2.10	-0.16	5.80
Area 3, U-3ah/at East	10	1.61	0.95	1.70	-0.24	5.76
Area 3, U-3ah/at North	10	4.26	2.29	6.28	-0.76	18.70
Area 3, U-3ah/at West	10	1.93	1.44	2.29	-0.68	6.04
Area 3, Mud Plant	4	1.45	1.41	1.54	-0.24	3.21
Area 3, Well ER 3-1	4	0.47	0.13	0.89	-0.14	1.77
Area 4, Bunker T-4	4	11.04	10.10	2.78	8.84	15.10

Table 3.4 (Descriptive Statistics for ^{238}Pu Concentrations by Sampling Location, µCi/mL x 10^{-18}, cont.)

Sampling Location	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
Area 5, WEF North	1	-0.11				
Area 5, WEF South	1	-0.13				
Area 5, RWMS Pit 5	10	0.08	-0.27	0.84	-0.65	1.58
Area 5, RWMS No. 4	10	-0.02	-0.16	0.56	-0.54	1.11
Area 5, RWMS No. 5	9	0.56	0.60	1.05	-0.67	2.57
Area 5, RWMS No. 6	10	0.10	-0.32	1.37	-0.77	3.88
Area 5, RWMS No. 7	9	0.27	-0.32	0.94	-0.46	2.35
Area 5, RWMS No. 8	10	0.24	0.13	0.75	-0.65	1.51
Area 5, RWMS No. 9	9	-0.18	-0.34	0.84	-1.55	1.54
Area 5, DOD Yard	4	-0.08	-0.06	0.06	-0.16	-0.03
Area 5, RWMS No. 3	9	0.60	-0.21	1.89	-0.69	4.43
Area 5, RWMS No. 1	10	-0.18	-0.24	0.43	-0.74	0.52
Area 5, Transuranic Bldg. North	10	0.58	0.51	0.75	-0.54	2.15
Area 5, Transuranic Bldg. South	10	0.17	-0.19	0.87	-0.14	1.77
Area 5, Well 5B	4	0.10	0.11	0.24	-0.14	0.33
Area 6, Yucca	4	0.62	-0.07	1.43	-0.13	2.76
Area 6, CP 6	4	0.31	0.30	0.49	-0.14	0.77
Area 6, Well 3	4	0.52	0.41	0.36	0.26	1.02
Area 7, UE-7ns	4	1.47	0.50	2.34	-0.06	4.95
Area 9, 9-300 Bunker	4	5.90	6.36	3.45	1.68	9.20
Area 10, Gate 700 South	4	0.38	0.34	0.45	-0.13	0.95
Area 10, SEDAN Crater	4	3.70	3.69	2.54	1.14	6.29
Area 11, Gate 293	4	-0.01	-0.05	0.18	-0.18	0.25
Area 12, Complex	4	0.28	0.08	0.50	-0.06	1.00
Area 13, Project 57	4	1.04	0.45	1.36	0.19	3.06
Area 15, EPA Farm	4	1.60	0.96	2.11	-0.19	4.65
Area 16, 3545 Substation	4	-0.03	-0.06	0.17	-0.19	0.21
Area 18, Well UE-18t	4	-0.02	-0.05	0.15	-0.17	0.19
Area 20, SCHOONER	4	2.25	2.06	1.29	1.03	3.86
Area 20, Camp	4	0.06	-0.04	0.31	-0.18	0.52
Area 20, CABRIOLET	1	-0.14				
Area 23, Building 790 No. 2	4	-0.06	-0.06	0.02	-0.07	-0.03
Area 23, H & S Building	4	0.11	0.10	0.20	-0.08	0.32
Area 25, E-MAD North	4	0.21	0.14	0.40	-0.17	0.73
Area 25, NRDS	4	0.43	0.35	0.27	0.20	0.83
Area 27, Camp	4	0.40	0.26	0.52	-0.09	1.14
Area 52, DOUBLE TRACKS	4	3.55	1.68	5.08	-0.05	10.90
Area 52, CLEAN SLATE III	4	-0.02	-0.04	0.18	-0.21	0.23
Area 52, CLEAN SLATE I	2	0.47	0.47	0.70	-0.13	0.97

Table 3.5 Descriptive Statistics for $^{239+240}Pu$ in Air by Location Type, μCi/mL x 10^{-18}

Statistic	Environmental	Waste Operations Perimeter	Waste Operations Inside	All Types Combined
Number of Data Values	123	116	30	271
Arithmetic Mean	57.08	59.77	5.58	52.32
Median	5.56	5.11	1.41	4.39
Standard Deviation	170.49	114.92	18.64	138.12
Minimum Value	-0.08	-0.26	-0.76	-0.76
Maximum Value	1390.0	804.00	103.00	1390.0
Median Mean Detection Limit	1.61	4.87	5.04	3.21
Results > Detection Limit	76%	37%	20%	59%

Table 3.6 Summary Statistics for $^{239+240}Pu$ Concentrations Compared Among NTS Operational Areas, μCi/mL x 10^{-18}

Operational Area	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	4	219.47	51.85	354.76	22.90	751.00
2	8	16.01	6.74	20.49	1.31	58.40
3	48	149.31	117.00	142.46	0.79	804.00
4	4	48.35	46.05	25.22	20.80	80.50
5	116	5.34	2.25	12.19	-0.76	103.00
6	12	18.44	10.25	30.30	3.44	114.00
7	4	122.43	18.81	216.71	5.13	447.00
8	0					
9	4	349.07	352.00	251.77	79.30	613.00
10	8	31.83	32.70	28.49	3.20	83.80
11	4	10.01	7.88	6.51	4.96	19.30
12	4	2.03	2.23	1.62	-0.07	3.70
13	4	20.53	24.55	11.09	4.33	28.70
14	0					
15	4	86.58	40.50	105.53	22.30	243.00
16	4	0.95	1.05	0.78	-0.04	1.75
17	0					
18	4	1.99	1.63	1.05	1.22	3.48
19	0					
20	9	2.50	1.88	1.50	0.83	5.97
22	0					
23	8	2.83	1.50	3.46	0.85	11.20
25	8	1.46	1.86	2.33	-0.08	7.05
26	0					
27	4	1.56	1.26	1.71	1.13	2.61
29	0					
30	0					
52	10	227.91	5.88	443.57	1.01	1390.00
All Areas Combined	271	52.32	4.39	138.32	-0.76	1390.00

Table 3.7 Descriptive Statistics for $^{239+240}Pu$ Concentrations by Sampling Location, µCi/mL x 10^{-18}

Sampling Location	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
Area 1, BJY	4	219.40	51.85	354.76	22.90	751.00
Area 2, Complex	4	6.62	6.36	3.93	2.34	11.40
Area 2, 2-1 Substation	4	25.41	20.96	26.99	1.31	58.40
Area 3, U-3ah/at South	10	110.06	117.00	71.53	18.80	253.00
Area 3, U-3ah/at East	10	124.99	90.85	104.78	24.80	305.00
Area 3, U-3ah/at North	10	260.28	211.50	227.68	38.60	804.00
Area 3, U-3ah/at West	10	161.49	145.50	104.35	50.10	362.00
Area 3, Mud Plant	4	123.95	119.50	105.08	0.79	256.00
Area 3, Well ER 3-1	4	25.78	22.84	24.16	3.53	53.90
Area 4, Bunker T-4	4	48.35	46.05	25.22	20.80	80.50
Area 5, WEF North	1	25.50				
Area 5, WEF South	1	23.10				
Area 5, RWMS Pit 5	10	3.22	2.05	3.69	-0.76	10.10
Area 5, RWMS No. 4	10	2.06	1.00	2.71	-0.15	8.21
Area 5, RWMS No. 5	9	7.31	2.74	9.93	1.20	31.00
Area 5, RWMS No. 6	10	5.14	3.92	3.61	-0.09	12.00
Area 5, RWMS No. 7	9	11.56	2.84	23.28	0.75	73.00
Area 5, RWMS No. 8	10	5.64	5.93	4.00	1.20	13.60
Area 5, RWMS No. 9	9	2.51	2.02	1.89	0.76	6.66
Area 5, DOD Yard	4	4.31	4.38	2.13	2.01	6.50
Area 5, RWMS No. 3	9	1.84	1.73	0.89	0.86	3.82
Area 5, RWMS No. 1	10	2.71	2.79	1.47	-0.26	4.73
Area 5, Trans. Bldg. North	10	2.20	2.01	1.90	-0.26	6.34
Area 5, Trans. Bldg. South	10	12.13	0.95	32.19	-0.24	103.00
Area 5, Well 5B	4	3.24	3.04	0.62	2.77	4.13
Area 6, Yucca Complex	4	35.92	10.79	52.08	8.10	114.00
Area 6, CP 6	4	8.59	8.25	3.29	5.56	12.30
Area 6, Well 3	4	10.81	12.15	5.43	3.44	15.50
Area 7, UE-7ns	4	122.43	18.81	216.71	5.13	447.00
Area 9, 9-300	4	349.07	352.00	250.77	79.30	613.00
Area 10, Gate 700 South	4	11.08	4.92	13.52	3.20	31.30
Area 10, SEDAN Crater	4	52.58	46.20	23.74	34.10	83.80
Area 11, Gate 293	4	10.01	7.88	6.51	4.96	19.30
Area 12, Complex	4	2.02	2.23	1.62	-0.07	3.70
Area 13, Project 57	4	20.53	24.55	11.09	4.33	28.70
Area 15, EPA Farm	4	86.58	40.50	105.53	22.30	243.00
Area 16, 3545 Substation	4	0.95	1.05	0.78	-0.04	1.75
Area 18, Well UE-18t	4	1.99	1.63	1.05	1.22	3.48
Area 20, SCHOONER	4	3.15	2.39	1.94	1.85	5.97
Area 20, Camp	4	1.74	1.56	0.93	0.83	3.03
Area 20, CABRIOLET	1	2.95				
Area 23, Building 790 No. 2	4	4.40	2.46	4.61	1.50	11.20
Area 23, H & S Building	4	1.26	1.35	0.29	0.86	1.51
Area 25, E-MAD North	4	2.37	1.25	3.19	-0.08	7.05

Table 3.7 (Descriptive Statistics for $^{239+240}Pu$ Concentrations by Sampling Location, cont.)

Sampling Location	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
Area 25, NRDS Warehouse	4	0.54	0.46	0.56	-0.04	1.29
Area 27, Camp	4	1.56	1.26	0.71	1.13	2.61
Area 52, DOUBLE TRACKS	4	447.67	198.79	653.87	3.10	1390.00
Area 52, CLEAN SLATE III	4	1.91	1.23	1.52	1.01	4.18
Area 52, CLEAN SLATE I	2	240.40	240.40	300.66	27.80	543.00

Table 3.8 Historical $^{239+240}Pu$ Annual Averages at Selected Locations, µCi/mL x 10^{-18}

Sampling Location	1989	1990	1991	1992	1993	1994	1995	1996
Area 2, Camp	12.0	11.9	6.0	26.5	21.4	98.0	4.7	6.6
Area 5, DOD Yard	2.5	2.0	15.5	1.7	5.5	8.1	3.9	4.3
Area 5, Well 5B	3.7	3.9	6.9	5.5	10.4	19.0	20.3	3.2
Area 6, CP-6	5.7	6.8	9.3	6.8	22.8	6.8	8.1	8.6
Area 6, Well 3	6.2	14.1	22.7	9.1	29.1	12.0	13.1	10.8
Area 10, Gate 700 South	13.0	11.4	13.7	44.2	22.8	12.0	12.3	11.1
Area 11, Gate 293	64.0	18.9	28.2	27.7	77.8	29.0	24.6	10.0
Area 12, Camp	2.6	2.7	3.8	5.7	97.4	2.1	3.9	2.0
Area 16, 3545 Substation	2.4	2.0	4.3	5.5	3.7	2.7	4.4	1.0
Area 23, H & S Building	3.3	24.9	2.3	4.3	1.6	68.0	2.1	1.3
Area 27, Camp	2.2	7.2	2.1	17.4	2.7	1.9	1.6	1.6
All selected locations combined	10.7	9.6	10.4	14.0	26.8	23.6	9.0	5.5

Table 3.9 Historical ^{238}Pu Annual Averages at Selected Locations, µCi/mL x 10^{-18}

Sampling Location	1989	1990	1991	1992	1993	1994	1995	1996
Area 2, Camp	6.3	7.1	-0.6	0.6	0.7	0.9	0.3	0.3
Area 5, DOD Yard	4.6	4.4	2.1	0.8	0.6	0.0	0.0	-0.1
Area 5, Well 5B	2.6	4.7	1.9	0.3	0.5	-0.4	2.7	0.1
Area 6, CP-6	3.4	4.8	0.3	0.4	0.6	0.1	0.6	0.3
Area 6, Well 3	5.1	5.2	0.5	1.4	0.7	0.3	2.0	0.5
Area 10, Gate 700 South	4.7	4.3	4.3	0.5	1.1	0.6	0.6	0.4

Table 3.9 (Historical ^{238}Pu Annual Averages at Selected Locations, µCi/mL x 10^{-18}, cont.)

Sampling Location	1989	1990	1991	1992	1993	1994	1995	1996
Area 11, Gate 293	2.0	-2.0	0.9	0.6	2.1	1.1	0.2	0.0
Area 12, Camp	1.9	1.0	-0.6	1.4	1.0	0.1	0.4	0.3
Area 16, 3545 Substation	6.8	3.6	-0.7	0.0	-0.1	0.1	-0.1	0.0
Area 23, H & S Building	1.6	4.9	-1.2	0.0	-0.1	0.7	0.3	0.1
Area 12, Camp	4.8	-1.2	1.9	1.0	-0.1	0.3	-0.1	0.4
All selected locations combined	4.0	3.3	0.8	0.6	0.6	0.3	0.6	0.2

Attachment 3.1 ^{238}Pu in Air - 1996

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-18} Concentration	Standard Deviation	Detection Limit
Area 1, BJY	01/03/96	04/01/96	1.030	0.721	1.850
Area 1, BJY	04/01/96	07/03/96	7.570	1.635	1.370
Area 1, BJY	07/03/96	09/30/96	0.612	0.483	1.450
Area 1, BJY	09/30/96	01/02/97	0.248	0.277	0.375
Area 2, Camp	01/02/96	04/02/96	-0.141	0.239	1.900
Area 2, Camp	04/02/96	07/03/96	0.580	0.461	1.380
Area 2, Camp	07/03/96	09/30/96	0.346	0.434	1.830
Area 2, Camp	09/30/96	01/02/97	0.307	0.342	0.463
Area 2, 2-1 Substation	01/02/96	04/02/96	-0.120	0.203	1.610
Area 2, 2-1 Substation	04/02/96	07/03/96	-0.073	0.099	1.730
Area 2, 2-1 Substation	07/03/96	09/30/96	2.420	0.696	0.884
Area 2, 2-1 Substation	09/30/96	01/02/97	0.274	0.306	0.414
Area 3, U-3ah/at South	01/03/96	01/29/96	2.140	2.429	10.200
Area 3, U-3ah/at South	01/29/96	03/04/96	1.250	1.163	3.560
Area 3, U-3ah/at South	03/04/96	04/01/96	-0.114	0.189	4.000
Area 3, U-3ah/at South	04/01/96	05/02/96	1.990	1.234	3.020
Area 3, U-3ah/at South	05/02/96	06/05/96	2.450	1.862	4.880
Area 3, U-3ah/at South	06/05/96	07/03/96	-0.162	0.226	4.040
Area 3, U-3ah/at South	07/03/96	08/07/96	5.650	2.240	3.730
Area 3, U-3ah/at South	08/07/96	09/04/96	5.800	2.775	5.380
Area 3, U-3ah/at South	09/04/96	09/30/96	1.260	1.581	6.700
Area 3, U-3ah/at South	09/30/96	12/30/96	0.795	0.596	0.572
Area 3, U-3ah/at East	01/03/96	01/29/96	1.940	2.202	9.210
Area 3, U-3ah/at East	01/29/96	03/04/96	0.858	1.536	6.230
Area 3, U-3ah/at East	03/04/96	04/01/96	1.040	1.212	4.990
Area 3, U-3ah/at East	04/01/96	05/02/96	0.867	1.079	4.510
Area 3, U-3ah/at East	05/02/96	06/05/96	0.569	1.442	5.790
Area 3, U-3ah/at East	06/05/96	07/03/96	2.550	2.014	6.020
Area 3, U-3ah/at East	07/03/96	08/07/96	2.290	2.462	7.630
Area 3, U-3ah/at East	08/07/96	09/04/96	5.760	3.110	6.540
Area 3, U-3ah/at East	09/04/96	09/30/96	-0.237	0.324	5.740
Area 3, U-3ah/at East	09/30/96	12/30/96	0.409	0.456	0.617
Area 3, U-3ah/at North	01/03/96	01/29/96	2.880	3.269	13.900
Area 3, U-3ah/at North	01/29/96	03/04/96	-0.239	0.404	3.200
Area 3, U-3ah/at North	03/04/96	04/01/96	2.430	1.847	4.860
Area 3, U-3ah/at North	04/01/96	05/02/96	0.564	0.702	2.930
Area 3, U-3ah/at North	05/02/96	06/05/96	4.270	2.007	3.830
Area 3, U-3ah/at North	06/05/96	07/03/96	12.200	4.038	5.320
Area 3, U-3ah/at North	07/03/96	08/07/96	-0.756	1.051	7.190
Area 3, U-3ah/at North	08/07/96	09/04/96	18.700	5.161	6.110
Area 3, U-3ah/at North	09/04/96	09/30/96	2.150	1.699	5.100
Area 3, U-3ah/at North	09/30/96	12/30/96	0.404	0.450	0.611
Area 3, U-3ah/at West	01/03/96	01/29/96	-0.218	0.397	9.240
Area 3, U-3ah/at West	01/29/96	03/04/96	3.520	2.446	6.270
Area 3, U-3ah/at West	03/04/96	04/01/96	-0.169	0.281	5.900

Attachment 3.1 (^{238}Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-18} Concentration	Standard Deviation	Detection Limit
Area 3, U-3ah/at West	04/01/96	05/02/96	-0.679	0.944	6.450
Area 3, U-3ah/at West	05/02/96	06/05/96	0.468	1.186	4.750
Area 3, U-3ah/at West	06/05/96	07/03/96	4.570	2.422	5.130
Area 3, U-3ah/at West	07/03/96	08/07/96	2.870	2.181	5.710
Area 3, U-3ah/at West	08/07/96	09/04/96	2.300	2.599	8.160
Area 3, U-3ah/at West	09/04/96	09/30/96	6.040	3.775	9.360
Area 3, U-3ah/at West	09/30/96	12/30/96	0.586	0.653	0.885
Area 3, Mud Plant	01/03/96	04/01/96	2.160	0.927	1.650
Area 3, Mud Plant	04/01/96	07/02/96	3.210	1.120	1.570
Area 3, Mud Plant	07/02/96	09/30/96	-0.243	0.332	2.250
Area 3, Mud Plant	09/30/96	01/02/97	0.652	0.489	0.470
Area 3, Well ER 3-1	01/02/96	04/02/96	-0.140	0.237	1.880
Area 3, Well ER 3-1	04/02/96	07/01/96	0.359	0.454	1.900
Area 3, Well ER 3-1	07/01/96	09/30/96	-0.092	0.125	2.240
Area 3, Well ER 3-1	09/30/96	12/31/96	1.770	1.071	0.835
Area 4, Bunker T-4	01/03/96	04/01/96	10.000	1.850	1.430
Area 4, Bunker T-4	04/01/96	07/03/96	10.200	1.683	1.010
Area 4, Bunker T-4	07/03/96	09/30/96	15.100	2.356	1.430
Area 4, Bunker T-4	09/30/96	01/02/97	8.840	2.122	0.611
Area 5, WEF North	10/10/96	11/05/96	-0.114	0.221	1.760
Area 5, WEF South	10/09/96	11/05/96	-0.129	0.250	2.000
Area 5, RWMS Pit 5	01/03/96	01/29/96	-0.210	0.382	8.930
Area 5, RWMS Pit 5	01/29/96	03/04/96	-0.446	0.740	5.770
Area 5, RWMS Pit 5	03/04/96	04/01/96	-0.541	0.898	7.030
Area 5, RWMS Pit 5	04/01/96	04/30/96	-0.589	0.819	5.590
Area 5, RWMS Pit 5	04/30/96	06/04/96	-0.648	0.904	6.230
Area 5, RWMS Pit 5	06/04/96	07/01/96	1.460	3.738	15.000
Area 5, RWMS Pit 5	07/01/96	08/06/96	0.581	1.487	5.970
Area 5, RWMS Pit 5	08/06/96	09/04/96	1.580	1.785	5.550
Area 5, RWMS Pit 5	09/04/96	09/30/96	-0.338	0.461	8.220
Area 5, RWMS Pit 5	09/30/96	12/30/96	-0.065	0.126	1.000
Area 5, RWMS No. 4	01/03/96	01/29/96	1.110	1.260	5.210
Area 5, RWMS No. 4	01/29/96	03/04/96	-0.301	0.509	4.050
Area 5, RWMS No. 4	03/04/96	04/01/96	0.850	0.990	4.100
Area 5, RWMS No. 4	04/01/96	05/01/96	-0.142	0.197	3.520
Area 5, RWMS No. 4	05/01/96	06/04/96	-0.486	0.678	4.670
Area 5, RWMS No. 4	06/04/96	07/01/96	-0.171	0.239	4.270
Area 5, RWMS No. 4	07/01/96	08/06/96	-0.104	0.140	2.450
Area 5, RWMS No. 4	08/06/96	09/04/96	-0.537	0.709	4.680
Area 5, RWMS No. 4	09/04/96	09/30/96	-0.382	0.521	9.360
Area 5, RWMS No. 4	09/30/96	12/31/96	-0.040	0.077	0.617
Area 5, RWMS No. 5	01/03/96	01/29/96	1.160	1.317	5.480
Area 5, RWMS No. 5	01/29/96	03/04/96	0.631	1.129	4.580
Area 5, RWMS No. 5	03/04/96	04/01/96	-0.447	0.742	5.810
Area 5, RWMS No. 5	04/01/96	05/01/96	-0.554	0.770	5.270

Attachment 3.1 (^{238}Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-18} Concentration	Standard Deviation	Detection Limit
Area 5, RWMS No. 5	05/01/96	06/04/96	0.598	1.516	6.120
Area 5, RWMS No. 5	06/04/96	07/01/96	2.570	2.030	6.100
Area 5, RWMS No. 5	07/01/96	08/06/96	1.370	1.733	7.390
Area 5, RWMS No. 5	08/06/96	09/04/96	0.380	1.121	4.470
Area 5, RWMS No. 5	09/04/96	09/30/96	-0.670	0.918	17.000
Area 5, RWMS No. 6	01/03/96	01/29/96	-0.123	0.224	5.170
Area 5, RWMS No. 6	01/29/96	03/04/96	3.880	1.959	3.920
Area 5, RWMS No. 6	03/04/96	04/01/96	-0.548	0.759	5.190
Area 5, RWMS No. 6	04/01/96	05/01/96	-0.531	0.738	5.050
Area 5, RWMS No. 6	05/01/96	06/04/96	0.357	0.905	3.620
Area 5, RWMS No. 6	06/04/96	07/01/96	-0.231	0.322	5.780
Area 5, RWMS No. 6	07/01/96	08/06/96	-0.402	0.559	3.830
Area 5, RWMS No. 6	08/06/96	09/04/96	-0.579	0.764	5.070
Area 5, RWMS No. 6	09/04/96	09/30/96	-0.772	1.027	18.600
Area 5, RWMS No. 6	09/30/96	12/31/96	-0.049	0.095	0.757
Area 5, RWMS No. 7	01/03/96	01/29/96	2.350	1.774	5.260
Area 5, RWMS No. 7	01/29/96	03/04/96	-0.318	0.539	4.290
Area 5, RWMS No. 7	03/04/96	04/01/96	1.020	1.188	4.920
Area 5, RWMS No. 7	04/01/96	05/01/96	-0.459	0.638	4.360
Area 5, RWMS No. 7	05/01/96	06/04/96	-0.389	0.543	3.730
Area 5, RWMS No. 7	06/04/96	07/01/96	-0.368	0.513	9.230
Area 5, RWMS No. 7	07/01/96	08/06/96	0.350	0.896	3.590
Area 5, RWMS No. 7	08/06/96	09/04/96	0.545	1.608	6.480
Area 5, RWMS No. 7	09/04/96	09/30/96	-0.330	0.450	8.020
Area 5, RWMS No. 8	01/03/96	01/29/96	-0.182	0.252	4.500
Area 5, RWMS No. 8	01/29/96	03/04/96	-0.502	0.851	6.830
Area 5, RWMS No. 8	03/04/96	04/01/96	-0.130	0.216	4.560
Area 5, RWMS No. 8	04/01/96	05/01/96	-0.449	0.622	4.260
Area 5, RWMS No. 8	05/01/96	06/04/96	1.510	1.616	5.020
Area 5, RWMS No. 8	06/04/96	07/01/96	0.767	1.964	7.880
Area 5, RWMS No. 8	07/01/96	08/06/96	0.407	1.042	4.180
Area 5, RWMS No. 8	08/06/96	09/04/96	-0.648	0.855	5.680
Area 5, RWMS No. 8	09/04/96	09/30/96	1.260	1.581	6.700
Area 5, RWMS No. 8	09/30/96	12/31/96	0.380	0.424	0.573
Area 5, RWMS No. 9	01/03/96	01/29/96	-0.138	0.251	5.800
Area 5, RWMS No. 9	01/29/96	03/04/96	-0.416	0.705	5.630
Area 5, RWMS No. 9	03/04/96	04/01/96	-0.126	0.209	4.420
Area 5, RWMS No. 9	04/01/96	05/01/96	-0.532	0.739	5.050
Area 5, RWMS No. 9	05/01/96	06/04/96	1.540	1.648	5.140
Area 5, RWMS No. 9	06/04/96	07/01/96	-1.550	2.046	13.600
Area 5, RWMS No. 9	07/01/96	08/06/96	-0.540	0.751	5.160
Area 5, RWMS No. 9	08/06/96	09/04/96	0.490	1.446	5.790
Area 5, RWMS No. 9	09/04/96	09/30/96	-0.338	0.461	8.220
Area 5, DOD Yard	01/03/96	04/01/96	-0.160	0.266	2.070
Area 5, DOD Yard	04/01/96	07/01/96	-0.063	0.085	1.490

Attachment 3.1 (^{238}Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-18} Concentration	Standard Deviation	Detection Limit
Area 5, DOD Yard	07/01/96	09/30/96	-0.061	0.083	1.470
Area 5, DOD Yard	09/30/96	12/31/96	-0.030	0.058	0.463
Area 5, RWMS No. 3	01/03/96	01/29/96	-0.142	0.258	5.950
Area 5, RWMS No. 3	01/29/96	03/04/96	3.230	2.245	5.740
Area 5, RWMS No. 3	03/04/96	04/01/96	4.430	2.702	6.540
Area 5, RWMS No. 3	04/01/96	05/01/96	-0.595	0.827	5.650
Area 5, RWMS No. 3	05/01/96	06/04/96	-0.688	0.960	6.650
Area 5, RWMS No. 3	06/04/96	07/01/96	-0.630	0.832	5.500
Area 5, RWMS No. 3	07/01/96	08/06/96	-0.417	0.580	3.970
Area 5, RWMS No. 3	08/06/96	09/04/96	0.411	1.212	4.850
Area 5, RWMS No. 3	09/04/96	09/30/96	-0.205	0.280	4.930
Area 5, RWMS No. 1	01/03/96	01/29/96	-0.162	0.295	6.860
Area 5, RWMS No. 1	01/29/96	03/04/96	-0.342	0.578	4.600
Area 5, RWMS No. 1	03/04/96	04/01/96	-0.135	0.224	4.720
Area 5, RWMS No. 1	04/01/96	05/01/96	-0.627	0.868	5.940
Area 5, RWMS No. 1	05/01/96	06/04/96	-0.477	0.665	4.580
Area 5, RWMS No. 1	06/04/96	07/01/96	0.515	1.519	6.070
Area 5, RWMS No. 1	07/01/96	08/06/96	0.493	1.262	5.070
Area 5, RWMS No. 1	08/06/96	09/04/96	-0.743	0.981	6.500
Area 5, RWMS No. 1	09/04/96	09/30/96	-0.320	0.437	7.740
Area 5, RWMS No. 1	09/30/96	12/31/96	-0.042	0.082	0.654
Area 5, Transuranic Bldg. N	01/03/96	01/29/96	1.170	1.328	5.510
Area 5, Transuranic Bldg. N	01/29/96	03/04/96	0.507	0.933	3.770
Area 5, Transuranic Bldg. N	03/04/96	04/01/96	2.150	2.032	6.230
Area 5, Transuranic Bldg. N	04/01/96	04/30/96	-0.543	0.755	5.160
Area 5, Transuranic Bldg. N	04/30/96	06/04/96	0.504	1.278	5.130
Area 5, Transuranic Bldg. N	06/04/96	07/01/96	0.757	1.938	7.790
Area 5, Transuranic Bldg. N	07/01/96	08/06/96	0.674	1.725	6.940
Area 5, Transuranic Bldg. N	08/06/96	09/04/96	0.517	1.525	6.110
Area 5, Transuranic Bldg. N	09/04/96	09/30/96	-0.360	0.491	8.770
Area 5, Transuranic Bldg. N	09/30/96	12/30/96	0.447	0.498	0.675
Area 5, Transuranic Bldg. S	01/03/96	01/29/96	-0.118	0.215	4.950
Area 5, Transuranic Bldg. S	01/29/96	03/04/96	-0.266	0.442	3.440
Area 5, Transuranic Bldg. S	03/04/96	04/01/96	0.711	1.308	5.290
Area 5, Transuranic Bldg. S	04/01/96	04/30/96	-0.649	0.902	6.200
Area 5, Transuranic Bldg. S	04/30/96	06/04/96	-0.375	0.523	3.590
Area 5, Transuranic Bldg. S	06/04/96	07/01/96	-0.508	0.706	4.840
Area 5, Transuranic Bldg. S	07/01/96	08/06/96	-0.495	0.688	4.710
Area 5, Transuranic Bldg. S	08/06/96	09/04/96	0.399	1.177	4.720
Area 5, Transuranic Bldg. S	09/04/96	09/30/96	0.878	1.102	4.620
Area 5, Transuranic Bldg. S	09/30/96	12/30/96	2.120	0.829	0.421
Area 5, Well 5B	01/03/96	04/01/96	-0.139	0.231	1.810
Area 5, Well 5B	04/01/96	07/01/96	0.286	0.362	1.510
Area 5, Well 5B	07/01/96	09/30/96	-0.072	0.099	1.750
Area 5, Well 5B	09/30/96	12/31/96	0.331	0.369	0.500

Attachment 3.1 (^{238}Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-18} Concentration	Standard Deviation	Detection Limit
Area 6, Yucca	01/02/96	04/02/96	-0.129	0.219	1.730
Area 6, Yucca	04/02/96	07/01/96	2.760	1.021	1.520
Area 6, Yucca	07/01/96	09/30/96	-0.100	0.136	2.440
Area 6, Yucca	09/30/96	12/31/96	-0.043	0.082	0.659
Area 6, CP 6	01/02/96	04/02/96	-0.141	0.238	1.890
Area 6, CP 6	04/02/96	07/01/96	0.695	0.553	1.650
Area 6, CP 6	07/01/96	09/30/96	-0.088	0.121	2.150
Area 6, CP 6	09/30/96	12/31/96	0.769	0.577	0.554
Area 6, Well 3	01/02/96	04/02/96	0.546	0.508	1.560
Area 6, Well 3	04/02/96	07/01/96	0.265	0.335	1.400
Area 6, Well 3	07/01/96	09/30/96	1.020	0.541	1.150
Area 6, Well 3	09/30/96	12/31/96	0.264	0.294	0.398
Area 7, UE-7ns	01/02/96	04/02/96	0.237	0.424	1.720
Area 7, UE-7ns	04/02/96	07/02/96	-0.062	0.084	1.460
Area 7, UE-7ns	07/02/96	09/30/96	4.950	1.448	1.830
Area 7, UE-7ns	09/30/96	01/02/97	0.760	0.570	0.547
Area 9, 9-300 Bunker	01/02/96	04/02/96	4.540	1.276	1.550
Area 9, 9-300 Bunker	04/02/96	07/03/96	9.200	1.444	0.825
Area 9, 9-300 Bunker	07/03/96	09/30/96	8.190	0.880	0.404
Area 9, 9-300 Bunker	09/30/96	12/31/96	1.680	0.778	0.471
Area 10, Gate 700 South	01/02/96	04/02/96	0.265	0.474	1.930
Area 10, Gate 700 South	04/02/96	07/03/96	0.948	0.593	1.450
Area 10, Gate 700 South	07/03/96	09/30/96	-0.127	0.173	1.170
Area 10, Gate 700 South	09/30/96	12/26/96	0.422	0.471	0.638
Area 10, SEDAN Crater	01/02/96	04/02/96	1.140	0.701	1.630
Area 10, SEDAN Crater	04/02/96	07/03/96	6.290	1.459	1.300
Area 10, SEDAN Crater	07/03/96	09/30/96	5.440	1.548	1.880
Area 10, SEDAN Crater	09/30/96	01/02/97	1.940	0.820	0.451
Area 11, Gate 293	01/02/96	04/02/96	-0.177	0.300	2.400
Area 11, Gate 293	04/02/96	07/01/96	0.247	0.312	1.310
Area 11, Gate 293	07/01/96	09/30/96	-0.066	0.089	1.580
Area 11, Gate 293	09/30/96	12/31/96	-0.030	0.059	0.469
Area 12, Camp	01/02/96	04/02/96	1.000	0.695	1.790
Area 12, Camp	04/02/96	07/03/96	-0.063	0.085	1.480
Area 12, Camp	07/03/96	09/30/96	0.190	0.510	2.050
Area 12, Camp	09/30/96	01/02/97	-0.028	0.054	0.428
Area 13, Project 57	01/03/96	04/04/96	0.490	0.463	1.410
Area 13, Project 57	04/04/96	07/02/96	3.060	1.069	1.500
Area 13, Project 57	07/02/96	10/01/96	0.186	0.499	2.010
Area 13, Project 57	09/30/96	12/30/96	0.409	0.456	0.618
Area 15, EPA Farm	01/02/96	04/02/96	-0.189	0.320	2.580
Area 15, EPA Farm	04/02/96	07/03/96	0.956	0.598	1.470
Area 15, EPA Farm	07/03/96	09/30/96	4.650	1.421	1.860
Area 15, EPA Farm	09/30/96	01/02/97	0.970	0.587	0.458
Area 16, 3545 Substation	01/02/96	04/08/96	-0.088	0.146	1.140

Attachment 3.1 (^{238}Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL x 10^{-18} Concentration	Standard Deviation	Detection Limit
Area 16, 3545 Substation	04/08/96	07/03/96	0.211	0.267	1.110
Area 16, 3545 Substation	07/03/96	09/30/96	-0.194	0.265	1.800
Area 16, 3545 Substation	09/30/96	12/26/96	-0.032	0.061	0.492
Area 18, Well UE-18t	01/02/96	04/08/96	-0.165	0.274	2.160
Area 18, Well UE-18t	04/08/96	07/03/96	-0.072	0.097	1.690
Area 18, Well UE-18t	07/03/96	09/30/96	0.191	0.513	2.070
Area 18, Well UE-18t	09/30/96	01/02/97	-0.028	0.054	0.430
Area 20, Schooner	01/02/96	04/08/96	1.420	0.824	1.850
Area 20, Schooner	04/08/96	07/03/96	1.030	0.644	1.580
Area 20, Schooner	07/03/96	09/30/96	2.690	1.280	2.470
Area 20, Schooner	09/30/96	01/02/97	3.860	1.210	0.486
Area 20, Camp	01/02/96	04/02/96	-0.178	0.302	2.410
Area 20, Camp	04/02/96	07/03/96	-0.052	0.071	1.230
Area 20, Camp	07/03/96	09/30/96	0.520	0.567	1.770
Area 20, Camp	09/30/96	01/02/97	-0.034	0.066	0.527
Area 20, CABRIOLET	09/30/96	12/03/96	-0.138	0.268	2.130
Area 23, Bldg. 790 No. 2	01/03/96	04/01/96	-0.069	0.115	0.899
Area 23, Bldg. 790 No. 2	04/01/96	07/01/96	-0.061	0.083	1.450
Area 23, Bldg. 790 No. 2	07/01/96	09/30/96	-0.058	0.079	1.390
Area 23, Bldg. 790 No. 2	09/30/96	12/31/96	-0.034	0.066	0.529
Area 23, H & S Bldg.	01/03/96	04/01/96	0.235	0.432	1.740
Area 23, H & S Bldg.	04/01/96	07/01/96	-0.082	0.110	1.930
Area 23, H & S Bldg.	07/01/96	09/30/96	0.316	0.397	1.660
Area 23, H & S Bldg.	09/30/96	12/31/96	-0.029	0.057	0.453
Area 25, E-MAD North	01/03/96	04/01/96	-0.171	0.284	2.230
Area 25, E-MAD North	04/01/96	07/01/96	0.315	0.398	1.670
Area 25, E-MAD North	07/01/96	09/30/96	0.731	0.921	3.990
Area 25, E-MAD North	09/30/96	12/31/96	-0.031	0.060	0.482
Area 25, NRDS	01/03/96	04/01/96	0.202	0.372	1.500
Area 25, NRDS	04/01/96	07/01/96	0.361	0.457	1.930
Area 25, NRDS	07/01/96	09/30/96	0.830	0.660	1.990
Area 25, NRDS	09/30/96	12/31/96	0.340	0.379	0.513
Area 27, Camp	01/03/96	04/01/96	0.212	0.390	1.570
Area 27, Camp	04/01/96	07/01/96	0.315	0.398	1.670
Area 27, Camp	07/01/96	09/30/96	-0.085	0.116	2.050
Area 27, Camp	09/30/96	12/31/96	1.140	0.855	0.817
Area 52, DOUBLE TRACKS	01/04/96	04/04/96	0.343	0.400	1.660
Area 52, DOUBLE TRACKS	04/04/96	07/03/96	10.900	1.608	0.865
Area 52, DOUBLE TRACKS	07/03/96	09/27/96	3.020	1.057	1.580
Area 52, DOUBLE TRACKS	10/10/96	01/02/97	-0.048	0.094	0.750
Area 52, CLEAN SLATE III	01/04/96	04/04/96	-0.051	0.084	1.790
Area 52, CLEAN SLATE III	04/04/96	07/03/96	0.225	0.179	0.535
Area 52, CLEAN SLATE III	07/03/96	09/26/96	-0.209	0.285	1.940
Area 52, CLEAN SLATE III	10/10/96	01/02/97	-0.031	0.060	0.477
Area 52, CLEAN SLATE I	07/03/96	09/26/96	0.965	1.052	3.290
Area 52, CLEAN SLATE I	10/10/96	01/02/97	-0.031	0.060	0.479

Attachment 3.2 1996 $^{239+240}$Pu in Air

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL×10^{-18} Concentration	Standard Deviation	Detection Limit
Area 1, BJY	01/03/96	04/01/96	41.90	5.13	1.73
Area 1, BJY	04/01/96	07/03/96	751.00	51.07	1.33
Area 1, BJY	07/03/96	09/30/96	61.80	6.46	1.41
Area 1, BJY	09/30/96	01/02/97	22.90	3.01	1.21
Area 2, Camp	01/02/96	04/02/96	2.34	1.02	1.78
Area 2, Camp	04/02/96	07/03/96	4.76	1.29	1.34
Area 2, Camp	07/03/96	09/30/96	7.97	1.96	1.78
Area 2, Camp	09/30/96	01/02/97	11.40	2.15	1.50
Area 2, 2-1 Substation	01/02/96	04/02/96	1.31	0.71	1.52
Area 2, 2-1 Substation	04/02/96	07/03/96	58.40	6.42	1.68
Area 2, 2-1 Substation	07/03/96	09/30/96	5.52	1.04	0.81
Area 2, 2-1 Substation	09/30/96	01/02/97	36.40	4.19	1.34
Area 3, U-3ah/at South	01/03/96	01/29/96	66.40	14.01	10.10
Area 3, U-3ah/at South	01/29/96	03/04/96	18.80	4.04	3.35
Area 3, U-3ah/at South	03/04/96	04/01/96	50.00	7.78	3.93
Area 3, U-3ah/at South	04/01/96	05/02/96	119.00	12.08	2.94
Area 3, U-3ah/at South	05/02/96	06/05/96	115.00	13.69	4.48
Area 3, U-3ah/at South	06/05/96	07/03/96	130.00	14.43	3.93
Area 3, U-3ah/at South	07/03/96	08/07/96	253.00	22.90	3.42
Area 3, U-3ah/at South	08/07/96	09/04/96	176.00	19.10	4.80
Area 3, U-3ah/at South	09/04/96	09/30/96	140.00	19.25	6.52
Area 3, U-3ah/at South	09/30/96	12/30/96	32.40	4.60	1.85
Area 3, U-3ah/at East	01/03/96	01/29/96	88.20	16.05	9.13
Area 3, U-3ah/at East	01/29/96	03/04/96	24.80	6.13	5.86
Area 3, U-3ah/at East	03/04/96	04/01/96	38.80	7.31	4.90
Area 3, U-3ah/at East	04/01/96	05/02/96	148.00	16.21	4.39
Area 3, U-3ah/at East	05/02/96	06/05/96	305.00	30.20	5.32
Area 3, U-3ah/at East	06/05/96	07/03/96	93.50	13.46	5.87
Area 3, U-3ah/at East	07/03/96	08/07/96	171.00	20.01	7.00
Area 3, U-3ah/at East	08/07/96	09/04/96	298.00	29.35	5.83
Area 3, U-3ah/at East	09/04/96	09/30/96	43.60	8.37	5.58
Area 3, U-3ah/at East	09/30/96	12/30/96	39.00	5.48	2.00
Area 3, U-3ah/at North	01/03/96	01/29/96	89.40	19.67	13.80
Area 3, U-3ah/at North	01/29/96	03/04/96	96.80	10.65	3.01
Area 3, U-3ah/at North	03/04/96	04/01/96	286.00	27.31	4.46
Area 3, U-3ah/at North	04/01/96	05/02/96	130.00	12.68	2.85
Area 3, U-3ah/at North	05/02/96	06/05/96	454.00	36.09	3.52
Area 3, U-3ah/at North	06/05/96	07/03/96	804.00	66.73	5.19
Area 3, U-3ah/at North	07/03/96	08/07/96	159.00	18.76	6.60
Area 3, U-3ah/at North	08/07/96	09/04/96	281.00	29.22	5.45
Area 3, U-3ah/at North	09/04/96	09/30/96	264.00	27.32	4.96
Area 3, U-3ah/at North	09/30/96	12/30/96	38.60	5.46	1.98
Area 3, U-3ah/at West	01/03/96	01/29/96	69.20	13.77	9.16

Attachment 3.2 ($^{239+240}$Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL×10^{-18} Concentration	Standard Deviation	Detection Limit
Area 3, U-3ah/at West	01/29/96	03/04/96	59.60	10.19	5.90
Area 3, U-3ah/at West	03/04/96	04/01/96	189.00	21.45	5.79
Area 3, U-3ah/at West	04/01/96	05/02/96	100.00	13.55	5.92
Area 3, U-3ah/at West	05/02/96	06/05/96	194.00	19.11	4.36
Area 3, U-3ah/at West	06/05/96	07/03/96	362.00	32.58	5.00
Area 3, U-3ah/at West	07/03/96	08/07/96	170.00	18.19	5.24
Area 3, U-3ah/at West	08/07/96	09/04/96	121.00	17.36	7.28
Area 3, U-3ah/at West	09/04/96	09/30/96	300.00	37.80	9.11
Area 3, U-3ah/at West	09/30/96	12/30/96	50.10	7.26	2.87
Area 3, Mud Plant	01/03/96	04/01/96	135.00	11.75	1.51
Area 3, Mud Plant	04/01/96	07/02/96	256.00	21.12	1.53
Area 3, Mud Plant	07/02/96	09/30/96	0.79	0.68	2.06
Area 3, Mud Plant	09/30/96	01/02/97	104.00	10.24	1.52
Area 3, Well ER 3-1	01/02/96	04/02/96	3.53	1.24	1.77
Area 3, Well ER 3-1	04/02/96	07/01/96	7.87	1.95	1.84
Area 3, Well ER 3-1	07/01/96	09/30/96	37.80	5.69	2.18
Area 3, Well ER 3-1	09/30/96	12/31/96	53.90	7.68	2.70
Area 4, Bunker T-4	01/03/96	04/01/96	38.80	4.23	1.31
Area 4, Bunker T-4	04/01/96	07/03/96	53.30	4.96	0.98
Area 4, Bunker T-4	07/03/96	09/30/96	80.50	7.41	1.31
Area 4, Bunker T-4	09/30/96	01/02/97	20.80	3.50	1.98
Area 5, WEF North	10/10/96	11/05/96	25.50	6.04	5.71
Area 5, WEF South	10/09/96	11/05/96	23.10	6.11	6.48
Area 5, RWMS Pit 5	01/03/96	01/29/96	6.12	3.67	8.86
Area 5, RWMS Pit 5	01/29/96	03/04/96	-0.21	0.51	5.39
Area 5, RWMS Pit 5	03/04/96	04/01/96	10.10	4.05	6.57
Area 5, RWMS Pit 5	04/01/96	04/30/96	1.98	1.70	5.13
Area 5, RWMS Pit 5	04/30/96	06/04/96	0.95	1.41	5.73
Area 5, RWMS Pit 5	06/04/96	07/01/96	-0.76	1.52	13.80
Area 5, RWMS Pit 5	07/01/96	08/06/96	4.53	2.51	5.48
Area 5, RWMS Pit 5	08/06/96	09/04/96	7.50	3.02	4.95
Area 5, RWMS Pit 5	09/04/96	09/30/96	-0.16	0.31	8.00
Area 5, RWMS Pit 5	09/30/96	12/30/96	2.12	1.30	3.25
Area 5, RWMS No. 4	01/03/96	01/29/96	1.14	1.25	5.16
Area 5, RWMS No. 4	01/29/96	03/04/96	-0.15	0.36	3.80
Area 5, RWMS No. 4	03/04/96	04/01/96	0.91	0.98	4.02
Area 5, RWMS No. 4	04/01/96	05/01/96	-0.07	0.14	3.43
Area 5, RWMS No. 4	05/01/96	06/04/96	4.49	2.19	4.29
Area 5, RWMS No. 4	06/04/96	07/01/96	0.91	1.01	4.17
Area 5, RWMS No. 4	07/01/96	08/06/96	1.09	0.81	2.38
Area 5, RWMS No. 4	08/06/96	09/04/96	8.21	2.89	4.18
Area 5, RWMS No. 4	09/04/96	09/30/96	4.09	3.07	9.11
Area 5, RWMS No. 4	09/30/96	12/31/96	-0.04	0.14	2.00
Area 5, RWMS No. 5	01/03/96	01/29/96	1.20	1.31	5.43
Area 5, RWMS No. 5	01/29/96	03/04/96	2.74	1.74	4.30

Attachment 3.2 ($^{239+240}$Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL×10^{-18} Concentration	µCi/mL×10^{-18} Standard Deviation	µCi/mL×10^{-18} Detection Limit
Area 5, RWMS No. 5	03/04/96	04/01/96	8.38	3.36	5.43
Area 5, RWMS No. 5	04/01/96	05/01/96	2.92	1.93	4.84
Area 5, RWMS No. 5	05/01/96	06/04/96	2.16	1.86	5.62
Area 5, RWMS No. 5	06/04/96	07/01/96	1.29	1.43	5.94
Area 5, RWMS No. 5	07/01/96	08/06/96	1.54	1.71	7.19
Area 5, RWMS No. 5	08/06/96	09/04/96	31.00	5.69	3.99
Area 5, RWMS No. 5	09/04/96	09/30/96	14.60	7.74	16.50
Area 5, RWMS No. 6	01/03/96	01/29/96	-0.09	0.19	5.13
Area 5, RWMS No. 6	01/29/96	03/04/96	4.02	1.92	3.68
Area 5, RWMS No. 6	03/04/96	04/01/96	9.20	3.26	4.76
Area 5, RWMS No. 6	04/01/96	05/01/96	3.83	2.13	4.64
Area 5, RWMS No. 6	05/01/96	06/04/96	2.02	1.33	3.33
Area 5, RWMS No. 6	06/04/96	07/01/96	12.00	4.13	5.64
Area 5, RWMS No. 6	07/01/96	08/06/96	6.78	2.41	3.51
Area 5, RWMS No. 6	08/06/96	09/04/96	2.81	1.83	4.52
Area 5, RWMS No. 6	09/04/96	09/30/96	3.76	4.14	18.00
Area 5, RWMS No. 6	09/30/96	12/31/96	7.09	2.09	2.45
Area 5, RWMS No. 7	01/03/96	01/29/96	73.00	11.28	5.21
Area 5, RWMS No. 7	01/29/96	03/04/96	0.75	0.99	4.03
Area 5, RWMS No. 7	03/04/96	04/01/96	1.09	1.17	4.83
Area 5, RWMS No. 7	04/01/96	05/01/96	11.20	3.30	4.00
Area 5, RWMS No. 7	05/01/96	06/04/96	2.84	1.58	3.43
Area 5, RWMS No. 7	06/04/96	07/01/96	4.10	3.05	9.00
Area 5, RWMS No. 7	07/01/96	08/06/96	7.09	2.38	3.30
Area 5, RWMS No. 7	08/06/96	09/04/96	2.29	1.92	5.78
Area 5, RWMS No. 7	09/04/96	09/30/96	1.69	1.88	7.80
Area 5, RWMS No. 8	01/03/96	01/29/96	3.06	1.84	4.39
Area 5, RWMS No. 8	01/29/96	03/04/96	5.49	2.99	6.42
Area 5, RWMS No. 8	03/04/96	04/01/96	6.38	2.68	4.47
Area 5, RWMS No. 8	04/01/96	05/01/96	13.60	3.60	3.91
Area 5, RWMS No. 8	05/01/96	06/04/96	1.78	1.53	4.61
Area 5, RWMS No. 8	06/04/96	07/01/96	1.20	1.79	7.23
Area 5, RWMS No. 8	07/01/96	08/06/96	6.55	2.48	3.84
Area 5, RWMS No. 8	08/06/96	09/04/96	9.91	3.51	5.06
Area 5, RWMS No. 8	09/04/96	09/30/96	1.41	1.57	6.51
Area 5, RWMS No. 8	09/30/96	12/31/96	7.04	1.81	1.86
Area 5, RWMS No. 9	01/03/96	01/29/96	1.27	1.39	5.75
Area 5, RWMS No. 9	01/29/96	03/04/96	3.36	2.13	5.29
Area 5, RWMS No. 9	03/04/96	04/01/96	2.02	1.48	4.33
Area 5, RWMS No. 9	04/01/96	05/01/96	0.76	1.14	4.64
Area 5, RWMS No. 9	05/01/96	06/04/96	0.78	1.16	4.72
Area 5, RWMS No. 9	06/04/96	07/01/96	2.12	2.98	12.10
Area 5, RWMS No. 9	07/01/96	08/06/96	3.90	2.16	4.74
Area 5, RWMS No. 9	08/06/96	09/04/96	6.66	2.91	5.16
Area 5, RWMS No. 9	09/04/96	09/30/96	1.73	1.92	8.00

Attachment 3.2 ($^{239+240}$Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL×10^{-18} Concentration	Standard Deviation	Detection Limit
Area 5, DOD Yard	01/03/96	04/01/96	6.50	1.78	1.94
Area 5, DOD Yard	04/01/96	07/01/96	3.06	1.06	1.44
Area 5, DOD Yard	07/01/96	09/30/96	2.01	0.85	1.43
Area 5, DOD Yard	09/30/96	12/31/96	5.69	1.46	1.50
Area 5, RWMS No. 3	01/03/96	01/29/96	1.31	1.43	5.90
Area 5, RWMS No. 3	01/29/96	03/04/96	2.22	1.81	5.39
Area 5, RWMS No. 3	03/04/96	04/01/96	1.45	1.56	6.42
Area 5, RWMS No. 3	04/01/96	05/01/96	2.00	1.72	5.19
Area 5, RWMS No. 3	05/01/96	06/04/96	1.01	1.50	6.11
Area 5, RWMS No. 3	06/04/96	07/01/96	0.86	1.21	4.91
Area 5, RWMS No. 3	07/01/96	08/06/96	3.82	1.86	3.65
Area 5, RWMS No. 3	08/06/96	09/04/96	1.73	1.44	4.33
Area 5, RWMS No. 3	09/04/96	09/30/96	2.19	1.63	4.79
Area 5, RWMS No. 1	01/03/96	01/29/96	4.73	2.84	6.80
Area 5, RWMS No. 1	01/29/96	03/04/96	2.76	1.75	4.32
Area 5, RWMS No. 1	03/04/96	04/01/96	4.39	2.26	4.63
Area 5, RWMS No. 1	04/01/96	05/01/96	2.10	1.81	5.45
Area 5, RWMS No. 1	05/01/96	06/04/96	3.48	1.93	4.21
Area 5, RWMS No. 1	06/04/96	07/01/96	-0.26	0.56	5.41
Area 5, RWMS No. 1	07/01/96	08/06/96	2.82	1.86	4.65
Area 5, RWMS No. 1	08/06/96	09/04/96	3.60	2.34	5.80
Area 5, RWMS No. 1	09/04/96	09/30/96	1.64	1.82	7.53
Area 5, RWMS No. 1	09/30/96	12/31/96	1.86	0.98	2.12
Area 5, Transuranic Building N	01/03/96	01/29/96	3.81	2.29	5.47
Area 5, Transuranic Building N	01/29/96	03/04/96	0.66	0.86	3.52
Area 5, Transuranic Building N	03/04/96	04/01/96	6.34	3.03	5.83
Area 5, Transuranic Building N	04/01/96	04/30/96	-0.26	0.52	4.74
Area 5, Transuranic Building N	04/30/96	06/04/96	0.78	1.16	4.71
Area 5, Transuranic Building N	06/04/96	07/01/96	2.75	2.37	7.15
Area 5, Transuranic Building N	07/01/96	08/06/96	1.05	1.56	6.37
Area 5, Transuranic Building N	08/06/96	09/04/96	2.17	1.81	5.45
Area 5, Transuranic Building N	09/04/96	09/30/96	1.84	2.04	8.54
Area 5, Transuranic Building N	09/30/96	12/30/96	2.90	1.24	2.19
Area 5, Transuranic Building S	01/03/96	01/29/96	1.09	1.19	4.90
Area 5, Transuranic Building S	01/29/96	03/04/96	-0.13	0.30	3.21
Area 5, Transuranic Building S	03/04/96	04/01/96	0.93	1.21	4.94
Area 5, Transuranic Building S	04/01/96	04/30/96	13.40	4.33	5.69
Area 5, Transuranic Building S	04/30/96	06/04/96	-0.18	0.36	3.30
Area 5, Transuranic Building S	06/04/96	07/01/96	1.72	1.48	4.44
Area 5, Transuranic Building S	07/01/96	08/06/96	-0.24	0.48	4.32
Area 5, Transuranic Building S	08/06/96	09/04/96	0.74	1.04	4.21
Area 5, Transuranic Building S	09/04/96	09/30/96	0.98	1.09	4.49
Area 5, Transuranic Building S	09/30/96	12/30/96	103.00	9.53	1.36
Area 5, Well 5B	01/03/96	04/01/96	4.13	1.32	1.69
Area 5, Well 5B	04/01/96	07/01/96	2.77	1.01	1.47

Attachment 3.2 ($^{239+240}$Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL×10^{-18} Concentration	µCi/mL×10^{-18} Standard Deviation	µCi/mL×10^{-18} Detection Limit
Area 5, Well 5B	07/01/96	09/30/96	3.20	1.17	1.70
Area 5, Well 5B	09/30/96	12/31/96	2.87	1.06	1.62
Area 6, Yucca	01/02/96	04/02/96	12.10	2.34	1.63
Area 6, Yucca	04/02/96	07/01/96	114.00	10.15	1.48
Area 6, Yucca	07/01/96	09/30/96	9.47	2.46	2.37
Area 6, Yucca	09/30/96	12/31/96	8.10	2.10	2.14
Area 6, CP 6	01/02/96	04/02/96	5.56	1.58	1.78
Area 6, CP 6	04/02/96	07/01/96	6.09	1.60	1.61
Area 6, CP 6	07/01/96	09/30/96	12.30	2.68	2.09
Area 6, CP 6	09/30/96	12/31/96	10.40	2.20	1.79
Area 6, Well 3	01/02/96	04/02/96	15.50	2.59	1.47
Area 6, Well 3	04/02/96	07/01/96	14.20	2.39	1.36
Area 6, Well 3	07/01/96	09/30/96	10.10	1.78	1.12
Area 6, Well 3	09/30/96	12/31/96	3.44	1.03	1.29
Area 7, UE-7ns	01/02/96	04/02/96	6.51	1.64	1.61
Area 7, UE-7ns	04/02/96	07/02/96	31.10	3.98	1.42
Area 7, UE-7ns	07/02/96	09/30/96	447.00	35.31	1.67
Area 7, UE-7ns	09/30/96	01/02/97	5.13	1.51	1.77
Area 9, 9-300 Bunker	01/02/96	04/02/96	200.00	16.30	1.42
Area 9, 9-300 Bunker	04/02/96	07/03/96	613.00	38.31	0.80
Area 9, 9-300 Bunker	07/03/96	09/30/96	504.00	20.01	0.37
Area 9, 9-300 Bunker	09/30/96	12/31/96	79.30	7.97	1.52
Area 10, Gate 700 South	01/02/96	04/02/96	4.00	1.34	1.81
Area 10, Gate 700 South	04/02/96	07/03/96	31.30	3.96	1.41
Area 10, Gate 700 South	07/03/96	09/30/96	5.84	1.24	1.07
Area 10, Gate 700 South	09/30/96	12/26/96	3.20	1.27	2.07
Area 10, SEDAN Crater	01/02/96	04/02/96	34.10	4.23	1.49
Area 10, SEDAN Crater	04/02/96	07/03/96	58.30	5.95	1.27
Area 10, SEDAN Crater	07/03/96	09/30/96	83.80	8.84	1.71
Area 10, SEDAN Crater	09/30/96	01/02/97	34.10	4.26	1.46
Area 11, Gate 293	01/02/96	04/02/96	4.96	1.67	2.25
Area 11, Gate 293	04/02/96	07/01/96	9.66	1.85	1.27
Area 11, Gate 293	07/01/96	09/30/96	19.30	3.01	1.53
Area 11, Gate 293	09/30/96	12/31/96	6.10	1.53	1.52
Area 12, Camp	01/02/96	04/02/96	-0.07	0.16	1.68
Area 12, Camp	04/02/96	07/03/96	1.69	0.78	1.44
Area 12, Camp	07/03/96	09/30/96	2.77	1.13	1.87
Area 12, Camp	09/30/96	01/02/97	3.70	1.12	1.39
Area 13, Project 57	01/03/96	04/04/96	28.70	3.56	1.32
Area 13, Project 57	04/04/96	07/02/96	22.60	3.28	1.46
Area 13, Project 57	07/02/96	10/01/96	4.33	1.40	1.84
Area 13, Project 57	09/30/96	12/30/96	26.50	4.13	2.00
Area 15, EPA Farm	01/02/96	04/02/96	23.70	4.28	2.42
Area 15, EPA Farm	04/02/96	07/03/96	57.30	6.13	1.43
Area 15, EPA Farm	07/03/96	09/30/96	243.00	21.51	1.70
Area 15, EPA Farm	09/30/96	01/02/97	22.30	3.23	1.49

Attachment 3.2 ($^{239+240}$Pu in Air - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	µCi/mL×10^{-18} Concentration	Standard Deviation	Detection Limit
Area 16, 3545 Substation	01/02/96	04/08/96	-0.04	0.10	1.06
Area 16, 3545 Substation	04/08/96	07/03/96	0.75	0.45	1.08
Area 16, 3545 Substation	07/03/96	09/30/96	1.35	0.75	1.64
Area 16, 3545 Substation	09/30/96	12/26/96	1.75	0.82	1.59
Area 18, Well UE-18t	01/02/96	04/08/96	1.28	0.81	2.02
Area 18, Well UE-18t	04/08/96	07/03/96	3.48	1.20	1.64
Area 18, Well UE-18t	07/03/96	09/30/96	1.97	0.96	1.89
Area 18, Well UE-18t	09/30/96	01/02/97	1.22	0.64	1.39
Area 20, SCHOONER	01/02/96	04/08/96	1.88	0.90	1.72
Area 20, SCHOONER	04/08/96	07/03/96	2.89	1.05	1.53
Area 20, SCHOONER	07/03/96	09/30/96	1.85	1.03	2.25
Area 20, SCHOONER	09/30/96	01/02/97	5.97	1.53	1.58
Area 20, Camp	01/02/96	04/02/96	1.42	0.92	2.30
Area 20, Camp	04/02/96	07/03/96	0.83	0.50	1.19
Area 20, Camp	07/03/96	09/30/96	1.69	0.83	1.62
Area 20, Camp	09/30/96	01/02/97	3.03	1.12	1.71
Area 20, CABRIOLET	09/30/96	12/03/96	2.95	2.26	6.92
Area 23, Building 790 No. 2	01/03/96	04/01/96	11.20	1.69	0.84
Area 23, Building 790 No. 2	04/01/96	07/01/96	3.32	1.09	1.41
Area 23, Building 790 No. 2	07/01/96	09/30/96	1.59	0.73	1.35
Area 23, Building 790 No. 2	09/30/96	12/31/96	1.50	0.79	1.71
Area 23, H & S Building	01/03/96	04/01/96	1.41	0.76	1.63
Area 23, H & S Building	04/01/96	07/01/96	0.85	0.64	1.88
Area 23, H & S Building	07/01/96	09/30/96	1.51	0.79	1.62
Area 23, H & S Building	09/30/96	12/31/96	1.28	0.67	1.47
Area 25, E-MAD North	01/03/96	04/01/96	-0.08	0.20	2.09
Area 25, E-MAD North	04/01/96	07/01/96	1.13	0.68	1.62
Area 25, E-MAD North	07/01/96	09/30/96	7.05	2.66	3.88
Area 25, E-MAD North	09/30/96	12/31/96	1.37	0.72	1.56
Area 25, NRDS	01/03/96	04/01/96	0.58	0.47	1.40
Area 25, NRDS	04/01/96	07/01/96	1.29	0.78	1.87
Area 25, NRDS	07/01/96	09/30/96	-0.04	0.08	1.93
Area 25, NRDS	09/30/96	12/31/96	0.34	0.39	1.66
Area 27, Camp	01/03/96	04/01/96	2.61	0.97	1.47
Area 27, Camp	04/01/96	07/01/96	1.13	0.68	1.62
Area 27, Camp	07/01/96	09/30/96	1.38	0.83	1.99
Area 27, Camp	09/30/96	12/31/96	1.13	0.86	2.65
Area 52, DOUBLE TRACKS	01/04/96	04/04/96	3.10	1.13	1.63
Area 52, DOUBLE TRACKS	04/04/96	07/03/96	1390.00	79.23	0.84
Area 52, DOUBLE TRACKS	07/03/96	09/27/96	390.00	29.05	1.44
Area 52, DOUBLE TRACKS	10/10/96	01/02/97	7.58	2.14	2.43
Area 52, CLEAN SLATE III	01/04/96	04/04/96	1.23	0.73	1.76
Area 52, CLEAN SLATE III	04/04/96	07/03/96	1.23	0.40	0.52
Area 52, CLEAN SLATE III	07/03/96	09/26/96	4.18	1.35	1.77
Area 52, CLEAN SLATE III	10/10/96	01/02/97	1.01	0.62	1.55
Area 52, CLEAN SLATE I	07/03/96	09/26/96	453.00	39.86	3.01
Area 52, CLEAN SLATE I	10/10/96	01/02/97	27.80	3.74	1.55

4.0 ONSITE TRITIUM IN AIR

Sixteen samplers for airborne tritiated water vapor were placed at locations on the Nevada Test Site (NTS). Attachment 4.1 displays the sampling locations, dates that sampling began and ended, observed concentrations in picocuries per milliliter (10^{-6} pCi/mL = pCi/m^3 = 10^{-12} µCi/mL), analytic standard deviation, and detection limits for the 385 analyses performed in 1996. (All tables, figures, and attachments are located at the end of this chapter in that order.) Samples were usually collected over two-week periods. The analytic standard deviations are in the same units of measurement as the concentration. The simple descriptive statistics for all the data combined and the detection limits (DL) are:

Number of data values	=	385 - including 20 missing values
Arithmetic mean	=	3.70×10^{-6} pCi/mL
Median	=	2.26×10^{-6} pCi/mL
Standard deviation	=	5.76×10^{-6} pCi/mL
Minimum value	=	-2.67×10^{-6} pCi/mL
Maximum value	=	64.70×10^{-6} pCi/mL
DL Mean ± s	=	$1.70 \pm 1.02 \times 10^{-6}$ pCi/mL

Note that the standard deviation given above with the DL is the sample standard deviation of the DL values. The first quartile of the data is 0.74×10^{-6} pCi/mL and the third quartile is 4.55×10^{-6} pCi/mL. Half the data values are between these statistics. Forty-one percent of the data values are below the individual detection limits. Most of the above DL results are from the Radioactive waste Management Site (RWMS) stations, the U.S. Environmental Protection Agency (EPA) Farm, the SEDAN Crater, and E-Tunnel stations. These statistics are almost identical to those reported in the 1994 and 1995 annual reports.

Figure 4.1 shows the locations of the tritium in air sampling stations as black squares on a map of the NTS. The unnamed stations are currently inactive. In this figure, the major roads are indicated by the wavy dotted lines. The nine RWMS stations are indicated by the larger square in Area 5. These stations are numbered counter-clockwise from the lower right corner with three stations to a side. In October of 1996, the four stations in the middle of each side of the RWMS were shut down, leaving only the stations on the corners of the RWMS. The reason for this reduction in the RWMS monitoring effort was to reduce cost, since no statistical differences among the several stations had been observed for several years. (The stations that were shut down are RWMS Nos. 3, 5, 7 and 9.) The Health and Safety Building (H&S Building) in Area 23 is also called Building 650. The term "Mud Plant" refers to a concrete mixing batch plant.

Note that there is no tritium in air sampling in most of the test site areas. Sampling locations are chosen where tritium may be detected. The RWMS is storage for tritiated waste. Area 23 has laboratories that analyze samples for tritium. The EPA Farm is close to the SEDAN crater, which is a known source of low levels of tritium. Area 12 Camp is close to several tunnel portals which have, in past years, discharged some tritiated water. BJY is a location within Yucca Valley, where many underground tests were conducted. Location U-3ah/at north was added in June of 1996; it is located at a waste management site entrance.

Figures 4.2 through 4.17 are time series plots of the data in Attachment 4.1. There is one figure for each sampling location. The data values are represented by an "o", the solid line shows the detection limit, and the dotted lines give the approximate upper and lower 95 percent confidence intervals for the data (calculated as the data value plus or minus twice the analytical standard deviation). The abscissa gives the time that sampling started. Note that the values for the

ordinate range from 0 to 100 for two of the sampling stations, 0 to 30 for five sampling stations, and the remaining plots have a range of 0 to 10. Figure 4.18 shows all the data combined in one plot; this plot does not contain any confidence intervals or detection limits. The highest value in all plots is 64.7 x 10^{-12} µCi/mL at RWMS No. 5 for the collection date beginning March 25, 1996. This value is considered an outlier since it obviously is not consistent with the pattern established by the remaining data points; however, no errors in sampling and analysis were found for this datum. These plots seem to show occasional values that are higher than most values. The high values seem to occur in the late summer and occur at some of the RWMS stations, the SEDAN Crater, and the E-Tunnel pond. These are locations with known inventories of tritium. This pattern has consistently occurred for many years. Research work has been proposed to determine if the late summer increases are due to plant transpiration of groundwater contaminated with tritium. Near surface soil samples also have tritium at a level about an order of magnitude less than the plants and could contribute to tritium in air by evaporation. The spatial distribution of tritium in soil around plants is unknown. During the early summer, there is adequate surface water for the vegetation, but by late summer the surface soil dries out and plants then seek moisture deeper in the soil. Examination of the time series figures shows that the stations seem to fall into two groups: (1) those stations with all values close to zero and most values below the corresponding detection limit; and (2) those locations with known contamination, the RWMS stations, the EPA Farm, the SEDAN Crater, and the E Tunnel Containment Pond.

DATA ANALYSIS

The exploratory statistical analysis of these data for statistical distribution characteristics, illustrated in Figures 4.19 and 4.20, indicates that the data are lognormally distributed and a logarithmic transformation will cause those few high values seen in Figure 4.19 to appear less remarkable. Figure 4.19 shows a curvature increasing towards the right, which suggests that the logarithm of the data should be used. The correlation test indicates that these data are not distributed normally, which is the expected result because of the clearly defined curvature of the data shown in the figure. The same procedure was repeated using the natural logarithms of the data and the resulting plot is shown in Figure 4.20. This figure now shows the data approximately falling on a straight line, except for the two lower values that are very close to zero. Since statistical tests are dependent on the data distribution, the natural logarithms of the data values were used for all of the following statistical testing. Note that there are 34 fewer data values in Figure 4.19 than in Figure 4.20; this is because the logarithmic transformation changes all negative values to missing values.

The correlation coefficient test for goodness of fit does not indicate a fit to a normal distribution for the logarithms of the data in Figure 4.20. However, if the two lowest data points are deleted, the data does approximately fit a lognormal distribution. Since the low deleted data values are well below the detection limit, they cannot be assumed to be from the same distribution as the data above the detection limit. They are positive values that are very close to zero. Thus, the conclusion of these tests is that this data set has a lognormal data distribution, except for a few values at the extreme low end of the range of values. The lognormal distribution was also found to be appropriate in last years' annual report. There are 16 sampling stations in this years' report; there were 21 in last years' report.

The distinctly high values, indicated graphically for some of the RWMS sampling locations, are not remarkable when working with logarithms of the data and thus do not seem to be high outliers. However, the highest value, discussed above from RWMS No. 5, was deleted from the data before any of the following statistics were done. Simple descriptive statistics can be used to summarize the data for each sampling station. Table 4.1 gives these statistics. The reason the

overall mean in this table is not the same as the mean given on the first page of this chapter is that for Table 4.1 the highest value from RWMS No. 5 was deleted. The first and third quartiles of the data are defined so that one quarter of the data have values lower than the first quartile, and one quarter of the data have values higher than the third quartile. Note that the medians are smaller than the means, and the medians are closer to the first quartile than to the third quartile. This is typical of lognormally distributed data. A comparison of Table 4.1 with the corresponding table in the 1995 Annual Site Environmental Report shows that concentrations were about the same for these two years.

An examination of Figures 4.2 to 4.18 indicates no reason to suspect any time trends within the tritium data other than that described above, that is, the trend possibly due to tritium transpiration and evaporation in the late summer. No formal statistical test for trend was performed. The significance of this possible trend awaits the testing of the transpiration and evaporation hypothesis. The final statistical test on these data was a one-way analysis of variance (ANOVA) to test for differences between location. The data were logarithmically transformed, using natural logarithms, before this test. Also, the negative values were removed by the transformation to logarithms. The output of this procedure is given in Tables 4.2 and 4.3. In Table 4.2, the "p" value gives the probability associated with the F-statistic and is the probability that there are no significant differences among the station means. Since the "p" value is essentially zero, the statistical conclusion is that there are statistically significant differences between the station medians. Note that the mean values and confidence intervals are of the natural logarithms of the data, thus an exponential transformation gives an estimate of the data median and the confidence interval of the median.

The medians in the ANOVA in Table 4.3, do not equal the corresponding medians in Table 4.1 for two reasons. First, the medians in Table 4.1 were derived from all the data while the medians reported in the ANOVA are computed from only the data values above zero. This truncation of the data is necessary because logarithms of negative numbers are imaginary numbers and cannot be used in the ANOVA. Second, the medians are estimated in Table 4.3 from the mean of the logarithms of the data. Statistically, if the data is lognormally distributed, the anti-logarithm of the mean of the logarithms of the data is an estimator of the median of the data. The ANOVA table shows strong evidence of differences between group medians, and the plot of confidence intervals suggests how the medians are grouped.

The ANOVA "groupings" denotes the median data values that are statistically similar; any geographical meaning to these groupings is secondary and interpretive. Tukey's multiple comparison procedure was used to simultaneously compare all medians for equality. This process identified two groupings in Table 4.3. The high grouping in Table 4.3 contains those locations known to be near sources of tritium: the RWMS locations, the SEDAN Crater, the EPA Farm, and the E Tunnel Pond. The remaining stations make up the low grouping.

HISTORICAL TRENDS

Annual averages are available for 12 of the tritium in air stations starting with 1982. Table 4.4 gives the data, and Figures 4.21 and 4.22 are plots of some of the data in this table. The laboratories, which were left out of the combined annual averages, are the Health and Safety Building, which is also known as Building 650, and Building 790. The high data values for these buildings from 1982 through 1987 are not indicative of environmental conditions, but rather reflect analytical activities of the laboratories. In Building 650, during those earlier years, many distillations of tritium and plutonium in water were performed. Building 790 was used as a soils laboratory. After 1987, the number of waste shipments into the RWMS significantly decreased, and this is evident in the magnitude of the tritium concentrations measured at these locations. In

recent years, the laboratories show tritium levels that are not significantly different from the other sampling locations in Table 4.4. However, for consistency with earlier data, we continue to exclude the laboratories from the overall average. The somewhat high average for the RWMS in 1987 is due to the obviously high annual average for RWMS No. 4 in that year. No reason is known for this reading and it is possibly in error. The two negative values reported in 1988 are probably in error and these two values were not used to compute the two annual averages reported in Table 4.4.

Figure 4.21 is a plot of the RWMS annual averages. It shows an obvious decrease in concentrations over the years with a rapid decline in the earlier years of the plot and a gradual decline in more recent years. The shape of this curve is typical of the exponential decay curve. The break in the pattern of exponential decreases is obvious for 1987; this was discussed in the previous paragraph. The rapid decrease in concentrations in the early 1980's is probably due to a decrease in all radiological activity over the entire NTS due to a decrease in testing and better confinement of the underground tests that were performed.

Figure 4.22 shows the annual tritium in air concentrations averaged over the entire NTS for the past 15 years, excluding the data from the laboratory buildings for the reasons discussed above, and including the RWMS stations. The discussion of the pattern above for Figure 4.21 also describes the pattern in Figure 4.22. Thus, the pattern seen at the RWMS is not distinct from the pattern seen for the entire NTS. However, the levels at the RWMS have generally been higher than the average of the other stations since 1989. The slight increase seen in Figure 4.22 for 1987, could show a contribution through world-wide fallout from the Chernoble accident which occurred in mid 1986.

CONCLUSIONS

The typical tritium in air pattern seen in the environmental sampling locations is that almost all concentrations are below the individual detection limits. Concentrations substantially higher than detection limits are observed only at the RWMS locations, the EPA Farm, the SEDAN Crater, and the E Tunnel Containment Pond. Tritium was used as a biological tracer at the EPA Farm and the SEDAN Crater is an open crater produced by a nuclear device. The E Tunnel pond received drainage water from the tunnel when it was used for device testing; the tunnel is now closed but water continues to drain from it. The RWMS locations show a distinct pattern of near detection limit tritium concentrations in the cool months of the year, then increased levels during the late summer months. It has been hypothesized that this pattern is due to plant transpiration and soil evaporation of tritiated water from the deeper levels of soil within the RWMS after water in surface soils is depleted by summer heat.

Several general conclusions can be drawn from the historical annual average tritium in air data for the 15 stations of the NTS used for Table 4.4. All stations show the same general trend; thus that trend should be representative of the entire site. In the early 1980's, concentrations decreased rapidly; this decrease corresponds to a time of decreasing test activity. Current concentrations are typically very low and are within the statistical confidence interval of the detection limit. These levels are substantially below levels of regulatory concern and thus are not a consideration for workers at the NTS.

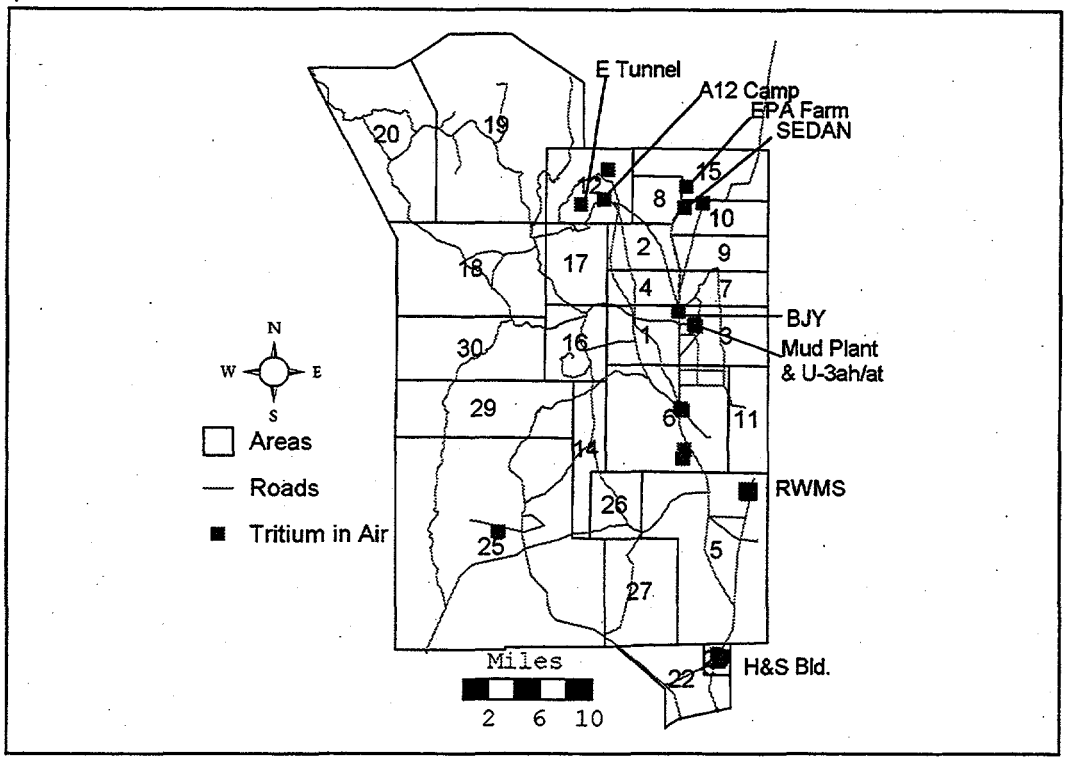


Figure 4.1 Tritium in Air Sampling Stations

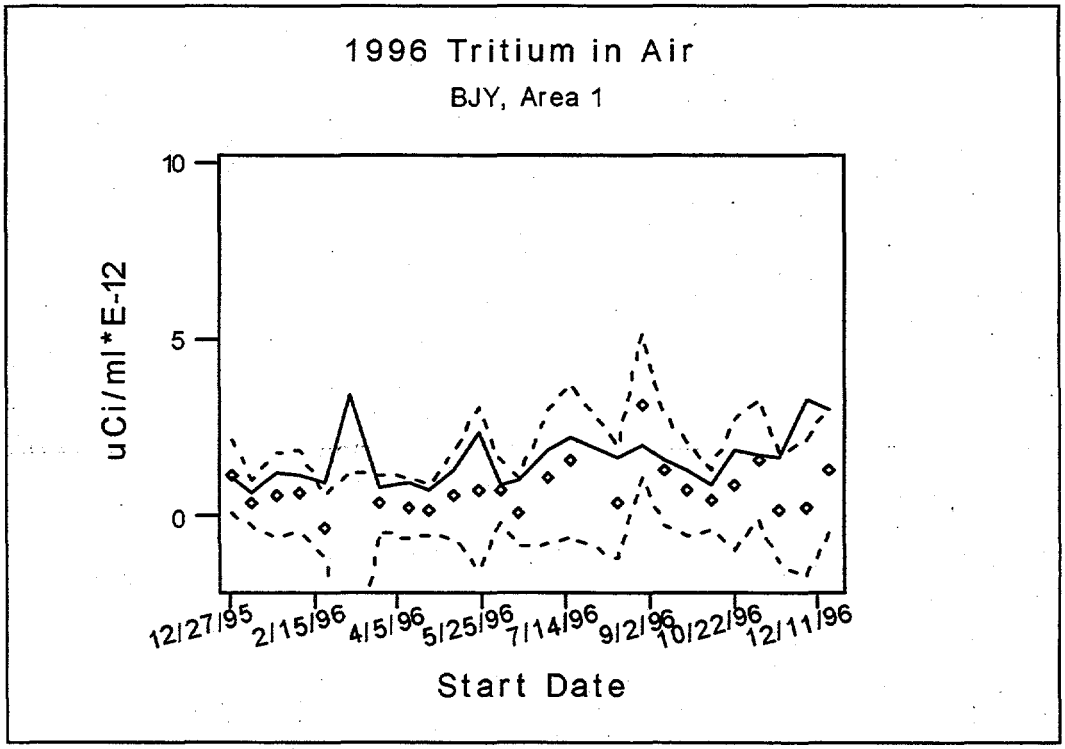


Figure 4.2 Time Series Plot for BJY

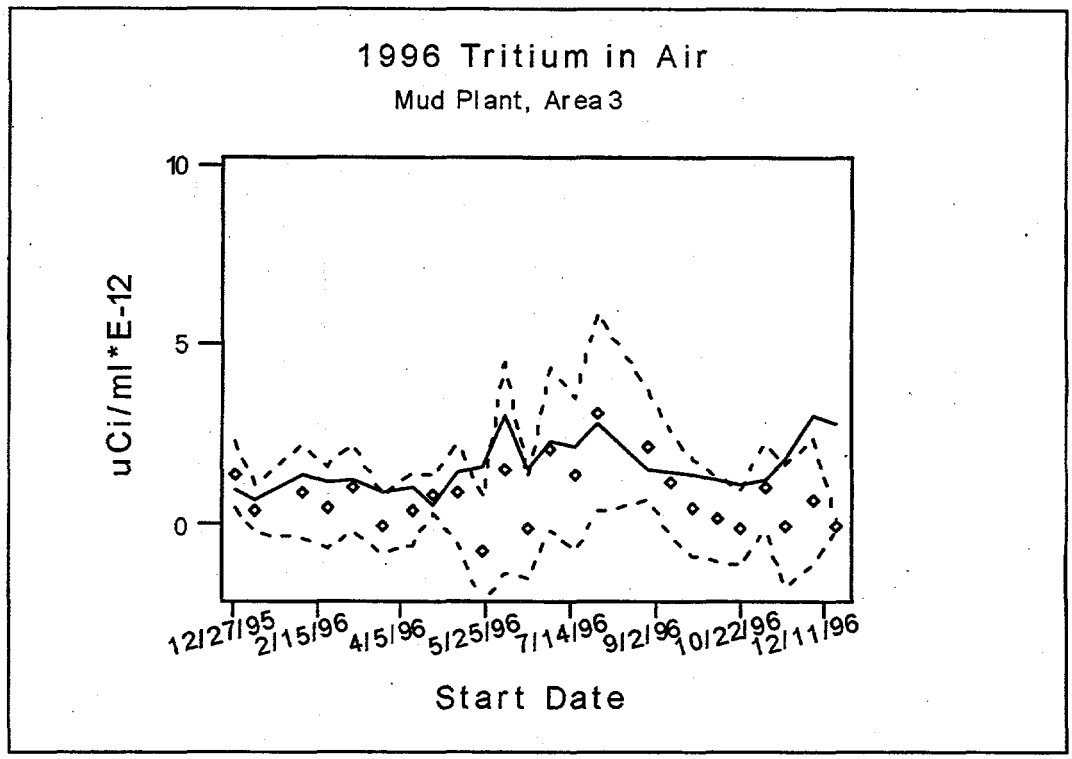


Figure 4.3 Time Series Plot for Area 3 Mud Plant

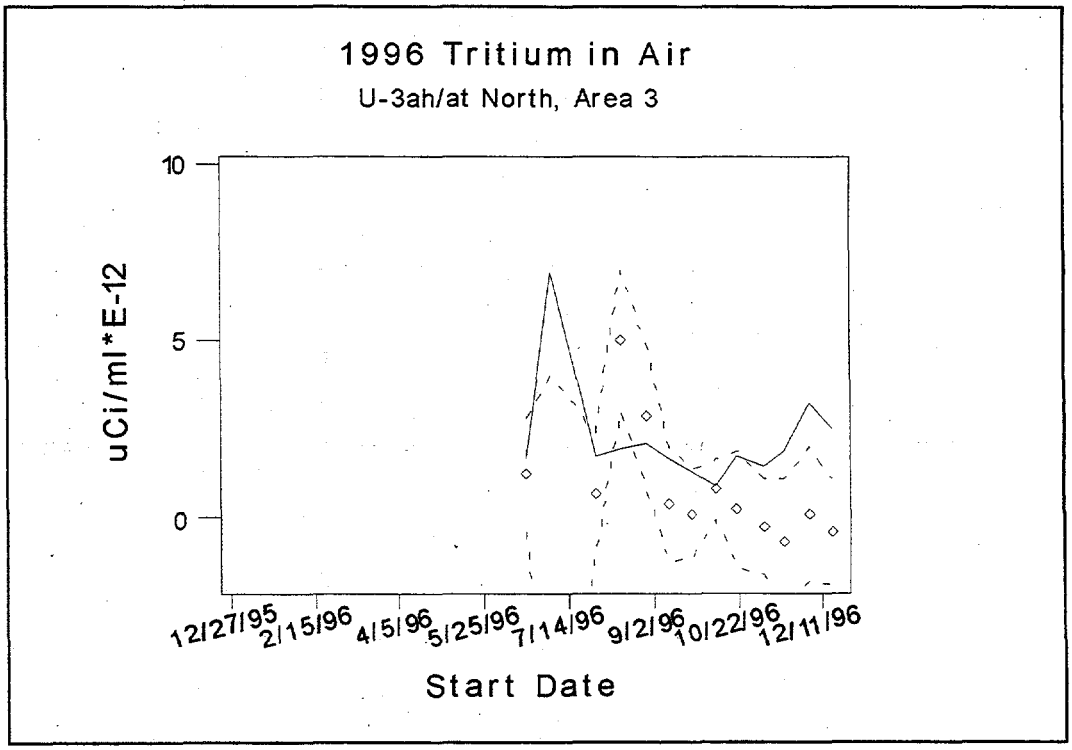


Figure 4.4 Time Series Plot for U-3ah/at North

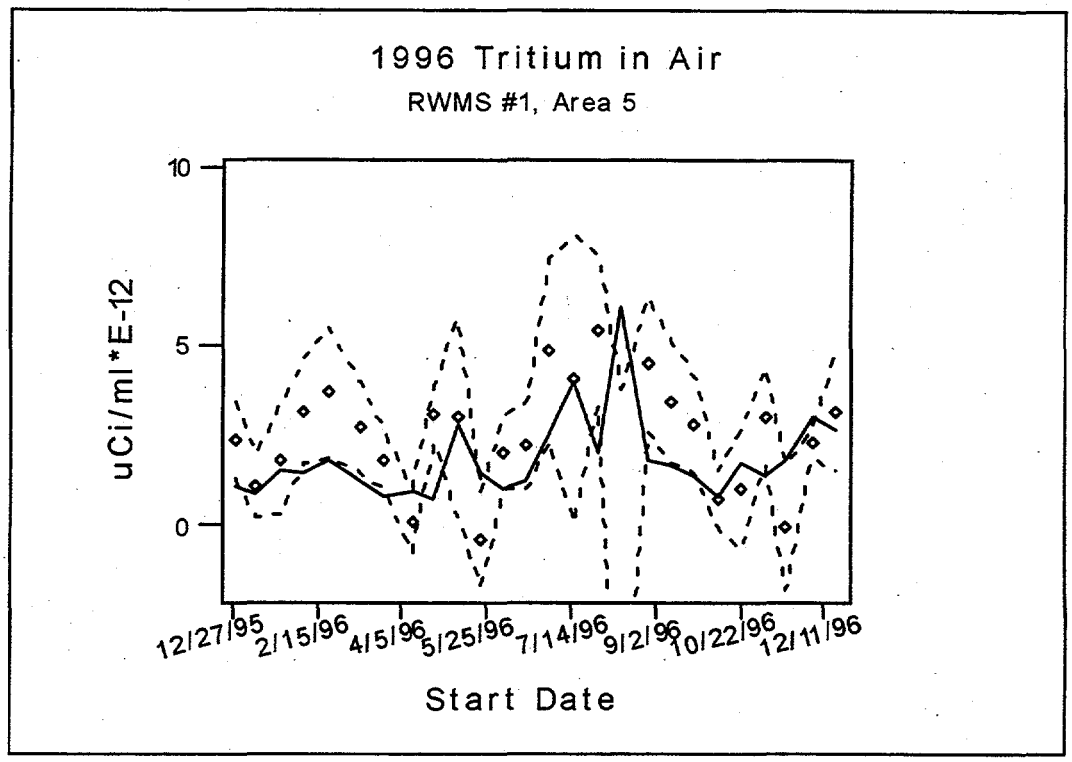


Figure 4.5 Time Series Plot for RWMS No. 1

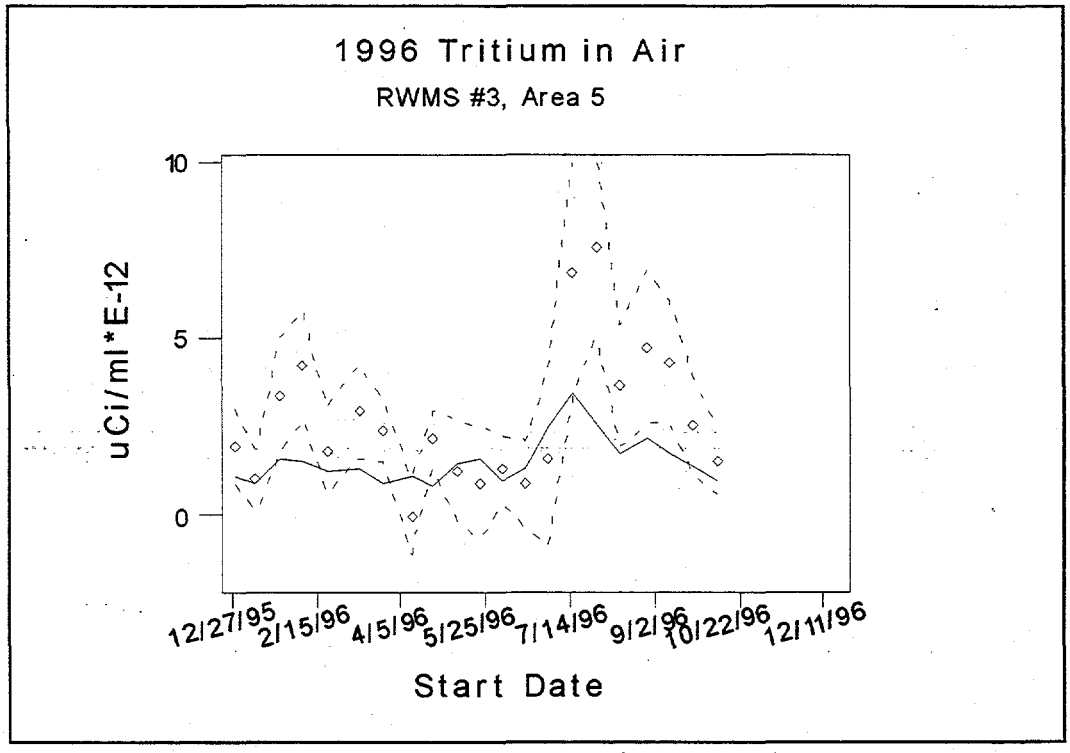


Figure 4.6 Time Series Plot for RWMS No. 3

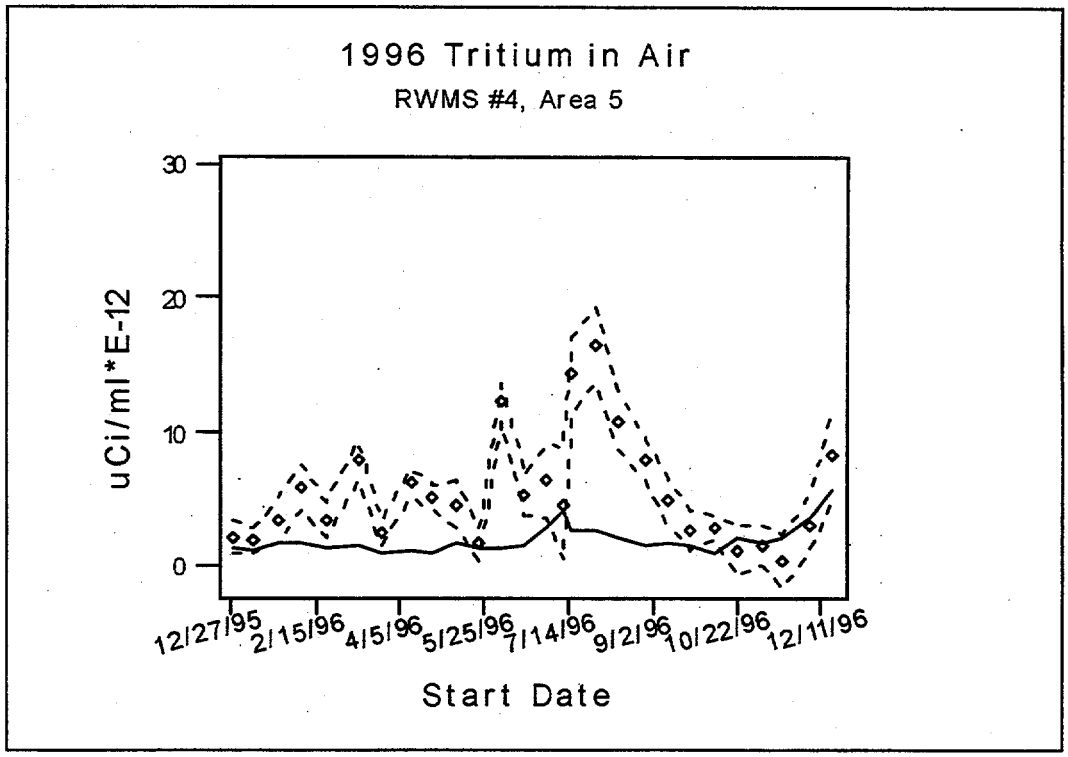


Figure 4.7 Time Series Plot for RWMS No. 4

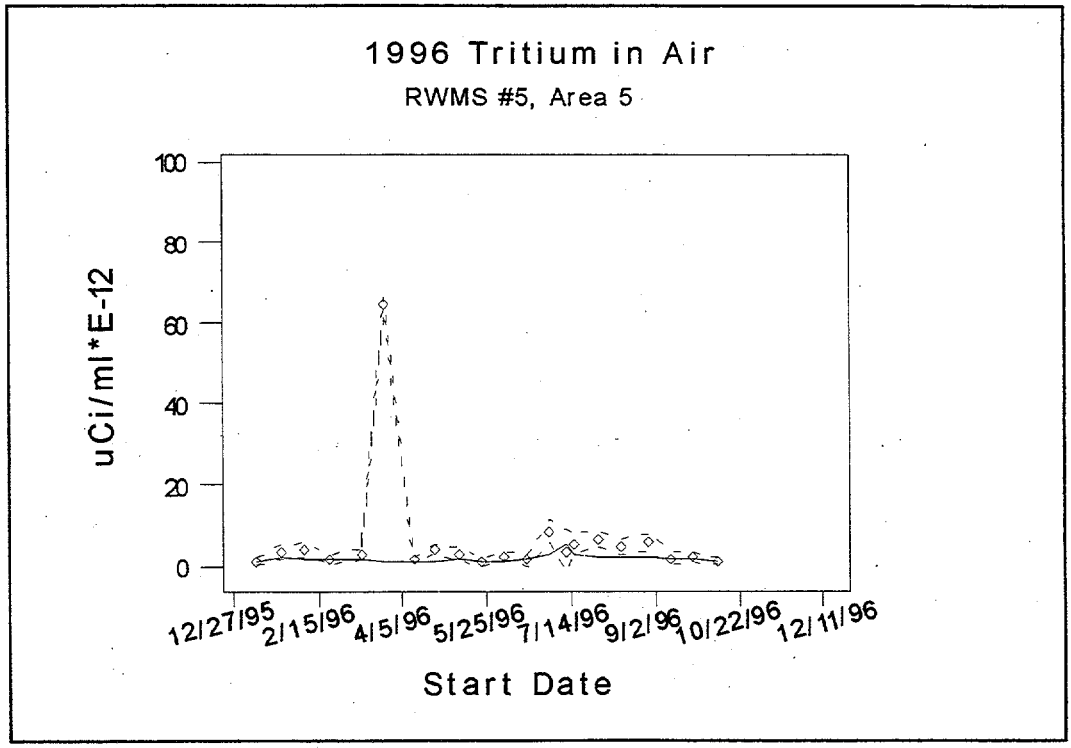


Figure 4.8 Time Series Plot for RWMS No. 5

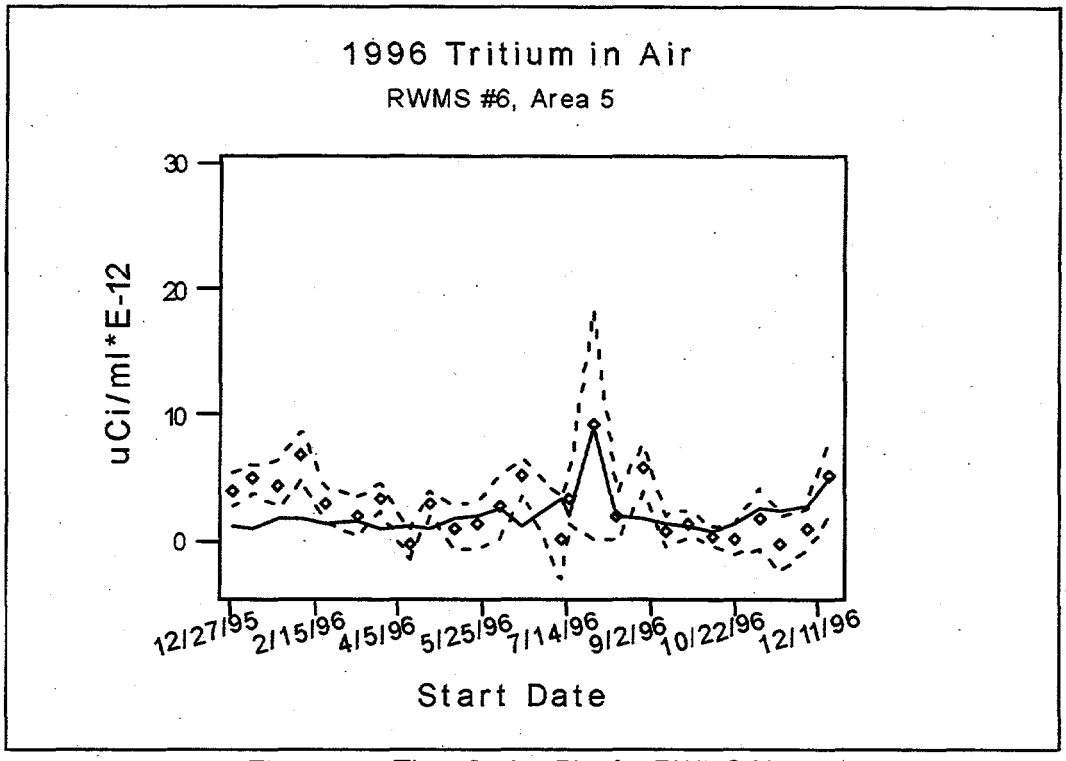


Figure 4.9 Time Series Plot for RWMS No. 6

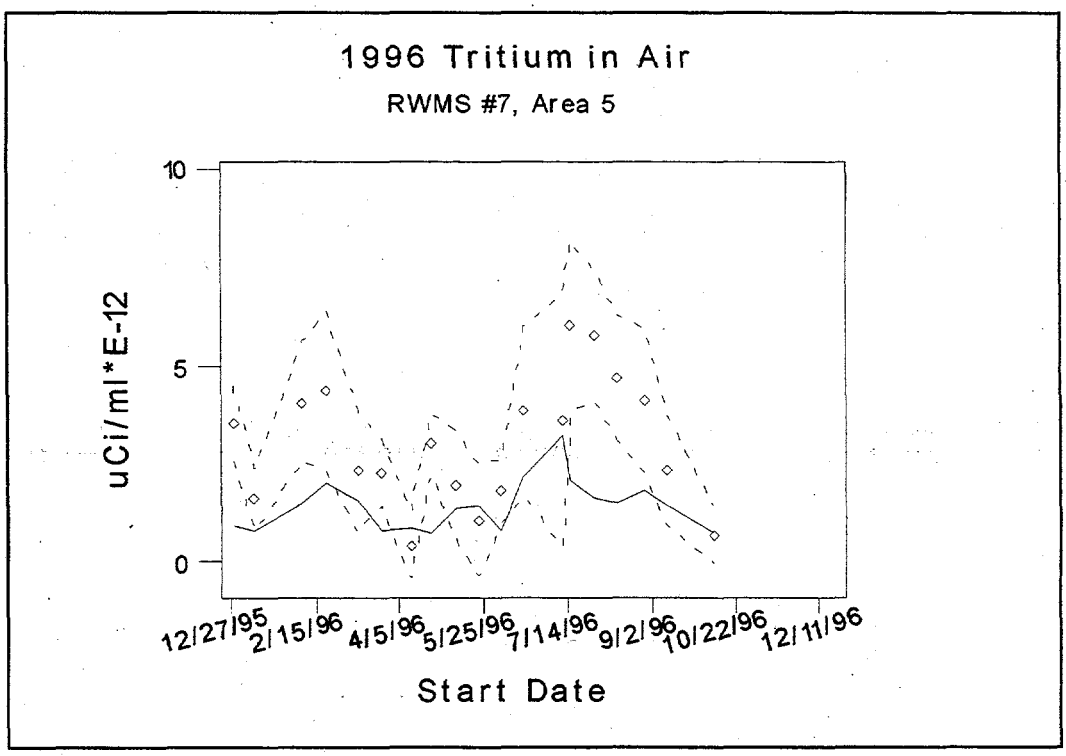


Figure 4.10 Time Series Plot for RWMS No. 7

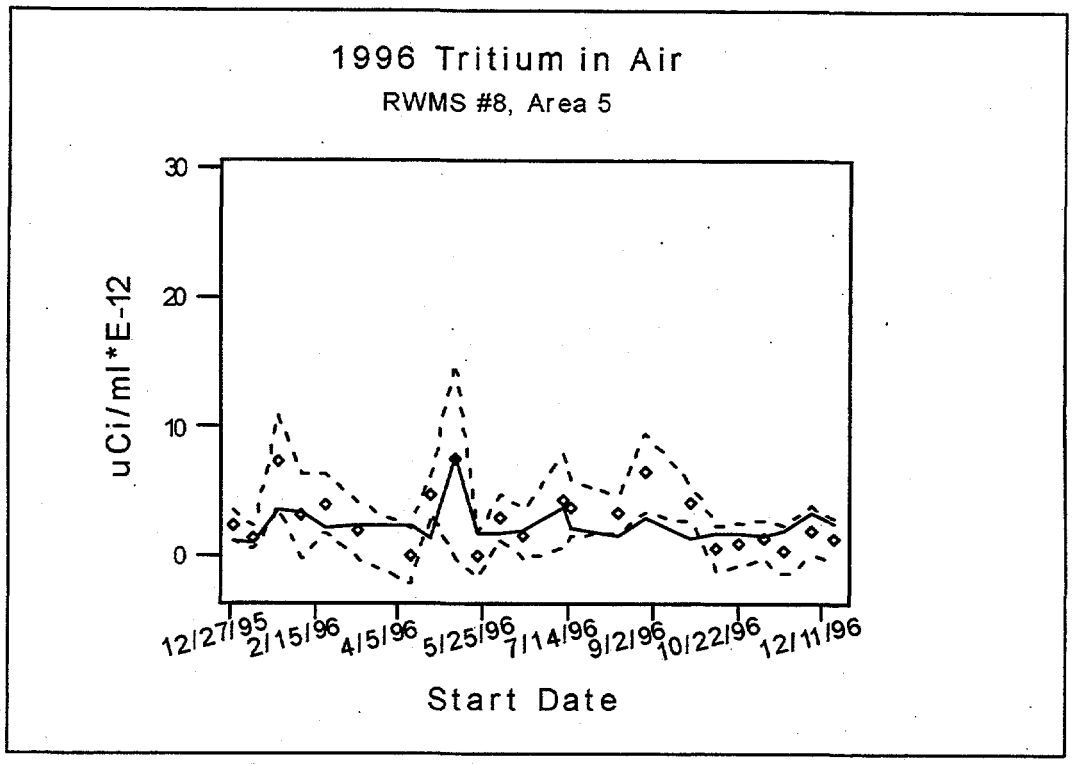


Figure 4.11 Time Series Plot for RWMS No. 8

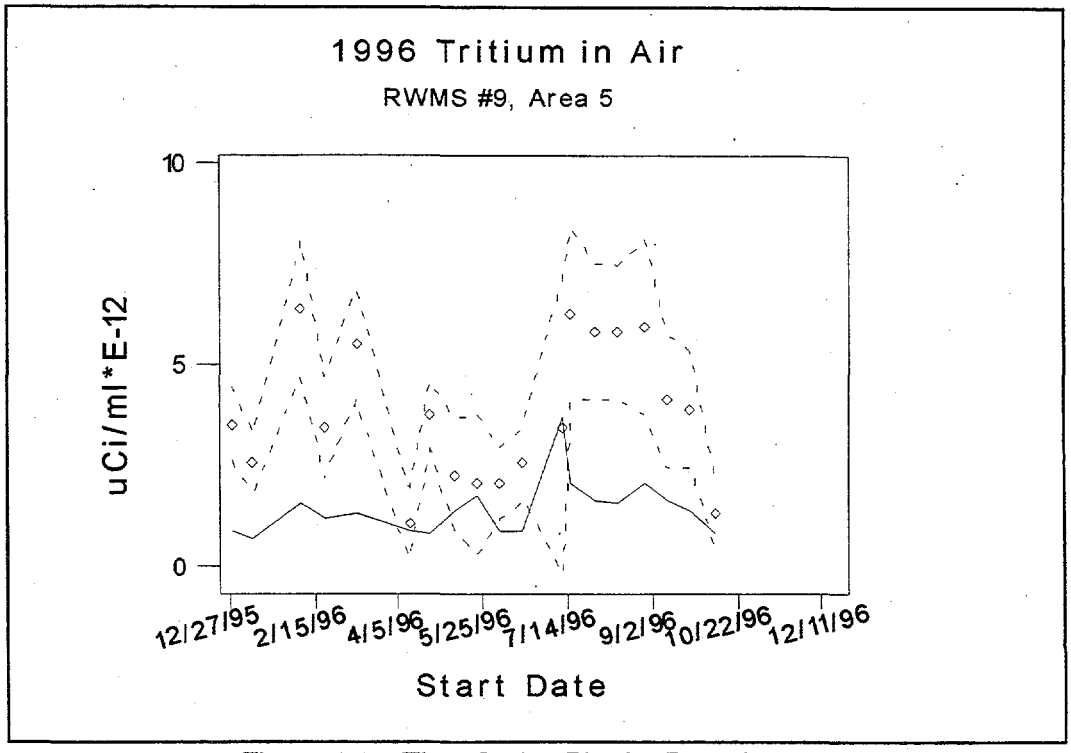


Figure 4.12 Time Series Plot for RWMS No. 9

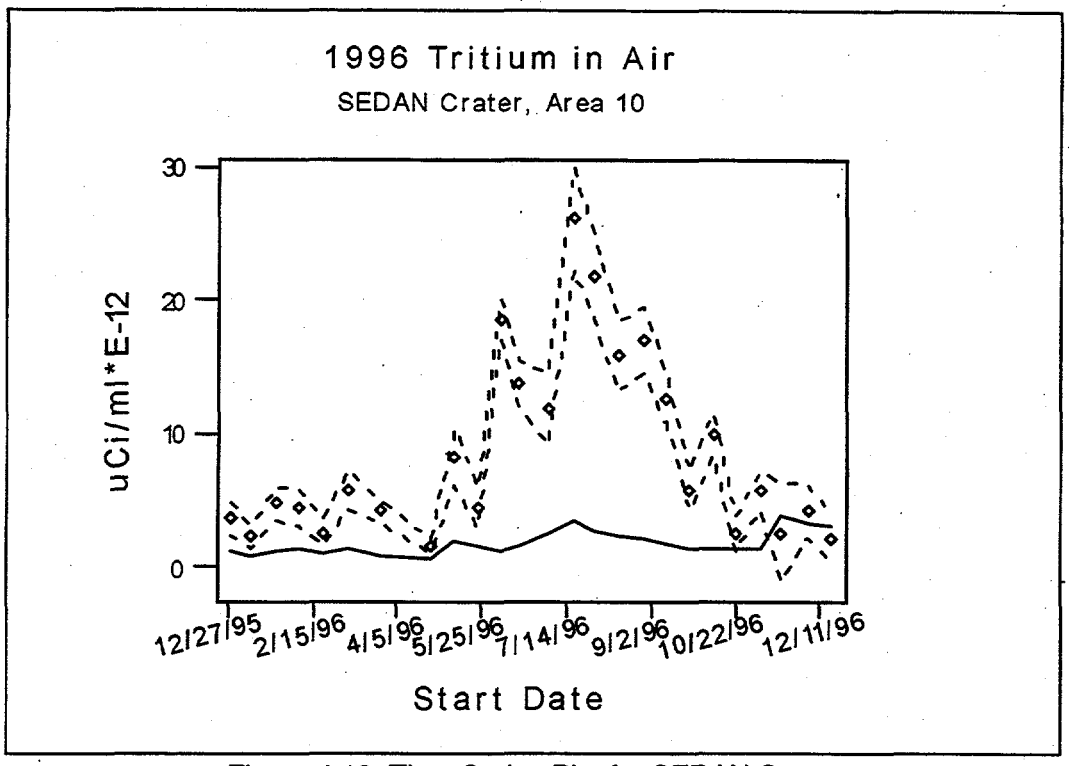


Figure 4.13 Time Series Plot for SEDAN Crater

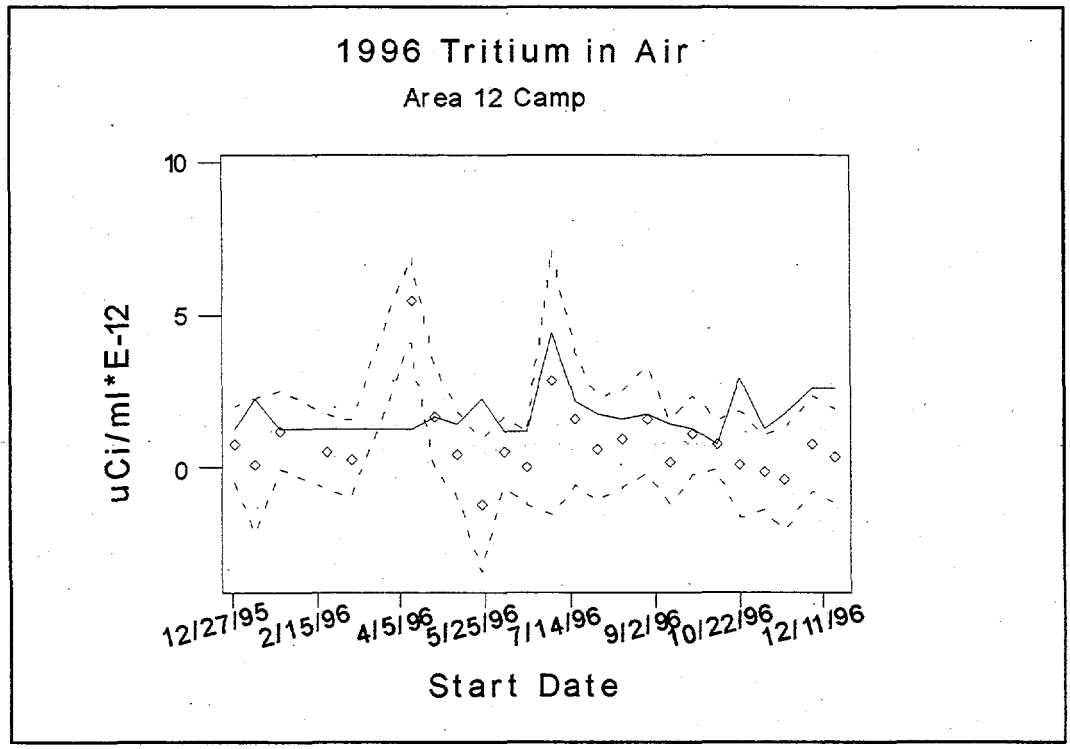


Figure 4.14 Time Series Plot for Area 12 Camp

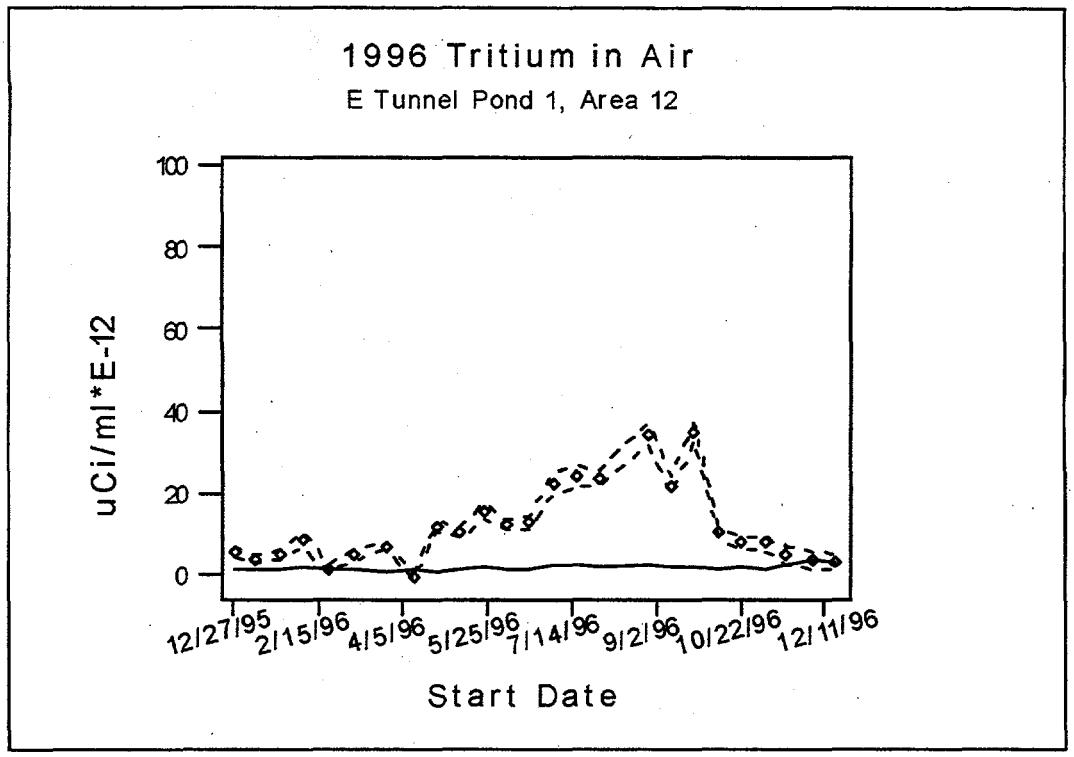


Figure 4.15 Time Series Plot for E Tunnel Pond No. 1

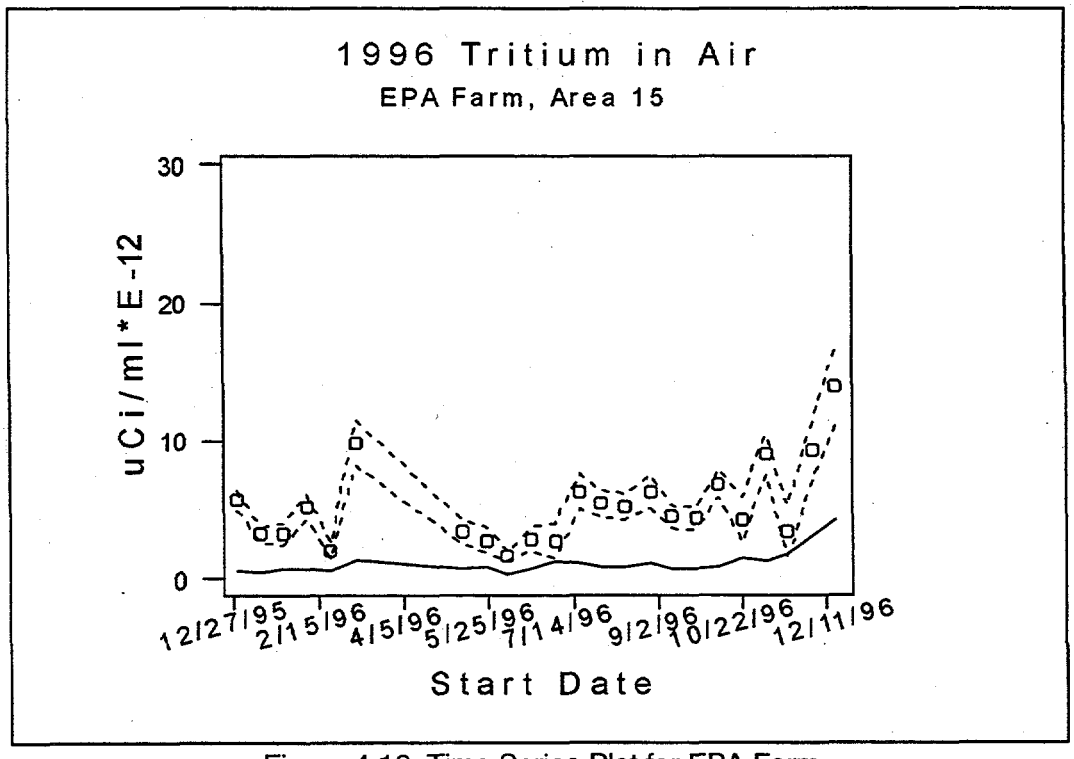


Figure 4.16 Time Series Plot for EPA Farm

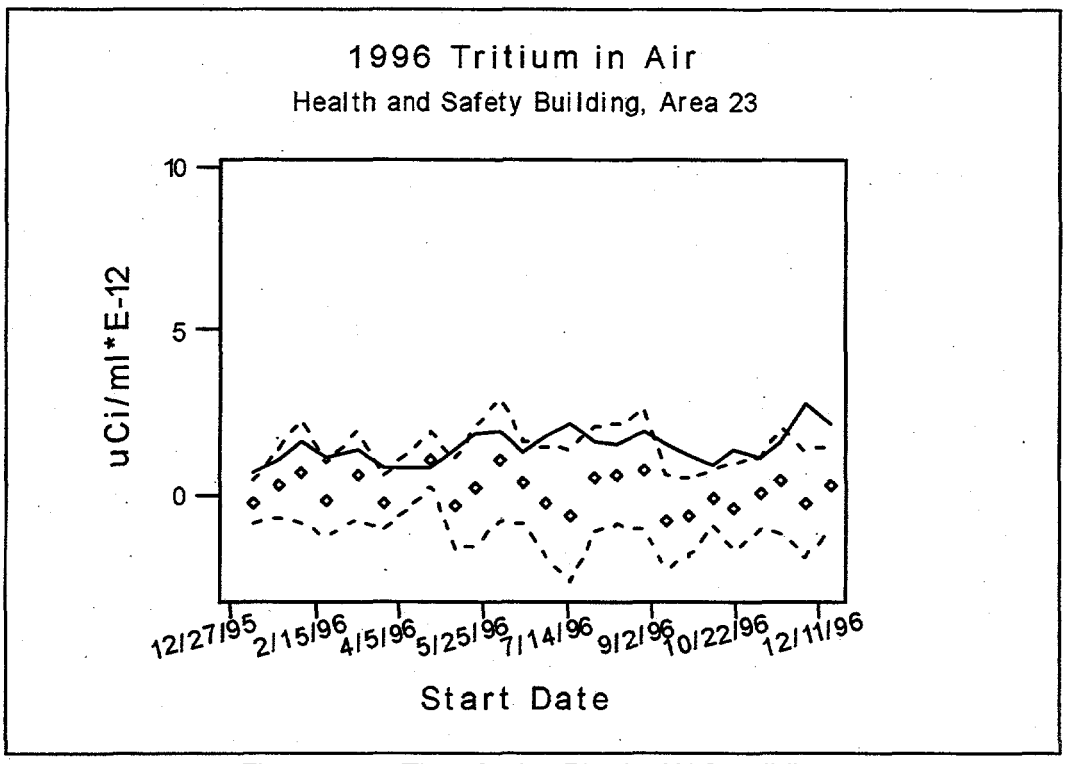


Figure 4.17 Time Series Plot for H&S Building

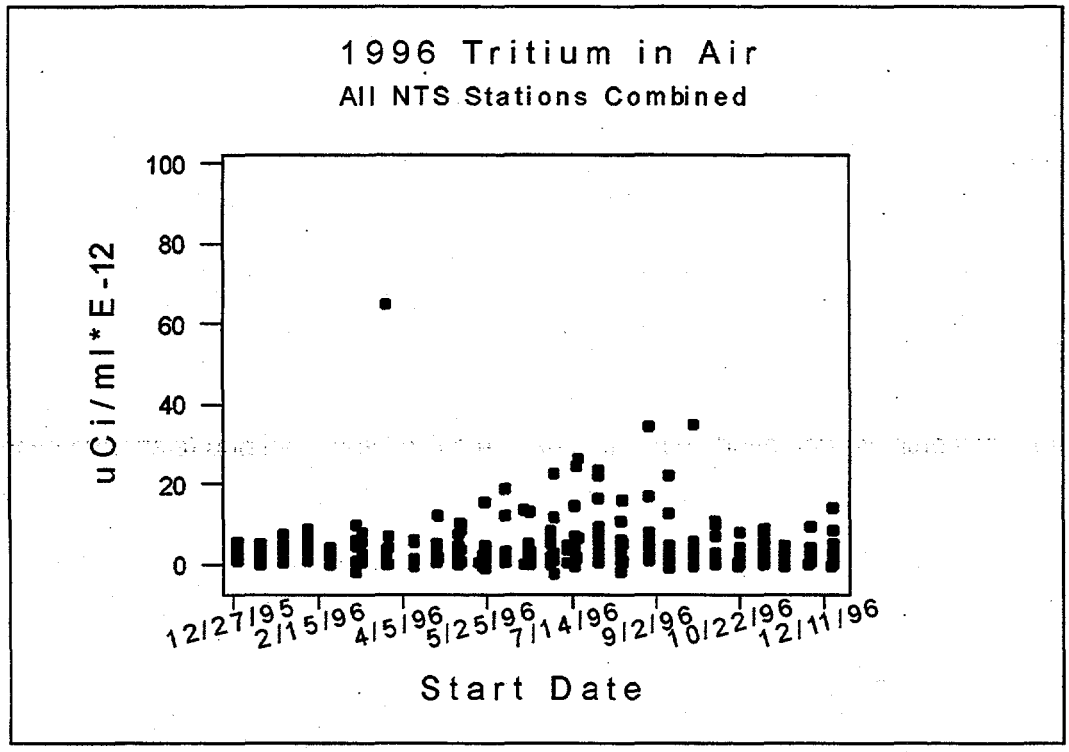


Figure 4.18 Times Series Plot for All NTS Stations Combined

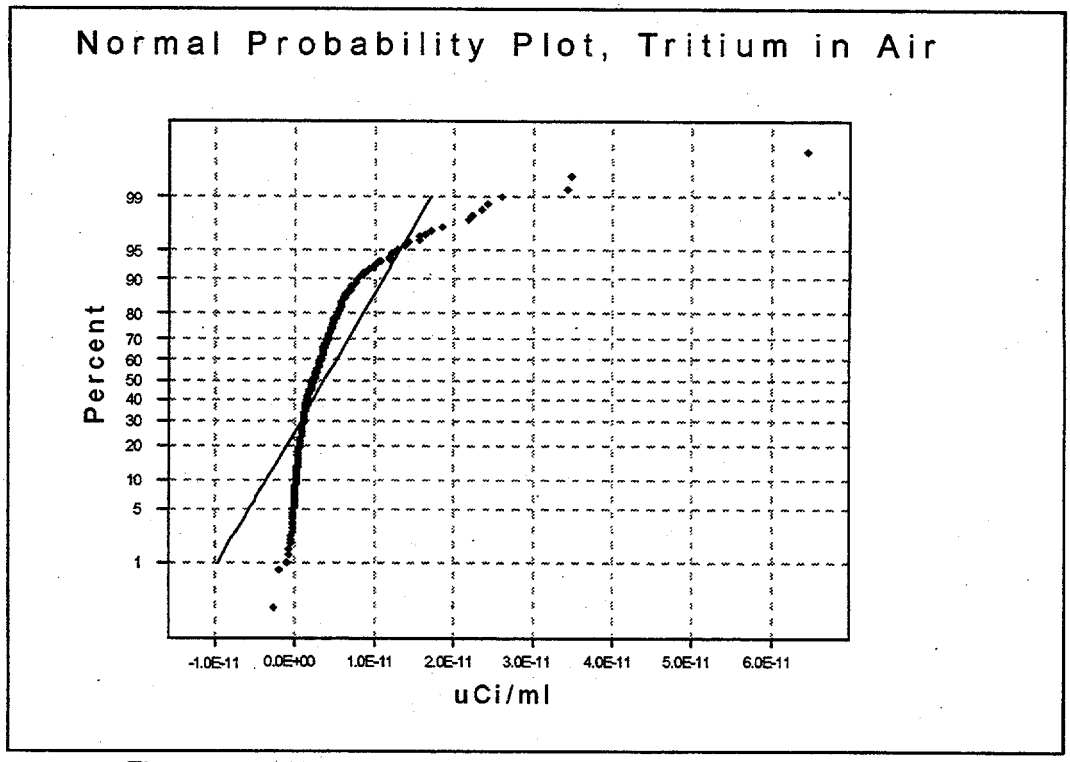


Figure 4.19 Normal Probability Plot, All NTS Stations Combined

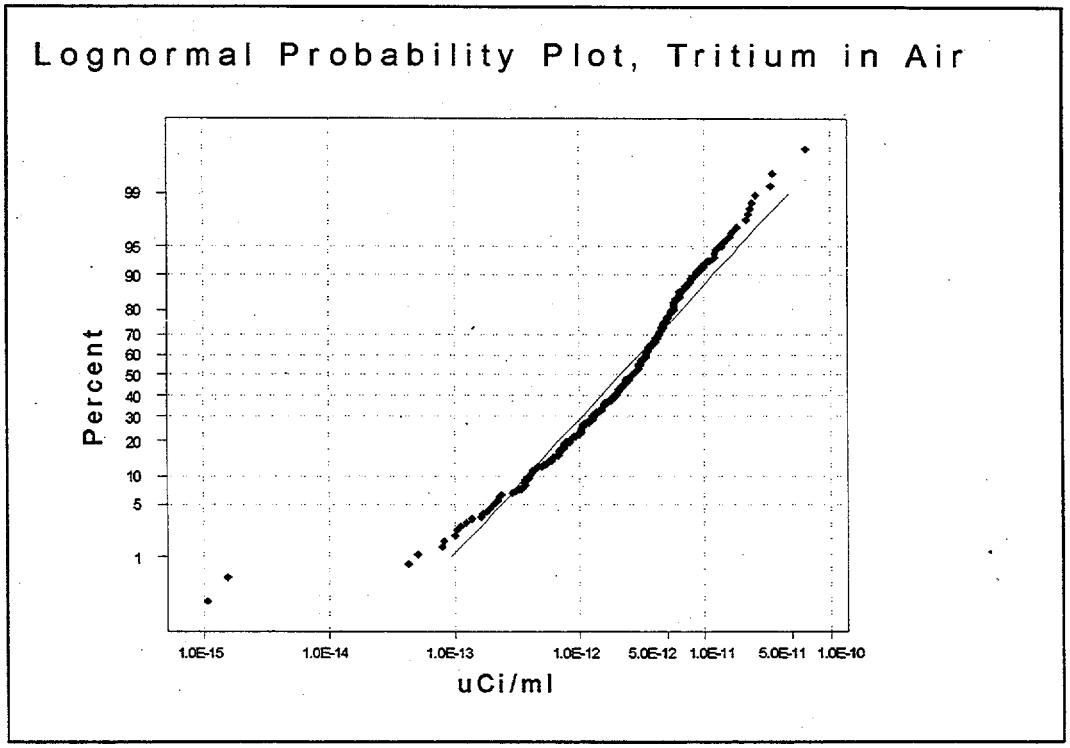


Figure 4.20 Lognormal Probability Plot, All NTS Stations Combined

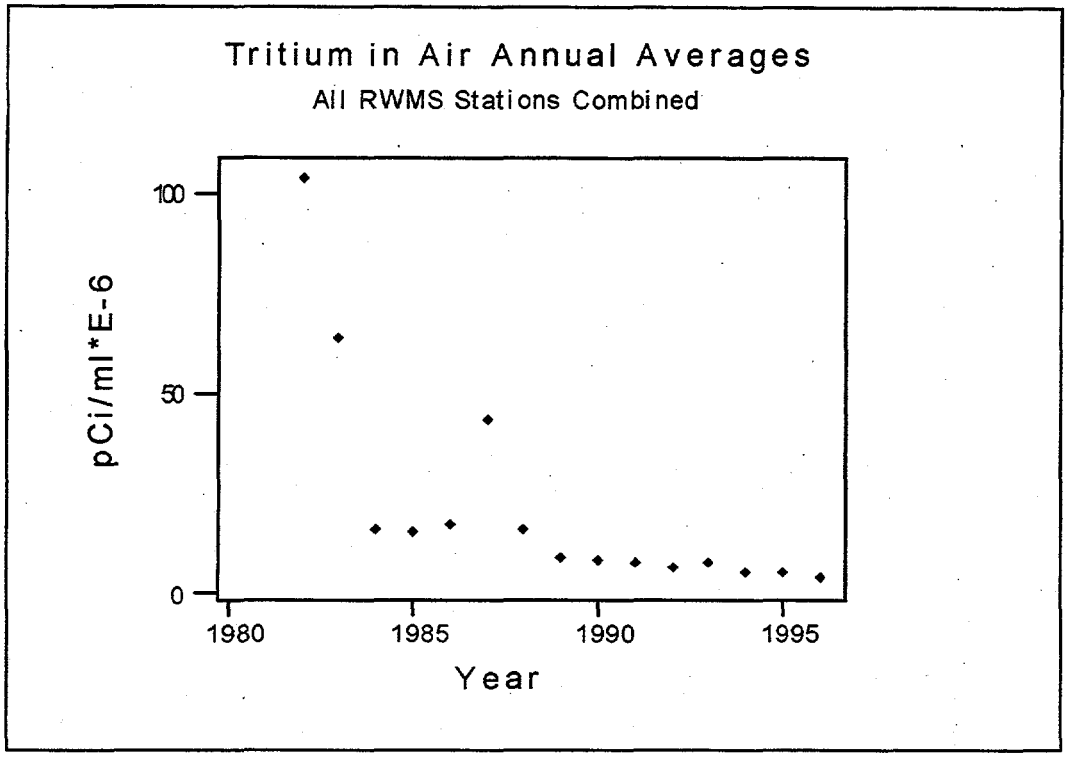


Figure 4.21 Historical Time Series Plot for RWMS

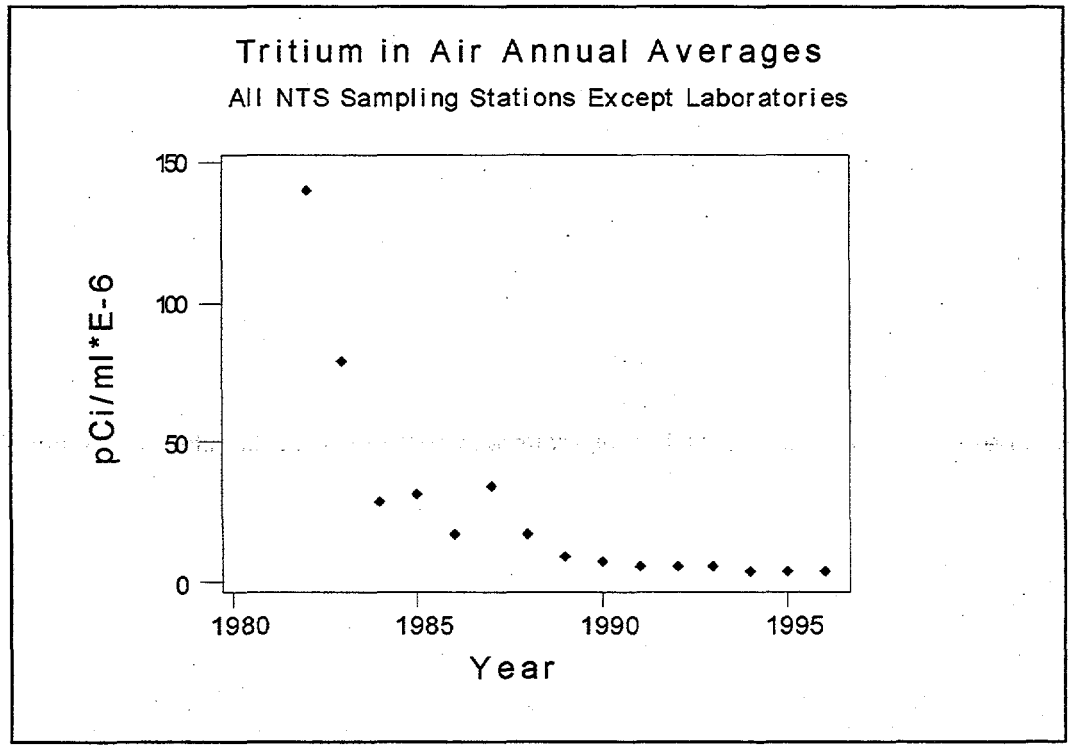


Figure 4.22 Historic Time Series Plot for NTS

Table 4.1 1996 Descriptive Statistics by Sampling Station

Station	Number	10^{-6} pCi/mL Mean	Standard Deviation	Median	1st Quartile	3rd Quartile
H & S Building 650	24	0.10	0.53	0.14	-0.28	0.55
RWMS No. 1	26	2.3	1.7	2.5	1.1	3.2
RWMS No. 3	21	2.7	2.0	2.1	1.2	3.9
RWMS No. 4	27	5.4	4.1	4.6	2.4	7.8
RWMS No. 5	20	3.2	2.1	2.6	1.3	4.5
RWMS No. 6	26	2.8	2.4	2.4	0.88	4.6
RWMS No. 7	19	3.0	1.6	3.0	1.8	4.1
RWMS No. 8	23	2.8	2.2	2.4	1.2	4.1
RWMS No. 9	19	3.8	1.7	3.5	2.3	5.8
BJY	25	0.63	0.89	0.59	0.20	1.1
Area 12, Camp	24	0.84	1.3	0.58	0.13	1.2
EPA Farm	23	5.3	2.9	4.5	3.3	6.4
SEDAN Crater	25	8.5	6.9	5.7	3.1	13.2
Mud Plant	24	0.76	0.88	0.71	0.0	1.3
E Tunnel Pond No. 1	25	11.9	9.8	8.6	4.7	18.7
U-3ah/at North	13	0.54	1.8	0.22	-0.36	0.98
All Locations Combined	364	3.5	4.8	2.3	0.74	4.5

Table 4.2 ANOVA on the Natural Log of Tritium in Air Concentrations by Sampling Location

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Statistic	p Value
Location	15	262.547	17.503	17.6	0.000
Error	314	312.286	0.995		
Total	329	574.834			

Table 4.3 Comparison of Station Medians for Significant Differences

Station	N	Ln of Median	Standard Deviation
H & S Building	13	-28.529	0.842
Area 12, Camp	21	-28.314	1.728
U-3ah/at N	9	-28.291	1.525
BJY	23	-28.198	0.877
Mud Plant	18	-27.795	0.778
RWMS No. 8	22	-27.111	1.749
RWMS No. 6	24	-26.915	1.069
RWMS No. 1	23	-26.844	0.841
RWMS No. 3	20	-26.796	0.657
RWMS No. 7	19	-26.714	0.709
RWMS No. 5	20	-26.689	0.715
RWMS No. 9	19	-26.425	0.533
RWMS No. 4	27	-26.264	0.919
EPA Farm	23	-26.091	0.524
SEDAN Crater	25	-25.810	0.821
E Tunnel	24	-25.417	0.831

Pooled Standard Deviation = 0.997

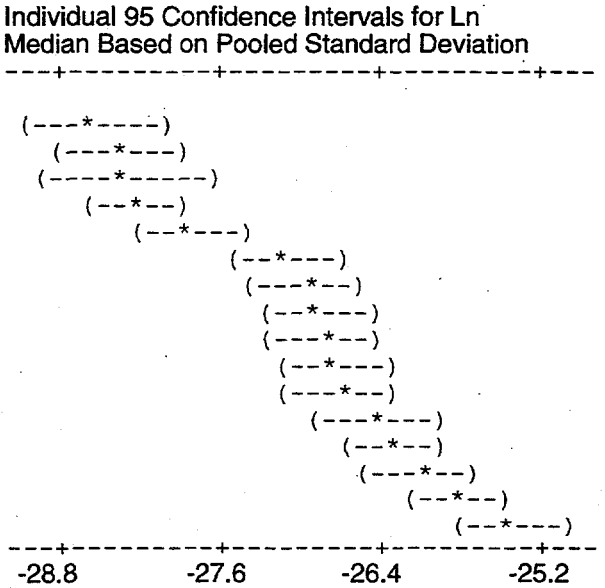


Table 4.4 Historical Annual Station Averages, Tritium in Air (10^{-6} pCi/mL)

Station	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
RWMS No. 1	400.	74.	37.	78.	46.	25.	12.	9.4	4.8	6.1	4.2	4.3	4.2	3.2	2.3
RWMS No. 2	58.	46.	12.	10.	19.	24.	12.	7.3	5.7	4.8	6.7	4.4	4.3	3.1	-
RWMS No. 3	21.	23.	7.7	3.6	8.6	25.	16.	11.	5.8	4.0	4.2	3.8	4.5	4.1	2.7
RWMS No. 4	85.	36.	17.	4.5	11.	220.	38.	9.5	8.5	5.1	6.5	10.	13.6	15.1	5.4
RWMS No. 5	130.	170.	26.	15.	30.	25.	6.7	8.8	7.9	5.0	4.0	6.8	3.6	3.0	3.2
RWMS No. 6	160.	35.	7.9	3.9	7.2	13.	-180.	5.5	7.5	5.4	4.0	7.7	2.9	8.6	2.8
RWMS No. 7	30.	67.	6.5	4.7	11.	13.	8.7	5.1	12.	14.	12.	21.	2.9	3.4	3.0
RWMS No. 8	24.	73.	4.1	4.9	5.3	11.	9.4	10.	9.1	8.9	5.0	6.2	2.2	3.4	2.8
RWMS No. 9	24.	54.	29.	8.9	12.	27.	22.	12.	11.	14.	12.	6.6	5.8	4.8	3.8
Average of RWMS	104.	64.	16.	15.	17.	43.	16.	8.7	8.1	7.5	6.5	7.9	4.9	5.4	3.6
BJY	150.	21.	25.	34.	37.	17.	-120.	15.	2.4	1.8	1.4	1.7	1.0	0.86	0.63
Gate 700 South	-	420.	5.8	7.1	9.8	45.	42.	3.2	1.8	1.5	0.63	0.72	0.57	0.64	-
Area 12, Camp	420.	28.	19.	260.	21.	21.	11.	5.9	2.0	1.3	0.54	0.42	0.42	0.25	0.84
EPA Farm	140.	96.	220.	29.	32.	30.	35.	26.	10.	6.3	10.	8.6	9.6	5.1	5.3
H & S Building	6000.	2700.	560.	8000.	390	66.	7.5	5.7	15.	0.90	0.53	0.34	0.30	0.29	0.11
East Boundary	-	17.	5.3	3.0	2.9	4.6	2.6	2.3	7.2	0.78	0.36	0.13	0.44	-	-
Building 790 No. 2	6300.	100.	120.	27.	3.9	6.6	0.8	2.4	2.5	0.54	0.76	0.78	0.75	0.31	-
E-MAD North	150.	29.	18.	2.9	3.8	6.7	3.8	3.0	5.5	4.5	7.6	0.17	0.25	0.11	-
All Stations Combined, Except Laboratories (Included RWMS)	140.	79.	29.	31.	17.	34.	17.	8.9	6.8	5.6	5.3	5.5	3.9	4.0	3.2

Attachment 4.1 Tritiated Water Vapor in Air Sampling Results - 1996

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 1, BJY	12/28/95	01/10/96	1.110	0.525	1.050
Area 1, BJY	01/10/96	01/24/96	0.356	0.335	0.678
Area 1, BJY	01/24/96	02/07/96	0.588	0.603	1.220
Area 1, BJY	02/07/96	02/21/96	0.677	0.582	1.170
Area 1, BJY	02/21/96	03/07/96	0.324	0.434	0.901
Area 1, BJY	03/07/96	03/25/96	2.040	1.642	3.430
Area 1, BJY	03/25/96	04/11/96	0.367	0.402	0.816
Area 1, BJY	04/11/96	04/24/96	0.210	0.444	0.907
Area 1, BJY	04/24/96	05/09/96	0.167	0.354	0.720
Area 1, BJY	05/09/96	05/23/96	0.590	0.625	1.270
Area 1, BJY	05/23/96	06/05/96	0.739	1.168	2.370
Area 1, BJY	06/05/96	06/16/96	0.679	0.441	0.891
Area 1, BJY	06/16/96	07/03/96	0.103	0.496	1.010
Area 1, BJY	07/03/96	07/17/96	1.040	0.926	1.870
Area 1, BJY	07/17/96	07/30/96	1.560	1.092	2.210
Area 1, BJY	07/30/96	08/14/96	Meter Failed		
Area 1, BJY	08/14/96	08/29/96	0.371	0.798	1.630
Area 1, BJY	08/29/96	09/11/96	3.140	1.025	2.020
Area 1, BJY	09/11/96	09/25/96	1.280	0.781	1.570
Area 1, BJY	09/25/96	10/09/96	0.737	0.649	1.310
Area 1, BJY	10/09/96	10/23/96	0.449	0.427	0.862
Area 1, BJY	10/23/96	11/06/96	0.879	0.923	1.870
Area 1, BJY	11/06/96	11/19/96	1.580	0.853	1.710
Area 1, BJY	11/19/96	12/04/96	0.136	0.796	1.620
Area 1, BJY	12/04/96	12/18/96	0.181	0.977	3.260
Area 1, BJY	12/18/96	01/02/97	1.280	0.902	2.980
Area 3, Mud Plant	12/28/95	01/10/96	1.340	0.469	0.929
Area 3, Mud Plant	01/10/96	01/24/96	0.384	0.332	0.669
Area 3, Mud Plant	01/24/96	02/07/96	Meter Failed		
Area 3, Mud Plant	02/07/96	02/21/96	0.884	0.659	1.330
Area 3, Mud Plant	02/21/96	03/07/96	0.449	0.575	1.170
Area 3, Mud Plant	03/07/96	03/25/96	0.992	0.605	1.210
Area 3, Mud Plant	03/25/96	04/11/96	0.042	0.405	0.832
Area 3, Mud Plant	04/11/96	04/24/96	0.375	0.504	1.020
Area 3, Mud Plant	04/24/96	05/09/96	0.798	0.261	0.516
Area 3, Mud Plant	05/09/96	05/23/96	0.828	0.696	1.400
Area 3, Mud Plant	05/23/96	06/05/96	0.809	0.760	1.580
Area 3, Mud Plant	06/05/96	06/19/96	1.520	1.474	2.980
Area 3, Mud Plant	06/19/96	07/02/96	0.150	0.718	1.480
Area 3, Mud Plant	07/02/96	07/17/96	2.070	1.128	2.260
Area 3, Mud Plant	07/17/96	07/30/96	1.360	1.068	2.160
Area 3, Mud Plant	07/30/96	08/14/96	3.090	1.386	2.770
Area 3, Mud Plant	08/14/96	08/29/96	Incorrect Weight		

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 3, Mud Plant	08/29/96	09/11/96	2.170	0.756	1.490
Area 3, Mud Plant	09/11/96	09/25/96	1.120	0.728	1.460
Area 3, Mud Plant	09/25/96	10/09/96	0.420	0.672	1.370
Area 3, Mud Plant	10/09/96	10/23/96	0.123	0.592	1.210
Area 3, Mud Plant	10/23/96	11/06/96	0.123	0.522	1.080
Area 3, Mud Plant	11/06/96	11/19/96	1.020	0.607	1.210
Area 3, Mud Plant	11/19/96	12/04/96	0.106	0.864	1.760
Area 3, Mud Plant	12/04/96	12/18/96	0.612	0.894	2.970
Area 3, Mud Plant	12/18/96	01/02/97	0.043	0.082	2.750
Area 3, U-3ah/at North	New Sampling Location				
Area 3, U-3ah/at North	06/19/96	07/03/96	1.190	0.815	1.650
Area 3, U-3ah/at North	07/03/96	07/17/96	2.670	3.337	6.910
Area 3, U-3ah/at North	07/17/96	07/30/96	Power Out		
Area 3, U-3ah/at North	07/30/96	08/14/96	0.663	0.855	1.740
Area 3, U-3ah/at North	08/14/96	08/29/96	4.980	0.996	1.920
Area 3, U-3ah/at North	08/29/96	09/11/96	2.840	1.034	2.050
Area 3, U-3ah/at North	09/11/96	09/25/96	0.339	0.817	1.670
Area 3, U-3ah/at North	09/25/96	10/09/96	0.082	0.628	1.290
Area 3, U-3ah/at North	10/09/96	10/22/96	0.766	0.425	0.850
Area 3, U-3ah/at North	10/22/96	11/06/96	0.216	0.831	1.700
Area 3, U-3ah/at North	11/06/96	11/19/96	0.289	0.688	1.420
Area 3, U-3ah/at North	11/19/96	12/03/96	0.681	0.889	1.830
Area 3, U-3ah/at North	12/03/96	12/17/96	0.051	0.963	3.230
Area 3, U-3ah/at North	12/17/96	12/31/96	0.434	0.744	2.520
Area 5, RWMS No. 1	12/28/95	01/10/96	2.360	0.537	1.050
Area 5, RWMS No. 1	01/10/96	01/24/96	1.080	0.441	0.878
Area 5, RWMS No. 1	01/24/96	02/07/96	1.820	0.769	1.530
Area 5, RWMS No. 1	02/07/96	02/21/96	3.170	0.728	1.410
Area 5, RWMS No. 1	02/21/96	03/11/96	3.690	0.913	1.780
Area 5, RWMS No. 1	03/11/96	03/25/96	2.710	0.631	1.230
Area 5, RWMS No. 1	03/25/96	04/11/96	1.810	0.413	0.800
Area 5, RWMS No. 1	04/11/96	04/24/96	0.100	0.445	0.913
Area 5, RWMS No. 1	04/24/96	05/08/96	3.090	0.399	0.742
Area 5, RWMS No. 1	05/08/96	05/22/96	2.970	1.378	2.750
Area 5, RWMS No. 1	05/22/96	06/04/96	0.400	0.676	1.400
Area 5, RWMS No. 1	06/04/96	06/18/96	1.990	0.513	1.000
Area 5, RWMS No. 1	06/18/96	07/01/96	2.200	0.607	1.190
Area 5, RWMS No. 1	07/01/96	07/16/96	4.860	1.281	2.500
Area 5, RWMS No. 1	07/16/96	07/30/96	4.070	2.004	4.000
Area 5, RWMS No. 1	07/30/96	08/13/96	5.430	1.059	2.030
Area 5, RWMS No. 1	08/13/96	08/29/96	2.040	2.927	6.050
Area 5, RWMS No. 1	08/29/96	09/11/96	4.470	0.936	1.800
Area 5, RWMS No. 1	09/11/96	09/25/96	3.450	0.856	1.660

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 5, RWMS No. 1	09/25/96	10/09/96	2.790	0.684	1.330
Area 5, RWMS No. 1	10/09/96	10/23/96	0.690	0.393	0.788
Area 5, RWMS No. 1	10/23/96	11/06/96	1.000	0.845	1.710
Area 5, RWMS No. 1	11/06/96	11/19/96	3.020	0.689	1.340
Area 5, RWMS No. 1	11/19/96	12/04/96	0.086	0.873	1.790
Area 5, RWMS No. 1	12/04/96	12/18/96	2.260	0.211	3.010
Area 5, RWMS No. 1	12/18/96	12/31/96	3.120	0.825	2.630
Area 5, RWMS No. 3	12/28/95	01/10/96	1.920	0.545	1.070
Area 5, RWMS No. 3	01/10/96	01/24/96	0.978	0.423	0.844
Area 5, RWMS No. 3	01/24/96	02/07/96	3.350	0.811	1.580
Area 5, RWMS No. 3	02/07/96	02/21/96	4.250	0.774	1.480
Area 5, RWMS No. 3	02/21/96	03/11/96	1.800	0.607	1.200
Area 5, RWMS No. 3	03/11/96	03/25/96	2.920	0.657	1.270
Area 5, RWMS No. 3	03/25/96	04/11/96	2.370	0.431	0.826
Area 5, RWMS No. 3	04/11/96	04/24/96	0.054	0.536	1.100
Area 5, RWMS No. 3	04/24/96	05/08/96	2.120	0.409	0.787
Area 5, RWMS No. 3	05/08/96	05/22/96	1.230	0.726	1.460
Area 5, RWMS No. 3	05/22/96	06/04/96	0.876	0.788	1.600
Area 5, RWMS No. 3	06/04/96	06/18/96	1.250	0.478	0.945
Area 5, RWMS No. 3	06/18/96	07/01/96	0.838	0.629	1.270
Area 5, RWMS No. 3	07/01/96	07/16/96	1.570	1.217	2.460
Area 5, RWMS No. 3	07/16/96	07/30/96	6.850	1.750	3.410
Area 5, RWMS No. 3	07/30/96	08/13/96	7.600	1.300	2.470
Area 5, RWMS No. 3	08/13/96	08/29/96	3.630	0.868	1.690
Area 5, RWMS No. 3	08/29/96	09/11/96	4.750	1.102	2.140
Area 5, RWMS No. 3	09/11/96	09/25/96	4.290	0.875	1.690
Area 5, RWMS No. 3	09/25/96	10/09/96	2.480	0.712	1.390
Area 5, RWMS No. 3	10/09/96	10/23/96	1.500	0.459	0.900
Area 5, RWMS No. 4	12/28/95	01/10/96	2.020	0.618	1.220
Area 5, RWMS No. 4	01/10/96	01/24/96	1.800	0.487	0.953
Area 5, RWMS No. 4	01/24/96	02/07/96	3.350	0.864	1.690
Area 5, RWMS No. 4	02/07/96	02/21/96	5.870	0.860	1.610
Area 5, RWMS No. 4	02/21/96	03/11/96	3.350	0.680	1.310
Area 5, RWMS No. 4	03/11/96	03/25/96	7.820	0.747	1.340
Area 5, RWMS No. 4	03/25/96	04/11/96	2.390	0.476	0.918
Area 5, RWMS No. 4	04/11/96	04/24/96	6.110	0.556	0.995
Area 5, RWMS No. 4	04/24/96	05/08/96	5.030	0.495	0.895
Area 5, RWMS No. 4	05/08/96	05/22/96	4.570	0.882	1.690
Area 5, RWMS No. 4	05/22/96	06/04/96	1.530	0.601	1.190
Area 5, RWMS No. 4	06/04/96	06/18/96	12.200	0.708	1.170
Area 5, RWMS No. 4	06/18/96	07/01/96	5.290	0.741	1.390
Area 5, RWMS No. 4	07/01/96	07/11/96	6.290	1.409	2.730
Area 5, RWMS No. 4	07/11/96	07/16/96	4.530	2.091	4.180

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 5, RWMS No. 4	07/16/96	07/30/96	14.300	1.394	2.510
Area 5, RWMS No. 4	07/30/96	08/13/96	16.500	1.444	2.560
Area 5, RWMS No. 4	08/13/96	08/29/96	10.800	1.069	1.930
Area 5, RWMS No. 4	08/29/96	09/11/96	7.890	0.797	1.430
Area 5, RWMS No. 4	09/11/96	09/25/96	4.810	0.895	1.710
Area 5, RWMS No. 4	09/25/96	10/09/96	2.600	0.754	1.480
Area 5, RWMS No. 4	10/09/96	10/23/96	2.830	0.447	0.845
Area 5, RWMS No. 4	10/23/96	11/06/96	1.060	0.980	1.990
Area 5, RWMS No. 4	11/06/96	11/19/96	1.480	0.777	1.550
Area 5, RWMS No. 4	11/19/96	12/04/96	0.219	0.994	2.030
Area 5, RWMS No. 4	12/04/96	12/18/96	2.980	1.067	3.460
Area 5, RWMS No. 4	12/18/96	12/31/96	8.260	1.784	5.640
Area 5, RWMS No. 5	12/28/95	01/10/96	Unknown Cause		
Area 5, RWMS No. 5	01/10/96	01/24/96	1.070	0.509	1.020
Area 5, RWMS No. 5	01/24/96	02/07/96	3.470	0.959	1.880
Area 5, RWMS No. 5	02/07/96	02/21/96	3.970	0.854	1.650
Area 5, RWMS No. 5	02/21/96	03/11/96	1.510	0.670	1.330
Area 5, RWMS No. 5	03/11/96	03/25/96	2.690	0.729	1.430
Area 5, RWMS No. 5	03/25/96	04/11/96	64.700	0.958	0.898
Area 5, RWMS No. 5	04/11/96	04/24/96	1.280	0.449	0.888
Area 5, RWMS No. 5	04/24/96	05/08/96	4.120	0.466	0.854
Area 5, RWMS No. 5	05/08/96	05/22/96	2.600	0.846	1.670
Area 5, RWMS No. 5	05/22/96	06/04/96	0.593	0.587	1.190
Area 5, RWMS No. 5	06/04/96	06/18/96	2.380	0.568	1.100
Area 5, RWMS No. 5	06/18/96	07/01/96	1.270	0.724	1.450
Area 5, RWMS No. 5	07/01/96	07/11/96	8.570	1.358	2.570
Area 5, RWMS No. 5	07/11/96	07/16/96	3.540	2.602	5.250
Area 5, RWMS No. 5	07/16/96	07/30/96	5.230	1.274	2.480
Area 5, RWMS No. 5	07/30/96	08/13/96	6.670	1.024	1.930
Area 5, RWMS No. 5	08/13/96	08/29/96	4.690	0.959	1.850
Area 5, RWMS No. 5	08/29/96	09/11/96	5.740	1.180	2.270
Area 5, RWMS No. 5	09/11/96	09/25/96	1.720	0.789	1.580
Area 5, RWMS No. 5	09/25/96	10/09/96	2.010	0.669	1.320
Area 5, RWMS No. 5	10/09/96	10/23/96	1.040	0.425	0.842
Area 5, RWMS No. 6	12/28/95	01/10/96	4.080	0.659	1.250
Area 5, RWMS No. 6	01/10/96	01/24/96	4.930	0.547	1.010
Area 5, RWMS No. 6	01/24/96	02/07/96	4.490	0.925	1.780
Area 5, RWMS No. 6	02/07/96	02/21/96	6.820	0.968	1.810
Area 5, RWMS No. 6	02/21/96	03/11/96	2.950	0.709	1.380
Area 5, RWMS No. 6	03/11/96	03/25/96	1.940	0.772	1.540
Area 5, RWMS No. 6	03/25/96	04/11/96	3.470	0.555	1.050
Area 5, RWMS No. 6	04/11/96	04/24/96	0.298	0.563	1.160
Area 5, RWMS No. 6	04/24/96	05/08/96	3.080	0.468	0.885

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 5, RWMS No. 6	05/08/96	05/22/96	1.010	0.864	1.750
Area 5, RWMS No. 6	05/22/96	06/04/96	1.350	0.945	1.900
Area 5, RWMS No. 6	06/04/96	06/18/96	2.710	1.247	1.490
Area 5, RWMS No. 6	06/18/96	07/11/96	5.160	0.673	1.250
Area 5, RWMS No. 6	07/11/96	07/16/96	0.163	1.646	3.390
Area 5, RWMS No. 6	07/16/96	07/30/96	3.380	1.006	1.980
Area 5, RWMS No. 6	07/30/96	08/13/96	9.260	4.556	9.100
Area 5, RWMS No. 6	08/13/96	08/29/96	2.000	0.980	1.960
Area 5, RWMS No. 6	08/29/96	09/11/96	5.840	0.946	1.790
Area 5, RWMS No. 6	09/11/96	09/25/96	0.758	0.641	1.300
Area 5, RWMS No. 6	09/25/96	10/09/96	1.380	0.554	1.100
Area 5, RWMS No. 6	10/09/96	10/23/96	0.414	0.329	0.665
Area 5, RWMS No. 6	10/23/96	11/06/96	0.194	0.623	1.270
Area 5, RWMS No. 6	11/06/96	11/19/96	1.730	1.228	2.480
Area 5, RWMS No. 6	11/19/96	12/04/96	0.251	1.133	2.330
Area 5, RWMS No. 6	12/04/96	12/18/96	0.917	0.834	2.760
Area 5, RWMS No. 6	12/18/96	12/31/96	5.120	1.551	4.980
Area 5, RWMS No. 7	12/28/95	01/10/96	3.540	0.485	0.909
Area 5, RWMS No. 7	01/10/96	01/24/96	1.590	0.390	0.762
Area 5, RWMS No. 7	01/24/96	02/07/96	Meter Failed		
Area 5, RWMS No. 7	02/07/96	02/21/96	4.080	0.769	1.470
Area 5, RWMS No. 7	02/21/96	03/11/96	4.350	1.024	1.990
Area 5, RWMS No. 7	03/11/96	03/25/96	2.300	0.782	1.540
Area 5, RWMS No. 7	03/25/96	04/11/96	2.280	0.422	0.807
Area 5, RWMS No. 7	04/11/96	04/24/96	0.429	0.433	0.879
Area 5, RWMS No. 7	04/24/96	05/08/96	3.010	0.385	0.719
Area 5, RWMS No. 7	05/08/96	05/22/96	1.960	0.692	1.370
Area 5, RWMS No. 7	05/22/96	06/04/96	1.060	0.716	1.440
Area 5, RWMS No. 7	06/04/96	06/18/96	1.780	0.414	0.805
Area 5, RWMS No. 7	06/18/96	07/11/96	3.840	1.102	2.160
Area 5, RWMS No. 7	07/11/96	07/16/96	3.590	1.605	3.200
Area 5, RWMS No. 7	07/16/96	07/30/96	6.020	1.096	2.090
Area 5, RWMS No. 7	07/30/96	08/13/96	5.780	0.847	1.590
Area 5, RWMS No. 7	08/13/96	08/29/96	4.690	0.793	1.510
Area 5, RWMS No. 7	08/29/96	09/11/96	4.090	0.924	1.790
Area 5, RWMS No. 7	09/11/96	09/25/96	2.340	0.709	1.400
Area 5, RWMS No. 7	09/25/96	10/09/96	Circuit Breaker Tripped		
Area 5, RWMS No. 7	10/09/96	10/23/96	0.684	0.369	0.738
Area 5, RWMS No. 8	12/28/95	01/10/96	2.350	0.585	1.140
Area 5, RWMS No. 8	01/10/96	01/24/96	1.370	0.443	0.877
Area 5, RWMS No. 8	01/24/96	02/07/96	7.300	1.796	3.500
Area 5, RWMS No. 8	02/07/96	02/21/96	3.040	1.657	3.330
Area 5, RWMS No. 8	02/21/96	03/11/96	3.990	1.093	2.140

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 5, RWMS No. 8	03/11/96	03/25/96	1.940	1.115	2.240
Area 5, RWMS No. 8	03/25/96	04/11/96	Meter Failed		
Area 5, RWMS No. 8	04/11/96	04/24/96	0.082	1.085	2.230
Area 5, RWMS No. 8	04/24/96	05/08/96	4.680	0.707	1.330
Area 5, RWMS No. 8	05/08/96	05/22/96	7.370	3.796	7.620
Area 5, RWMS No. 8	05/22/96	06/04/96	0.002	0.879	1.800
Area 5, RWMS No. 8	06/04/96	06/18/96	2.970	0.879	1.730
Area 5, RWMS No. 8	06/18/96	07/11/96	1.570	0.981	1.960
Area 5, RWMS No. 8	07/11/96	07/16/96	4.200	1.821	3.620
Area 5, RWMS No. 8	07/16/96	07/30/96	3.650	1.042	2.040
Area 5, RWMS No. 8	07/30/96	08/13/96	Meter Failed		
Area 5, RWMS No. 8	08/13/96	08/29/96	3.210	0.743	1.440
Area 5, RWMS No. 8	08/29/96	09/11/96	6.390	1.534	2.980
Area 5, RWMS No. 8	09/11/96	09/25/96	Meter Failed		
Area 5, RWMS No. 8	09/25/96	10/09/96	4.080	0.741	1.410
Area 5, RWMS No. 8	10/09/96	10/23/96	0.546	0.882	1.790
Area 5, RWMS No. 8	10/23/96	11/06/96	0.850	0.846	1.710
Area 5, RWMS No. 8	11/06/96	11/19/96	1.310	0.747	1.500
Area 5, RWMS No. 8	11/19/96	12/04/96	0.372	0.952	1.940
Area 5, RWMS No. 8	12/04/96	12/18/96	1.880	0.978	3.210
Area 5, RWMS No. 8	12/18/96	12/31/96	1.230	0.793	2.610
Area 5, RWMS No. 9	12/28/95	01/10/96	3.520	0.466	0.870
Area 5, RWMS No. 9	01/10/96	01/24/96	2.560	0.370	0.695
Area 5, RWMS No. 9	01/24/96	02/07/96	Meter Failed		
Area 5, RWMS No. 9	02/07/96	02/21/96	6.360	0.849	1.580
Area 5, RWMS No. 9	02/21/96	03/11/96	3.410	0.622	1.190
Area 5, RWMS No. 9	03/11/96	03/25/96	5.480	0.685	1.270
Area 5, RWMS No. 9	03/25/96	04/11/96	Error in Weights		
Area 5, RWMS No. 9	04/11/96	04/24/96	1.050	0.433	0.860
Area 5, RWMS No. 9	04/24/96	05/08/96	3.740	0.421	0.771
Area 5, RWMS No. 9	05/08/96	05/22/96	2.260	0.693	1.360
Area 5, RWMS No. 9	05/22/96	06/04/96	2.030	0.871	1.740
Area 5, RWMS No. 9	06/04/96	06/18/96	2.040	0.433	0.838
Area 5, RWMS No. 9	06/18/96	07/11/96	2.580	0.464	0.886
Area 5, RWMS No. 9	07/11/96	07/16/96	3.460	1.834	3.670
Area 5, RWMS No. 9	07/16/96	07/30/96	6.260	1.077	2.050
Area 5, RWMS No. 9	07/30/96	08/13/96	5.810	0.854	1.600
Area 5, RWMS No. 9	08/13/96	08/29/96	5.780	0.841	1.580
Area 5, RWMS No. 9	08/29/96	09/11/96	5.940	1.087	2.080
Area 5, RWMS No. 9	09/11/96	09/25/96	4.090	0.838	1.620
Area 5, RWMS No. 9	09/25/96	10/09/96	3.880	0.716	1.370
Area 5, RWMS No. 9	10/09/96	10/23/96	1.280	0.410	0.805
Area 10, SEDAN Crater	12/28/95	01/10/96	3.550	0.588	1.120

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 10, SEDAN Crater	01/10/96	01/24/96	2.220	0.397	0.760
Area 10, SEDAN Crater	01/24/96	02/07/96	4.700	0.649	1.210
Area 10, SEDAN Crater	02/07/96	02/21/96	4.390	0.700	1.330
Area 10, SEDAN Crater	02/21/96	03/07/96	2.550	0.510	0.981
Area 10, SEDAN Crater	03/07/96	03/26/96	5.770	0.727	1.350
Area 10, SEDAN Crater	03/26/96	04/11/96	4.160	0.447	0.815
Area 10, SEDAN Crater	04/11/96	04/25/96	Meter Failed		
Area 10, SEDAN Crater	04/25/96	05/09/96	1.530	0.256	0.488
Area 10, SEDAN Crater	05/09/96	05/23/96	8.230	1.070	1.990
Area 10, SEDAN Crater	05/23/96	06/05/96	4.440	0.759	1.440
Area 10, SEDAN Crater	06/05/96	06/16/96	18.600	0.746	1.130
Area 10, SEDAN Crater	06/16/96	07/03/96	13.700	0.877	1.460
Area 10, SEDAN Crater	07/03/96	07/18/96	11.800	1.339	2.470
Area 10, SEDAN Crater	07/18/96	07/30/96	26.200	1.965	3.390
Area 10, SEDAN Crater	07/30/96	08/14/96	21.800	1.602	2.770
Area 10, SEDAN Crater	08/14/96	08/29/96	15.800	1.335	2.370
Area 10, SEDAN Crater	08/29/96	09/11/96	17.000	1.215	2.070
Area 10, SEDAN Crater	09/11/96	09/25/96	12.700	0.946	1.640
Area 10, SEDAN Crater	09/25/96	10/09/96	5.680	0.721	1.340
Area 10, SEDAN Crater	10/09/96	10/23/96	9.970	0.783	1.360
Area 10, SEDAN Crater	10/23/96	11/06/96	2.440	0.659	1.290
Area 10, SEDAN Crater	11/06/96	11/19/96	5.710	0.711	1.320
Area 10, SEDAN Crater	11/19/96	12/04/96	2.580	1.871	3.780
Area 10, SEDAN Crater	12/04/96	12/18/96	4.170	0.999	3.170
Area 10, SEDAN Crater	12/18/96	01/02/97	2.120	0.913	2.980
Area 12, Camp	12/28/95	01/10/96	0.750	0.619	1.250
Area 12, Camp	01/10/96	01/24/96	0.080	1.095	2.240
Area 12, Camp	01/24/96	02/07/96	1.220	0.641	1.280
Area 12, Camp	02/07/96	02/21/96	Meter Failed		
Area 12, Camp	02/21/96	03/07/96	0.530	0.620	1.260
Area 12, Camp	03/07/96	03/26/96	0.316	0.624	1.270
Area 12, Camp	03/26/96	04/11/96	Weighing Error		
Area 12, Camp	04/11/96	04/25/96	5.510	0.700	1.300
Area 12, Camp	04/25/96	05/09/96	1.670	0.852	1.720
Area 12, Camp	05/09/96	05/23/96	0.417	0.709	1.450
Area 12, Camp	05/23/96	06/05/96	1.230	1.101	2.290
Area 12, Camp	06/05/96	06/19/96	0.511	0.577	1.170
Area 12, Camp	06/19/96	07/03/96	0.001	0.588	1.210
Area 12, Camp	07/03/96	07/17/96	2.810	2.178	4.400
Area 12, Camp	07/17/96	07/30/96	1.600	1.080	2.180
Area 12, Camp	07/30/96	08/14/96	0.619	0.854	1.740
Area 12, Camp	08/14/96	08/29/96	0.921	0.792	1.600
Area 12, Camp	08/29/96	09/11/96	1.570	0.871	1.750

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 12, Camp	09/11/96	09/25/96	0.199	0.696	1.420
Area 12, Camp	09/25/96	10/09/96	1.070	0.642	1.290
Area 12, Camp	10/09/96	10/23/96	0.751	0.406	0.811
Area 12, Camp	10/23/96	11/06/96	0.112	0.862	2.880
Area 12, Camp	11/06/96	11/19/96	0.161	0.615	1.270
Area 12, Camp	11/19/96	12/04/96	0.352	0.840	1.730
Area 12, Camp	12/04/96	12/18/96	0.797	0.777	2.580
Area 12, Camp	12/18/96	01/02/97	0.401	0.766	2.560
Area 12, E Tunnel Pond No. 1	12/28/95	01/10/96	5.640	0.651	1.200
Area 12, E Tunnel Pond No. 1	01/10/96	01/24/96	3.810	0.457	0.845
Area 12, E Tunnel Pond No. 1	01/24/96	02/07/96	5.040	0.640	1.190
Area 12, E Tunnel Pond No. 1	02/07/96	02/21/96	8.610	1.003	1.840
Area 12, E Tunnel Pond No. 1	02/21/96	03/07/96	1.320	0.510	1.010
Area 12, E Tunnel Pond No. 1	03/07/96	03/26/96	4.650	0.609	1.140
Area 12, E Tunnel Pond No. 1	03/26/96	04/11/96	6.920	0.457	0.771
Area 12, E Tunnel Pond No. 1	04/11/96	04/25/96	0.478	0.459	0.956
Area 12, E Tunnel Pond No. 1	04/25/96	05/09/96	12.000	0.494	0.749
Area 12, E Tunnel Pond No. 1	05/09/96	05/23/96	10.300	0.690	1.170
Area 12, E Tunnel Pond No. 1	05/23/96	06/05/96	15.600	0.952	1.590
Area 12, E Tunnel Pond No. 1	06/05/96	06/19/96	12.200	0.602	0.963
Area 12, E Tunnel Pond No. 1	06/19/96	07/03/96	12.900	0.761	1.250
Area 12, E Tunnel Pond No. 1	07/03/96	07/17/96	22.300	1.327	2.200
Area 12, E Tunnel Pond No. 1	07/17/96	07/30/96	24.100	1.326	2.160
Area 12, E Tunnel Pond No. 1	07/30/96	08/14/96	23.600	0.981	1.480
Area 12, E Tunnel Pond No. 1	08/14/96	08/29/96	Sampler Shutdown		
Area 12, E Tunnel Pond No. 1	08/29/96	09/11/96	34.300	1.418	2.130
Area 12, E Tunnel Pond No. 1	09/11/96	09/25/96	21.800	1.112	1.770
Area 12, E Tunnel Pond No. 1	09/25/96	10/09/96	34.800	1.112	1.530
Area 12, E Tunnel Pond No. 1	10/09/96	10/23/96	10.500	0.562	0.904
Area 12, E Tunnel Pond No. 1	10/23/96	11/06/96	7.760	0.916	1.690
Area 12, E Tunnel Pond No. 1	11/06/96	11/19/96	7.700	0.785	1.420
Area 12, E Tunnel Pond No. 1	11/19/96	12/04/96	4.670	1.151	2.240
Area 12, E Tunnel Pond No. 1	12/04/96	12/16/96	3.490	1.157	3.740
Area 12, E Tunnel Pond No. 1	12/18/96	01/02/97	2.940	0.897	2.880
Area 15, EPA Farm	12/28/95	01/10/96	5.740	0.362	0.608
Area 15, EPA Farm	01/10/96	01/24/96	3.280	0.253	0.440
Area 15, EPA Farm	01/24/96	02/07/96	3.280	0.372	0.683
Area 15, EPA Farm	02/07/96	02/21/96	5.270	0.448	0.792
Area 15, EPA Farm	02/21/96	03/07/96	2.040	0.291	0.547
Area 15, EPA Farm	03/07/96	03/26/96	9.890	0.811	1.420
Area 15, EPA Farm	03/26/96	04/11/96	Error in Meter Reading		
Area 15, EPA Farm	04/11/96	05/09/96	Meter Failed		
Area 15, EPA Farm	05/09/96	05/23/96	3.430	0.429	0.794

Attachment 4.1 (Tritiated Water Vapor in Air Sampling Results - 1996, cont.)

Sampling Location	Sampling Period Start	Sampling Period End	pCi/mL x 10^{-06} Concentration	Standard Deviation	Detection Limit
Area 15, EPA Farm	05/23/96	06/05/96	2.840	0.474	0.903
Area 15, EPA Farm	06/05/96	06/19/96	1.660	0.156	0.279
Area 15, EPA Farm	06/19/96	07/03/96	2.970	0.419	0.782
Area 15, EPA Farm	07/03/96	07/18/96	2.790	0.643	1.250
Area 15, EPA Farm	07/18/96	07/30/96	6.370	0.653	1.180
Area 15, EPA Farm	07/30/96	08/14/96	5.460	0.483	0.853
Area 15, EPA Farm	08/14/96	08/29/96	5.250	0.470	0.839
Area 15, EPA Farm	08/29/96	09/11/96	6.320	0.613	1.100
Area 15, EPA Farm	09/11/96	09/25/96	4.500	0.407	0.722
Area 15, EPA Farm	09/25/96	10/09/96	4.380	0.390	0.692
Area 15, EPA Farm	10/09/96	10/23/96	6.930	0.492	0.841
Area 15, EPA Farm	10/23/96	11/06/96	4.320	0.810	1.550
Area 15, EPA Farm	11/06/96	11/19/96	9.040	0.719	1.250
Area 15, EPA Farm	11/19/96	12/04/96	3.450	0.909	1.780
Area 15, EPA Farm	12/04/96	12/18/96	9.320	1.053	3.150
Area 15, EPA Farm	12/18/96	01/02/97	14.000	1.421	4.220
Area 23, H & S Building	12/28/95	01/10/96	Pump Out		
Area 23, H & S Building	01/10/96	01/24/96	0.237	0.331	0.684
Area 23, H & S Building	01/24/96	02/07/96	0.295	0.521	1.060
Area 23, H & S Building	02/07/96	02/21/96	0.682	0.788	1.600
Area 23, H & S Building	02/21/96	03/11/96	0.170	0.554	1.140
Area 23, H & S Building	03/11/96	03/26/96	0.567	0.663	1.340
Area 23, H & S Building	03/26/96	04/11/96	0.256	0.413	0.854
Area 23, H & S Building	04/11/96	04/24/96	Meter Reading Error		
Area 23, H & S Building	04/24/96	05/08/96	1.050	0.413	0.818
Area 23, H & S Building	05/08/96	05/20/96	0.317	0.680	1.400
Area 23, H & S Building	05/20/96	06/04/96	0.229	0.899	1.840
Area 23, H & S Building	06/04/96	06/18/96	1.070	0.931	1.880
Area 23, H & S Building	06/18/96	07/01/96	0.343	0.631	1.290
Area 23, H & S Building	07/01/96	07/16/96	0.249	0.837	1.720
Area 23, H & S Building	07/16/96	07/30/96	0.652	1.020	2.110
Area 23, H & S Building	07/30/96	08/13/96	0.474	0.796	1.620
Area 23, H & S Building	08/13/96	08/29/96	0.595	0.762	1.550
Area 23, H & S Building	08/29/96	09/11/96	0.744	0.919	1.870
Area 23, H & S Building	09/11/96	09/25/96	0.853	0.717	1.490
Area 23, H & S Building	09/25/96	10/09/96	0.660	0.591	1.230
Area 23, H & S Building	10/09/96	10/22/96	0.109	0.417	0.862
Area 23, H & S Building	10/22/96	11/06/96	0.390	0.675	1.400
Area 23, H & S Building	11/06/96	11/19/96	0.043	0.554	1.140
Area 23, H & S Building	11/19/96	12/03/96	0.391	0.802	1.630
Area 23, H & S Building	12/03/96	12/18/96	0.283	0.814	2.750
Area 23, H & S Building	12/18/96	12/31/96	0.238	0.649	2.170

5.0 ONSITE THERMOLUMINESCENT DOSIMETER DATA

Thermoluminescent dosimeters (TLDs) were placed at 179 monitoring locations on the Nevada Test Site (NTS) during 1996. These locations are classified into four types. Environmental TLDs are in locations that monitor ambient gamma levels. Boundary TLDs are close to the NTS perimeter. Control TLDs are in areas believed to have no inventory of man-made radionuclides. Operational TLDs are within or on the perimeter of Radiological Waste Management Sites (RWMSs), where locations may have elevated exposures from nearby stored waste. The dosimeters are exchanged quarterly and processed at the Bechtel Nevada Radiological Laboratory in Mercury, Nevada. Attachment 5.1 lists the individual quarterly data for each location and also gives annual exposure values. (Figures, tables, and attachments are at the end of each chapter.) "Area" refers to the NTS operational area within which the TLD is located, and "Name" is a descriptive identifier for each sampling location. Figure 5.1 is an NTS map showing the TLD locations.

There were 24 TLD locations in the 1995 report that are not in this 1996 report. This decrease is due to reduced operational activity on the NTS. Eighteen of these locations were removed from service in the last quarter of 1995 and the choice of these locations for inactivation is discussed in last years data report. In addition to these, the four Device Assembly Facility (DAF) locations were eliminated at the end of 1995 because of the nonoperational status of that facility. Finally, the two locations at the RWMS Pit 3 were eliminated at the end of 1995, when that pit was covered and closed. There were also 12 new locations established in 1996, mandated by requirements in the NTS Radiological Control Manual. Monitoring at the corners of the Area 3 RWMS and the Area 6 Decontamination Pad commenced in the third quarter of the year. These two new monitoring locations have been operational for many years but not routinely monitored for gamma exposure. Monitoring at the corners of the Waste Examination Facility (WEF) commenced at the beginning of the fourth quarter. The WEF is a new facility still in preoperational monitoring status.

In annual reports prior to 1993, the boundary locations were not considered to be essentially the same as control locations. Boundary locations were established in late 1989 and data were first reported in the 1990 report. Data from 1990 to the present show that no statistically significant differences exist between control and boundary locations, and since the 1994 report these two types of locations have been assumed to represent background exposure levels.

The environmental surveillance program uses Panasonic™ model UD-814 TLDs. These TLDs are specially designed for environmental monitoring purposes. They contain three identical $CaSO_4$:Tm elements and one $Li_2B_4O_7$:Cu element. The lithium element is shielded with 14 mg/cm^2 of shielding material to monitor beta particles in the environment. The three calcium elements are encapsulated in 1000 mg/cm^2 shielding of plastic and lead to monitor ambient gamma levels. Since the calcium elements are about 30 times more sensitive than the lithium element, they are an excellent phosphor to measure the low levels of gamma radiation generally encountered in the environment, about 10 mR/month. The element readings are converted into exposure values using an algorithm supplied with commercial software.

The radiation source used to calibrate the TLD reader is Cs-137, a radionuclide which has a 30 year half-life and contributes to the external gamma exposures on the NTS. Calibration of the TLD reader is conducted using dosimeters that have individual responses within 3 percent of the mean of all the calibration dosimeters. The dosimeters used for calibration are irradiated in a

geometry similar to the environment; that is, freely suspended in air. Element correction factors (ECF) and run correction factors (RCF) are applied to all the elements. Quality control checks of the TLD reader are done each time the reader is used. Unirradiated and irradiated control TLDs are processed with each batch of TLDs loaded into the automatic changer of the reader, a Panasonic™ model UD-710 TLD reader. Quarterly exposure levels are computed by averaging the ECF and RCF corrected responses of the calcium elements, then dividing by the days of exposure.

In 1996, the days of deployment, the difference between the deployment and collection dates for each TLD, ranged from 50 to 147 days or about 7 to 21 weeks. The first deployment was on November 16, 1995, and the last collection was on January 30, 1997. The median days of deployment was 91 days, which is one quarter of a year. The days of exposure for each location and quarter vary because of the work schedules of the technicians. It takes several weeks to visit all locations.

DATA ANALYSIS

The analysis of the TLD data was performed in two phases. The first phase used exploratory data analysis methods to determine the distribution of the data and to identify atypical values. The second phase used analysis of variance (ANOVA) to test for significant differences between groups of sampling locations.

The exploratory data analysis primarily consisted of probability plots of the data and logarithms of the data grouped by quarter and NTS operational areas. Figure 5.2 is a probability plot of the 1996 TLD annual averages for the environmental sampling locations. The data in this plot includes the boundary and control locations but excludes the operational locations and the atypical values listed in Table 5.2. Atypical values were identified from probability plots and histograms of the data and subsets of the data as points plotting at some distance from most of the other data points in that subset. Figure 5.3 is a probability plot of the data classified as atypical. The notes at the bottom of Figures 5.2 and 5.3 summarize the Ryan - Joiner correlation coefficient goodness of fit test for the data in the plot. This test is performed by calculating the product moment correlation coefficient between the data values and the corresponding expected quantiles. This procedure can be considered a measure of the linearity of the data in a probability plot. Tables published in the statistical literature are then used to find the probability of a good fit from the correlation coefficient and the sample size.

The data in Figure 5.2 fit a normal statistical distribution very well, and the data in Figure 5.3 fit a lognormal statistical distribution very well. Thus it may be concluded that the TLD data is composed of two distinct groups of values with different statistical distributions. The group of environmental stations has a normal statistical distribution with a mean value of 0.334 mR/day, and the upper limit of exposures from this group is about 0.55 mR/day or 200 mR/year. The second group is defined as data from operational stations (sampling locations adjacent to stored radioactive materials) and locations having an exposure rate above approximately 200 mR/year. The data from this group of sampling stations has a lognormal statistical distribution with a median value of 2.5 mR/day or 931 mR/year. The 1994 and 1995 data reports found that the data was similarly divided into two groups, a higher exposure group with a lognormal statistical distribution and a lower exposure group with a normal distribution. In 1994 and 1995 the criterion for classifying a data value in one or the other of the groups was 0.6 mR/day or 220 mR/year.

The list of operational stations is almost the same as last years list. In late 1995, RWMS Pit 4 was closed. The two TLDs that were used to monitor that pit were moved to the newly opened Pit 5. Data for Pit 5 begins with the first quarter of 1996. All operational locations are in Area 5

and are locations used to monitor radiological waste management activities. Table 5.2 list the names of the operational locations. The data from the operational locations is included in Attachment 5.1 for reporting purposes, but is not used in the data analyses.

The data values that were judged to be atypical and not from operational locations are listed in Table 5.3. The last column of data, the "Group Mean" column, gives the average annual exposure for the operational area with all atypical values deleted. This list is substantially shorter than in previous years. The following locations were on this list for 1995 but not on this 1996 list. Sampling at Building 610 Bay was discontinued at the end of 1995 and thus this location is no longer listed. Sampling at ah/at south was discontinued after the first quarter of 1996. Extrapolating from the existing data yields an annual total of 130 mR/year. Sampling at this location began in 1990. The annual average for that year was 227 mR/year, and since then, the annual averages have varied around a value of 200 mR/year. Also, on the list in 1995, but not in 1996, are sampling locations Stake A-6.5, Stake C-31, and Stake J-31. These three locations are active sampling locations. In past years, Stake A-6.5 and Stake C-31 have shown single quarter data that is atypically high, but such was not the case in 1996. Stake J-31 has shown a decreasing trend in exposure levels since monitoring began there in 1980, with an annual total of 790 mR/year. The 1996 annual total was 191 mR/year. New on the atypical values list in Table 5.3 is the result for Area 3 RWMS south. This location is about a tenth of a mile from three of the early atmospheric testing locations and thus may be influenced by residual materials from those tests.

Most of the values reported in Table 5.3 are from sampling locations in Yucca Flat, in areas known to be contaminated by early atmospheric testing of nuclear devices. The SEDAN west location is adjacent to the SEDAN Crater. The tunnel ponds contain products from the nuclear tests performed within the tunnels.

Descriptive statistics for the environmental stations are given in Table 5.4. Since this subset of the data is normally distributed, the statistics in this table are estimates of the parameters of the distribution. Figure 5.2 is the normal probability plot of this subset of data. In this figure, note that the straight line from the data crosses the fiftieth percentile line at about a data value of 0.33 or 0.34. Normally distributed data have the mean equal to the median and half the data is above the median and half below. Also, the slope of the line in a probability plot is determined by the standard deviation. For comparison with previous years, the 1995 average from environmental locations is 0.34 mR/day and in 1994 the environmental average was 0.33 mR/day. Thus, the average environmental gamma exposure levels at the NTS seem to have been constant for the past three years.

The first step in the formal statistical analysis of the 1996 environmental TLD data was to perform a two-way ANOVA to simultaneously test for differences among operational areas and among quarters of the year. Most ANOVA programs require equal sample sizes within the cells of a data matrix and thus cannot be used with this data. It is necessary to use a "Generalized Linear Model" program in order to calculate the two-way ANOVA for the 1996 TLD data. The generalized linear model program that was used assumes that the ANOVA effects are fixed and fully crossed. These are reasonable assumptions for the TLD data. Since the data have a normal statistical distribution, the analyses of variance were calculated using the actual data values in mR/day. Since this analysis was for environmental data, the atypical values and operational location data were removed before the analysis.

The data are rank deficient for an interaction term because of an empty cell in the data matrix. There were no data for Area 30 in the first quarter. An ANOVA interaction term is a part of the analysis that measures any correlation between the effects. For these TLDs data, the effects are due to the differences between operational areas and the differences between quarters. The

interaction determines if the pattern of differences between quarters varies between areas. No interaction means that the pattern between quarters is essentially the same for all operational areas. Rank deficiency is a statistical problem that results in a theoretical nonexistence of the interaction term. Statisticians have devised a number of approximations to get around this problem. One of the most often used is to replace the missing data with a reasonable value such as a mean value for that cell of data. This is the approach used here. The missing value for Area 30 first quarter was replaced by the mean value at that location of the second, third, and fourth quarters. These values are very close in magnitude, and thus this approximation should have very little influence on the ANOVA results, while allowing the analysis to be computed with an interaction term. Table 5.5 presents the ANOVA results.

The ANOVA is summarized in Table 5.5. Significant differences were found among operational areas, no differences between quarters, and no interaction. This is the same as the ANOVA results for the past several years. Since this two-way analysis found that the only statistically significant effect is differences between operational areas, it is appropriate to further analyze these differences using a one-way ANOVA. An important feature of a one-way analysis is the ability to use "multiple comparisons" to elucidate the pattern of differences between operational areas. Multiple comparisons are a statistical tool for simultaneously performing multiple simple statistical comparisons while maintaining the overall level of significance at a fixed level. Tukey's multiple comparison method was used with a one-way ANOVA to further analyze the differences between operational areas. Table 5.6 presents the results of the one-way analysis. As expected from the two-way analysis, the one-way analysis found a very significant difference among operational areas. The lower portion of Table 5.6 contains a simple plotting of the area mean values and their confidence intervals. The areas have been rearranged in order of increasing magnitude of the mean values. The obvious differences in the lengths of the confidence intervals are due to the differences in the number of data values for each area.

The thematic map of area mean values in Figure 5.1 and the cross tabulation of mean values in Table 5.7 should be used along with the confidence intervals in Table 5.6 to interpret the pattern of differences among operational areas. The highest exposure value is for Area 30. This is actually the boundary station located at the junction of the NTS west boundary and the boundary between Areas 18 and 30. This is in a geographic region with high natural radiation levels from prehistoric lava flows. Aerial surveys of this region detect high levels of thallium-208, also known as thorium-C. The lowest exposure levels occur in Areas 22 and 23 and these two areas form a statistical group that is significantly different from all other areas. Areas 22 and 23 have low natural levels and no man-made contamination. Between the lower and highest exposure levels there is a continuum of gradually increasing values of the ranked means. The lower values are significantly different from the higher values, but no distinct groupings can be found. The thematic map shows highest means for Areas 3, 19, and 20. Area 3 is part of Yucca Valley, where much of the nuclear testing has occurred. Areas 19 and 20 contain Pahute and Rainier Mesas, which were used for many of the larger test events.

The reason that some operational areas show no TLD locations in Figure 5.1, while others show a few locations and still others show many locations is that TLDs were originally used to monitor operational activities rather than environmental conditions. The TLDs were first located in locations adjacent to construction activities. The areas with no TLD locations are generally rugged mountainous regions in which test activities would be difficult. Statistically it would be desirable to aggregate the sampling locations into groups of more equal size; however, the grouping must be based upon *a priori* considerations of sampling location characteristics. The current grouping, with the very unequal number of data per group, is based upon *a priori* considerations. The NTS operational areas were originally established as an area for each particular testing program, but recent usage is usually different from the original purpose. The operational areas also have various geological characteristics. Many of the areas are totally

contained within valley floors while others are mountainous or located on high plateaus. This is a good way to separate groups since the localized meteorology and geomorphology are consistent within areas. Since areas associated with a small number of sampling locations have obviously different localized meteorology and geomorphology, their data should not be combined into larger groupings.

The alternate approach would be to break up the groups containing many sampling locations into subgroups more equal in number of sampling locations as the currently defined groups containing few locations. This would significantly reduce the statistical power of the ANOVA procedures; that is, the ability of the procedure to find significant differences when in fact they do exist. Within the NTS such an alternative is statistically a poor choice. The sampling locations are close together in areas of high testing activity by choice for the purpose of localized detection of small increases in exposure levels. In areas where there are no potential sources of elevated exposures, there is no reason to have sampling locations. The localized meteorology and geomorphology is similar for all sampling locations within the established operational areas. In fact, it seems reasonable to combine the areas within Yucca Valley into one group, even though these areas already have the highest density of sampling locations, because of the almost identical meteorology and geomorphology within the valley. Typically each NTS area within Yucca Valley is used by a different testing organization and thus there may be a different potential for elevated exposure levels among the areas.

CONCLUSIONS

The exploratory data analysis part of the data analysis identified two mixed statistical distributions within the TLD data. One of these data sets has values less than approximately 0.55 mR/day or 200 mR/year, a normal statistical distribution, and contains 79 percent of all the data. This part of the data was considered the environmental data and subject to further statistical analyses. The second data set generally has values over 0.55 mR/day and is composed of the operational monitoring locations within the RWMS and a few atypical values from environmental locations. Most of the atypical values can be associated with known contamination events adjacent to those sampling locations. The general conclusions from the ANOVA on the environmental data is that there are significant differences in exposure levels between the NTS operational areas, but the pattern of differences cannot be well defined because of vastly different numbers of sampling locations within the many areas.

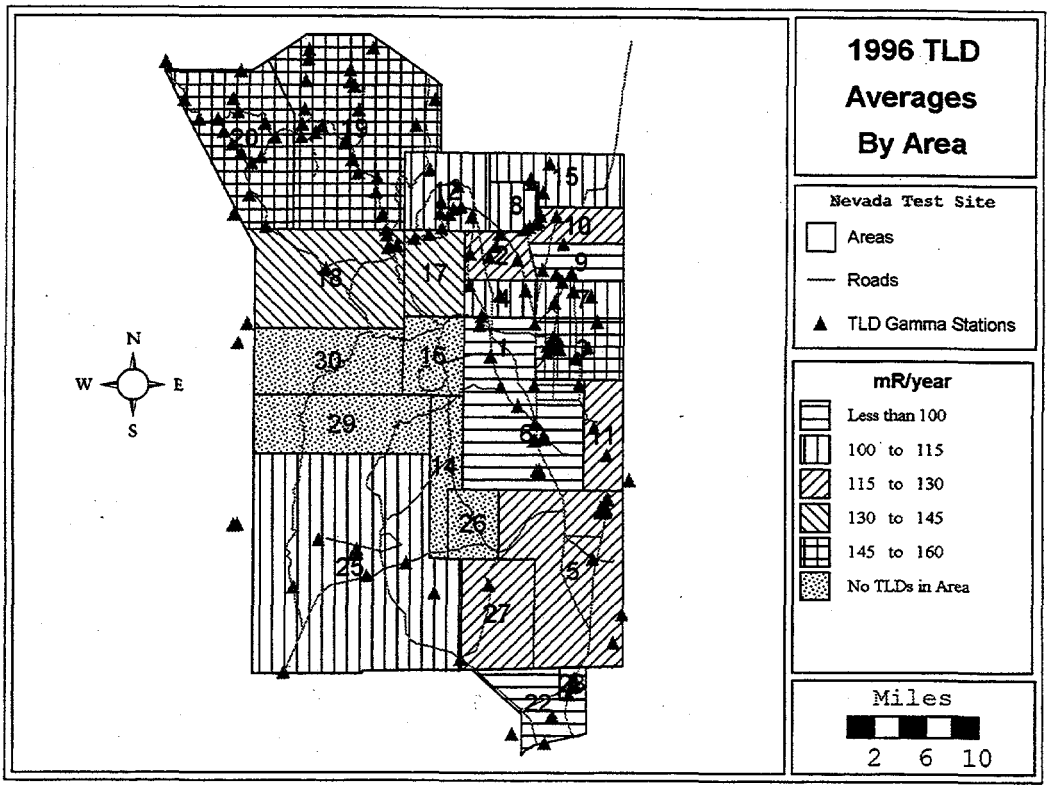


Figure 5.1 Thematic Map of NTS Environmental TLD Averages by Area

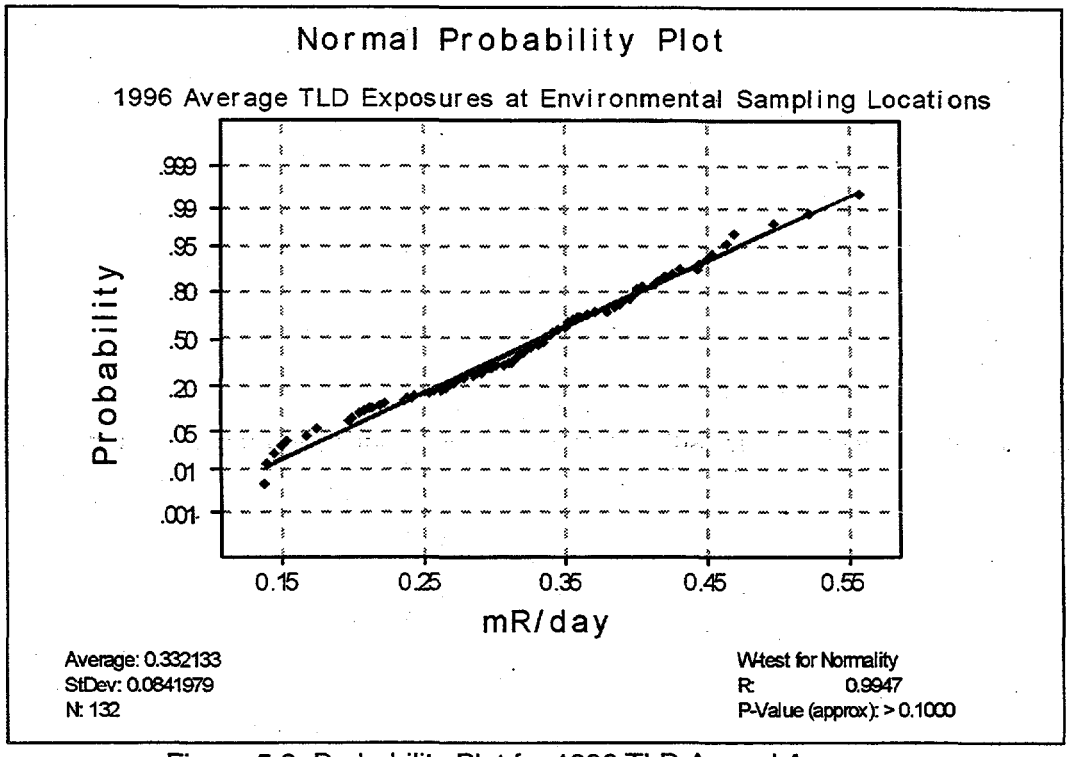


Figure 5.2 Probability Plot for 1996 TLD Annual Averages

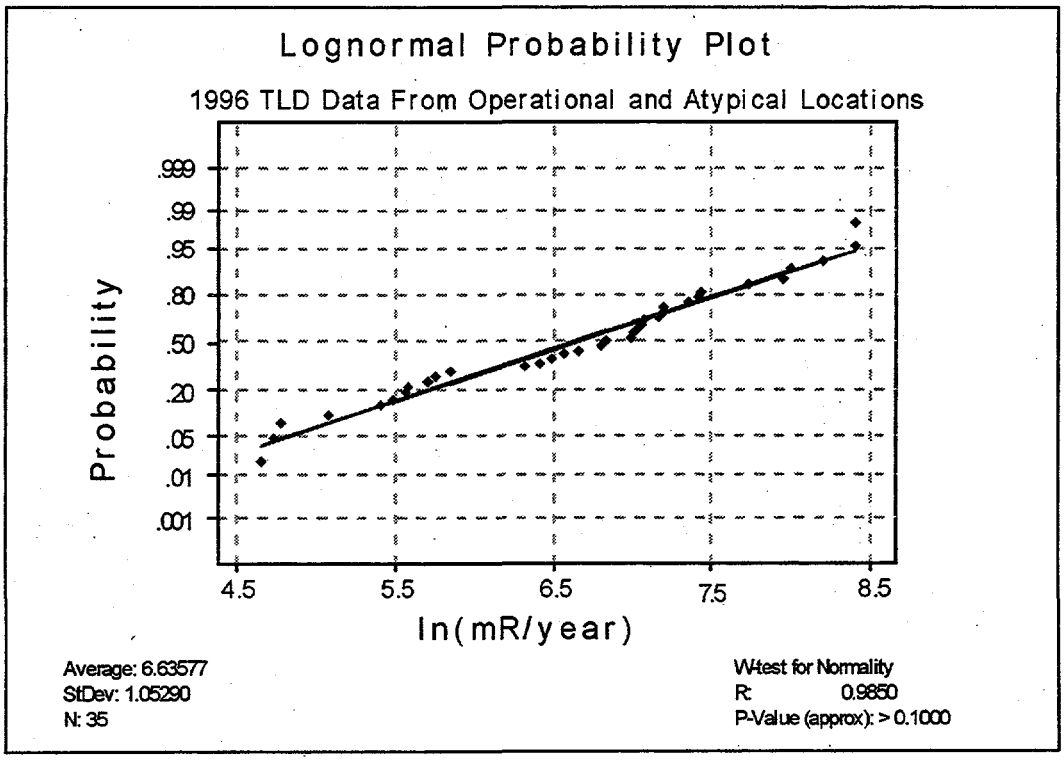


Figure 5.3 Probability Plot of Operational and Atypical Sampling Locations

Table 5.1 Summary of Boundary (B) and Control (C) TLD Data for 1996

Sampling Location Type/Area/Name	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr
B 3 Hill Top	0.37	0.34	0.35	0.34	0.35	128
C 5 Well 5B	0.30	0.31	0.30	0.29	0.30	109
B 5 3.3 Miles SE of Aggregate Pit	0.17	0.17	0.16	0.17	0.17	61
C 6 CP-6	0.23	0.21	0.20	0.19	0.21	75
C 6 Yucca Oil Storage Area	0.26	0.26	0.34	0.27	0.28	102
B 9 Papoose Lake Road	0.22	0.22	0.20	0.19	0.21	76
B 11 East of U-11b	0.34	0.31	0.31	0.31	0.32	115
B 12 Gold Meadows	0.29	0.29	0.27	(a)	0.28	102
B 15 U-15e Substation	0.26	0.26	0.26	0.23	0.25	93
B 18 Stake A-106	0.39	0.44	0.43	0.43	0.42	154
B 19 Stake C-31	0.36	0.42	0.42	0.40	0.40	146
B 19 Stake R-29	0.39	0.39	0.42	0.41	0.40	147
B 19 Gate 19-3P	0.40	0.40	0.41	(a)	0.40	147
B 20 Stake J-41	0.33	0.36	0.36	0.35	0.35	129
B 20 Stake LC-4	0.47	0.45	0.44	0.44	0.45	166
B 20 Stake A-118	0.37	0.41	0.42	0.40	0.40	146
B 22 Army Well No. 1	(a)	0.21	0.21	0.22	0.21	78
C 23 Building 650 Dosimetry	0.12	0.15	0.14	0.14	0.14	51
C 23 Building 650 Roof	0.12	0.14	0.15	0.14	0.14	50
C 23 Post Office	0.17	0.18	0.18	0.17	0.18	64
C 25 NRDS Warehouse	0.32	0.33	0.32	0.31	0.32	115
B 25 Jct. Jackass Flats & Area 27 Rds.	0.21	0.21	0.21	0.24	0.22	80
C 25 HENRE Site	0.33	0.32	0.33	0.37	0.34	123
B 25 Guard Station 510	0.31	0.38	0.33	0.36	0.35	126
B 25 Yucca Mountain	0.35	0.34	0.34	0.38	0.35	129
C 27 Area 27 Cafeteria	0.34	0.34	0.34	0.35	0.34	124
B 30 Gate 30-3P in Cat Canyon	(a)	0.44	0.43	0.51	0.45	165

(a) Signifies a missing data value.

Table 5.2 List of Operational Monitoring Thermoluminescent Dosimeter Locations

RWMS TRU Pad Northeast
RWMS TRU Pad North
RWMS TRU Pad Northwest
RWMS TRU Pad Southwest
RWMS TRU Pad South
RWMS TRU Pad Southeast
RWMS MSM-1 Southeast
RWMS MSM-1 East
RWMS MSM-1 Northeast
RWMS MSM-1 North-Northeast
RWMS MSM-1 North-Northwest
RWMS MSM-1 Northwest
RWMS MSM-1 West
RWMS MSM-1 Southwest
RWMS MSM-1 South-Southwest
RWMS MSM-1 South-Southeast
RWMS MSM-2 Northeast
RWMS MSM-2 North
RWMS MSM-2 Northwest
RWMS MSM-2 West
RWMS MSM-2 Southwest
RWMS MSM-2 South
RWMS MSM-2 Southeast
RWMS MSM-2 East
RWMS Pit 5 West Side
RWMS Pit 5 East Side

Table 5.3 Listing of Atypical TLD Data Values for 1996

Sampling Location	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr	Group Mean mR/day
2 Stake N-8	2.13	2.41	2.21	1.87	2.13	779	0.35
3 U-3ax/bl Northeast	0.56	Sampling Terminated			0.56	204	0.39
3 U-3bz North	0.51	0.69	Sampling Terminated		0.62	225	0.39
3 U-3by North	0.66	Sampling Terminated			0.66	241	0.39
3 U-3co North	2.15	2.89	Sampling Terminated		2.54	931	0.39
3 U-3co South	1.49	1.83	Sampling Terminated		1.67	611	0.39
3 A3 RWMS South		New Location	1.59	1.46	1.51	554	0.39
4 Stake A-9	2.62	2.58	2.49	2.30	2.48	906	0.30
7 7-300 Bunker	0.80	0.77	0.75	0.63	0.73	266	0.31
10 SEDAN West	0.81	0.89	0.86	0.75	0.82	301	0.32
12 T Tunnel Pond No. 2	0.63	0.67	0.84	0.74	0.72	264	0.31

Table 5.4 Descriptive Statistics for TLD Exposure Levels at Environmental Sampling Locations

Statistics from Location Annual Averages

Number of Locations = 143	Mean =	0.334 mR/day	Median =	0.338 mR/day
Standard Deviation =0.082	Minimum =	0.136 mR/day	Maximum =	0.557 mR/day
	First Quartile =	0.288 mR/day	Third Quartile =	0.390 mR/day

Statistics from Quarterly Data

Number of Datum = 499	Mean =	0.329 mR/day	Median =	0.335 mR/day
Standard Deviation =0.083	Minimum =	0.121 mR/day	Maximum =	0.565 mR/day
	First Quartile =	0.282 mR/day	Third Quartile =	0.385 mR/day

Table 5.5 Two-Way ANOVA on 1996 Environmental TLD Data

Source Term	Degrees of Freedom	Sum of Squares	Mean Square	F-Ratio	Probability Value
Area	21	2.2765	0.1084	46.01	0.0
Quarter	3	0.001044	3.48×10^{-3}	1.48	0.220
Area x Quarter	63	0.1196	1.90×10^{-3}	0.81	0.853
Error	412	0.9708	2.36×10^{-3}		
Total	499	3.4277			

Table 5.6 One-Way ANOVA on 1996 Environmental TLD Data

ANOVA for mR/day by Operational Area

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Ratio	Probability Value
Area	21	2.29607	0.10934	46.71	0.000
Error	477	1.11646	0.00234		
Total	498	3.41254			

Area	N	Mean	Standard Deviation	Individual 95 Percent Confidence Intervals for the Mean Based on Pooled Standard Deviation
23	24	0.15371	0.02032	(-*)
22	7	0.17815	0.03466	(--*--)
6	46	0.25609	0.06229	(*-)
8	4	0.27190	0.01665	(---*---)
9	16	0.27342	0.05191	(-*-)
1	16	0.27848	0.03090	(-*-)
15	12	0.28372	0.03299	(--*-)
4	8	0.30298	0.01913	(--*--)
12	22	0.30940	0.03648	(-*)
7	8	0.31024	0.02289	(--*--)
25	44	0.31297	0.04060	(*)
5	75	0.32187	0.04383	(*)
11	8	0.32822	0.01601	(-*--)
27	4	0.34048	0.00496	(---*---)
10	11	0.34824	0.05181	(-*-)
2	20	0.34926	0.07982	(-*-)
3	53	0.37504	0.07280	(*)
17	4	0.38887	0.01627	(---*---)
18	12	0.39400	0.02832	(-*-)
20	36	0.40901	0.05058	(*)
19	66	0.41811	0.03545	(*)
30	3	0.45870	0.04565	(---*----)

Pooled Standard Deviation = 0.04838

0.24 0.36 0.48

Table 5.7 Cross Tabulation of Counts and Average mR/day of 1996 Environmental TLD Data

Cell contents: Count (number of data values)
Average

	Quarter				
Area	1	2	3	4	All Quarters
1	4 0.277	4 0.278	4 0.281	4 0.277	16 0.278
2	5 0.337	5 0.371	5 0.372	5 0.317	20 0.349

Table 5.7 (Cross Tabulation of Counts and Average mR/day of 1996 Environmental TLD Data, cont.)

Cell contents: Count (number of data values)
Average

	Quarter				
Area	1	2	3	4	All Quarters
3	19 0.380	16 0.404	9 0.348	9 0.340	53 0.375
4	2 0.289	2 0.309	2 0.321	2 0.293	8 0.303
5	18 0.328	18 0.316	18 0.331	21 0.314	75 0.322
6	11 0.228	11 0.238	12 0.292	12 0.262	46 0.256
7	2 0.322	2 0.323	2 0.312	2 0.284	8 0.310
8	1 0.282	1 0.282	1 0.276	1 0.247	4 0.272
9	4 0.287	4 0.300	4 0.274	4 0.233	16 0.273
10	3 0.345	2 0.394	3 0.367	3 0.303	11 0.348
11	2 0.336	2 0.322	2 0.327	2 0.328	8 0.328
12	6 0.288	6 0.311	6 0.316	4 0.329	22 0.309
15	3 0.281	3 0.297	3 0.297	3 0.260	12 0.284
17	1 0.370	1 0.383	1 0.409	1 0.394	4 0.389
18	3 0.366	3 0.403	3 0.406	3 0.401	12 0.394
19	17 0.390	17 0.421	17 0.434	15 0.429	66 0.418
20	9 0.389	9 0.420	9 0.420	9 0.407	36 0.409
22	1 0.132	2 0.186	2 0.186	2 0.186	7 0.178
23	6 0.140	6 0.158	6 0.158	6 0.159	24 0.154
25	11 0.313	11 0.312	11 0.309	11 0.318	44 0.313
27	1 0.337	1 0.338	1 0.338	1 0.348	4 0.340
30	0 --	1 0.436	1 0.429	1 0.511	3 0.459
All Areas	129 0.323	127 0.336	122 0.336	121 0.321	499 0.329

Attachment 5.1 TLD Gamma Exposure Rates - 1996

Area/Location	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr
Area 1, BJY	0.24	0.24	0.25	0.23	0.24	87
Area 1, Stake TH-28/27	0.26	0.26	0.26	0.27	0.26	96
Area 1, Stake TH-38	0.28	0.29	0.30	0.31	0.30	108
Area 1, Sandbag Storage Hut	0.33	0.32	0.31	0.30	0.31	115
Area 2, Stake M-140	0.32	0.35	0.36	0.32	0.34	122
Area 2, Stake N-8	2.13	2.41	2.21	1.87	2.13	779
Area 2, Stake L-9	0.45	0.52	0.49	0.41	0.46	170
Area 2, Stake M-150	0.34	0.36	0.38	0.30	0.34	123
Area 2, Cable Yard	0.35	0.38	0.38	0.32	0.35	129
Area 2, Stake TH-58	0.22	0.24	0.25	0.24	0.24	88
Area 3, Stake OB-11.5	0.34	0.34	0.33	0.34	0.34	123
Area 3, Stake OB-20	0.23	0.25	0.23	0.24	0.24	86
Area 3, U-3ax/bl South	0.38	Sampling Terminated			0.38	139
Area 3, U-3ax/bl Southeast	0.42	Sampling Terminated			0.42	154
Area 3, U-3ax/bl Northeast	0.56	Sampling Terminated			0.56	204
Area 3, U-3ax/bl Northwest	0.42	Sampling Terminated			0.42	153
Area 3, LANL Trailers	0.31	0.31	0.30	0.31	0.31	112
Area 3, Stake A-6.5	0.40	0.40	0.39	0.39	0.40	145
Area 3, U-3du South	0.41	0.44	Sampling Terminated		0.42	156
Area 3, U-3by South	0.42	0.57	Sampling Terminated		0.50	182
Area 3, U-3bz South	0.39	0.53	Sampling Terminated		0.47	172
Area 3, U-3ey South	0.38	0.51	Sampling Terminated		0.45	166
Area 3, U-3cj North	0.37	0.52	Sampling Terminated		0.45	166
Area 3, U-3bz North	0.51	0.69	Sampling Terminated		0.62	225
Area 3, U-3by North	0.66	(a)	Sampling Terminated		0.66	241
Area 3, U-3co North	2.15	2.89	Sampling Terminated		2.54	931
Area 3, U-3co South	1.49	1.83	Sampling Terminated		1.67	611
Area 3, U-3du North	0.34	0.39	Sampling Terminated		0.37	134
Area 3, Hill Top	0.37	0.34	0.35	0.34	0.35	128
Area 3, RWMS North	New Location		0.35	0.33	0.35	125
Area 3, RWMS East	New Location		0.45	0.41	0.43	157
Area 3, RWMS South	New Location		1.59	1.46	1.51	554
Area 3, RWMS West	New Location		0.36	0.35	0.36	130
Area 3, Ah/at North	0.43	0.35	Sampling Terminated		0.39	141
Area 3, Ah/at South	(a)	0.36	Sampling Terminated		0.36	130
Area 3, Ah/at East	0.35	0.45	Sampling Terminated		0.40	146
Area 3, Ah/at West	0.34	0.33	Sampling Terminated		0.33	122
Area 3, Ah/at South Gate	0.37	0.41	0.36	0.33	0.37	134
Area 4, Stake A-9	2.62	2.58	2.49	2.30	2.48	906
Area 4, Stake M-130	0.29	0.31	0.31	0.27	0.29	107
Area 4, Stake TH-48	0.29	0.31	0.34	0.31	0.31	113

(a) TLD missing from sampling location.
(b) TLD damaged at sampling location.
(c) Location inaccessible due to snow.

Attachment 5.1 (TLD Gamma Exposure Rates - 1996, cont.)

Area/Location	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr
Area 5, Well 5B	0.30	0.31	0.30	0.29	0.30	109
Area 5, RWMS East 1500'	0.33	0.31	0.35	0.30	0.32	117
Area 5, RWMS East 1000'	0.35	0.35	0.39	0.34	0.35	129
Area 5, RWMS East 500'	0.32	0.32	0.34	0.33	0.33	119
Area 5, RWMS Northeast Corner	0.32	0.30	0.32	0.32	0.31	115
Area 5, RWMS North 1500'	0.35	0.34	0.33	0.32	0.33	122
Area 5, RWMS North 1000'	0.36	0.32	0.35	(a)	0.34	125
Area 5, RWMS North 500'	0.36	0.37	0.37	0.34	0.36	131
Area 5, RWMS Northwest Corner	0.36	0.33	0.34	0.34	0.34	125
Area 5, RWMS West 500'	0.36	0.34	0.38	0.35	0.35	129
Area 5, RWMS West 1000'	0.37	0.34	0.35	0.33	0.34	125
Area 5, RWMS West 1500'	0.33	0.31	0.34	0.33	0.33	120
Area 5, RWMS Southwest Corner	0.32	0.31	0.33	0.31	0.31	114
Area 5, RWMS South 500'	0.32	0.33	0.33	0.34	0.33	120
Area 5, RWMS South Gate	0.30	0.28	0.29	0.27	0.28	104
Area 5, RWMS East Gate	0.36	0.34	0.36	0.36	0.35	129
Area 5, RWMS Office	0.33	0.32	0.33	0.31	0.32	116
Area 5, 3.3 Miles SE of Aggregate Pit	0.17	0.17	0.16	0.17	0.17	61
Area 5, WEF West		New Location		0.29	0.29	106
Area 5, WEF South		New Location		0.34	0.34	123
Area 5, WEF East		New Location		0.31	0.31	115
Area 5, WEF North		New Location		0.31	0.31	112
Area 5, RWMS TRU Pad Northeast	2.99	3.84	3.51	3.69	3.53	1290
Area 5, RWMS TRU Pad North	0.93	0.95	0.89	0.76	0.87	317
Area 5, RWMS TRU Pad Northwest	0.29	0.29	0.28	0.30	0.29	105
Area 5, RWMS TRU Pad Southwest	0.32	0.32	0.32	0.30	0.31	114
Area 5, RWMS TRU Pad South	0.45	0.44	0.43	0.44	0.44	161
Area 5, RWMS TRU Pad Southeast	0.34	0.34	0.34	0.30	0.33	119
Area 5, RWMS MSM-1 Southeast	1.95	1.73	1.71	1.86	1.82	664
Area 5, RWMS MSM-1 East	3.42	3.14	3.03	3.29	3.23	1179
Area 5, RWMS MSM-1 Northeast	2.15	1.81	1.69	2.04	1.94	708
Area 5, RWMS MSM-1 North-Northeast	11.03	8.93	8.47	10.66	9.87	3604
Area 5, RWMS MSM-1 North-Northwest	3.30	2.86	2.90	3.03	3.02	1102
Area 5, RWMS MSM-1 Northwest	3.15	2.80	2.82	3.08	2.98	1086
Area 5, RWMS MSM-1 West	7.84	7.31	7.13	8.19	7.68	2804
Area 5, RWMS MSM-1 Southwest	3.31	2.86	2.87	3.21	3.08	1123
Area 5, RWMS MSM-1 South-Southwest	3.50	2.99	2.87	3.24	3.17	1155
Area 5, RWMS MSM-1 South-Southeast	4.34	4.02	4.66	5.07	4.56	1664
Area 5, RWMS MSM-2 Northeast	4.90	4.18	3.70	4.25	4.27	1560
Area 5, RWMS MSM-2 North	9.05	7.84	7.16	8.05	8.05	2937
Area 5, RWMS MSM-2 Northwest	5.01	4.39	4.20	4.85	4.64	1694

(a) TLD missing from sampling location.
(b) TLD damaged at sampling location.
(c) Location inaccessible due to snow.

Attachment 5.1 (TLD Gamma Exposure Rates - 1996, cont.)

Area/Location	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr
Area 5, RWMS MSM-2 West	13.07	10.53	10.16	14.07	12.18	4446
Area 5, RWMS MSM-2 Southwest	3.98	3.39	3.28	3.80	3.63	1327
Area 5, RWMS MSM-2 South	6.56	5.77	5.30	6.83	6.20	2263
Area 5, RWMS MSM-2 Southeast	3.83	3.38	3.45	3.89	3.66	1336
Area 5, RWMS MSM-2 East	12.89	10.78	10.50	13.59	12.11	4420
Area 5, RWMS Pit 5 West Side	(a)	0.71	(b)	1.15	0.95	346
Area 5, RWMS Pit 5 East Side	0.54	0.98	4.21	1.25	1.52	554
Area 6, CP-6	0.23	0.21	0.20	0.19	0.21	75
Area 6, CP-2 Logistic Desk	0.18	0.21	Sampling Terminated		0.20	72
Area 6, CP-50 Calibration Door	0.24	0.23	0.20	0.21	0.22	81
Area 6, CP-50 Calibration Bench	0.20	0.20	0.20	0.19	0.20	72
Area 6, Yucca Oil Storage Area	0.26	0.26	0.34	0.27	0.28	102
Area 6, D-Con Pad Office	0.27	0.27	Sampling Terminated		0.27	98
Area 6, D-Con Pad Back Room	0.21	0.21	Sampling Terminated		0.21	77
Area 6, Well 3	0.27	0.29	0.30	0.24	0.27	99
Area 6, Stake TH-1	0.18	0.23	0.19	0.20	0.20	73
Area 6, Stake TH-9	0.24	0.27	0.27	0.28	0.27	97
Area 6, Stake TH-18	0.23	0.25	0.25	0.25	0.24	89
Area 6, Decon Pad Northwest	New Location		0.38	0.36	0.37	136
Area 6, Decon Pad Southwest	New Location		0.36	0.33	0.34	124
Area 6, Decon Pad Southeast	New Location		0.46	0.38	0.39	141
Area 6, Decon Pad Northeast	New Location		0.35	0.31	0.33	122
Area 7, 7-300 Bunker	0.80	0.77	0.75	0.63	0.73	266
Area 7, UE-7ns	0.31	0.31	0.30	0.27	0.29	107
Area 7, Reitman Seep	0.33	0.34	0.33	0.30	0.32	118
Area 8, Stake K-25	0.28	0.28	0.28	0.25	0.27	98
Area 9, 9-300 Bunker	0.34	0.36	0.33	0.27	0.32	116
Area 9, Papoose Lake Road	0.22	0.22	0.20	0.19	0.21	76
Area 9, V&G Roads Junction	0.30	0.30	0.31	0.25	0.28	104
Area 9, Crater U-9cw	0.28	0.33	0.26	0.23	0.27	99
Area 10, SEDAN West	0.81	0.89	0.86	0.75	0.82	301
Area 10, SEDAN East Visitors Box	0.34	0.36	0.36	0.30	0.34	123
Area 10, Stake A-24	0.40	0.43	0.41	0.34	0.39	143
Area 10, Circle and L Roads	0.29	(a)	0.33	0.26	0.29	105
Area 11, Gate 293	0.33	0.34	0.34	0.35	0.34	124
Area 11, East of U11b	0.34	0.31	0.31	0.31	0.32	115
Area 12, Stake TH-68.5	0.24	0.26	0.26	0.27	0.26	94
Area 12, T-Tunnel Pond 2	0.63	0.67	0.84	0.74	0.72	264
Area 12, Upper N Pond	0.30	0.33	0.35	0.35	0.34	123
Area 12, Stake M-168	0.29	0.31	0.33	0.34	0.32	117
Area 12, Upper Haines Lake	0.28	0.33	0.33	0.35	0.32	118

(a) TLD missing from sampling location.
(b) TLD damaged at sampling location.
(c) Location inaccessible due to snow.

Attachment 5.1 (TLD Gamma Exposure Rates - 1996, cont.)

Area/Location	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr
Area 12, Stake M-175	0.33	0.35	0.35	(a)	0.34	125
Area 12, Gold Meadows	0.29	0.29	0.27	(c)	0.28	102
Area 15, EPA Complex	0.28	0.29	0.28	0.25	0.28	100
Area 15, Office	0.31	0.34	0.34	0.29	0.32	116
Area 15, U-15e Substation	0.26	0.26	0.26	0.23	0.25	93
Area 17, Stake M-190	0.37	0.38	0.41	0.39	0.39	142
Area 18, Stake P-35	0.35	0.39	0.41	0.40	0.39	141
Area 18, Stake A-106	0.39	0.44	0.43	0.43	0.42	154
Area 18, Stake A-83	0.36	0.38	0.38	0.38	0.37	136
Area 19, Stake P-41	0.40	0.42	0.43	0.42	0.42	152
Area 19, Stake P-54	0.35	0.35	0.36	0.37	0.36	132
Area 19, Stake P-66	0.40	0.44	0.45	0.43	0.43	158
Area 19, Stake P-71	0.37	0.40	0.41	0.41	0.40	145
Area 19, Stake C-31	0.36	0.42	0.42	0.40	0.40	146
Area 19, Stake C-27	0.37	0.41	0.45	0.42	0.41	151
Area 19, Stake C-25	0.35	0.40	0.43	0.43	0.40	147
Area 19, Stake C-16	0.41	0.40	0.40	0.39	0.40	146
Area 19, Stake P-77	0.42	0.44	0.45	0.46	0.44	162
Area 19, Stake P-88	0.43	0.48	0.46	0.49	0.47	170
Area 19, Stake P-91	0.44	0.48	0.49	0.48	0.47	172
Area 19, Stake R-29	0.39	0.39	0.42	0.41	0.40	147
Area 19, Stake R-26	0.39	0.43	0.44	0.45	0.43	156
Area 19, Stake R-18	0.35	0.39	0.40	0.41	0.39	142
Area 19, Stake R-8	0.41	0.44	0.46	0.46	0.45	163
Area 19, Stake R-3	0.39	0.48	0.47	(a)	0.45	163
Area 19, Gate 19-3P	0.40	0.40	0.41	(c)	0.40	147
Area 20, Stake P-116.5	0.37	0.41	0.39	0.38	0.39	141
Area 20, Stake P-124	0.40	0.41	0.41	0.40	0.41	148
Area 20, Stake P-134.5	0.36	0.39	0.40	0.40	0.39	141
Area 20, Stake J-31	0.48	0.55	0.54	0.52	0.52	191
Area 20, Stake J-16	0.35	0.39	0.40	0.38	0.38	139
Area 20, Stake J-6	0.37	0.41	0.42	0.39	0.40	146
Area 20, Stake J-41	0.33	0.36	0.36	0.35	0.35	129
Area 20, Stake LC-4	0.47	0.45	0.44	0.44	0.45	166
Area 20, Stake A-118	0.37	0.41	0.42	0.40	0.40	146
Area 22, Desert Rock Control Tower	0.13	0.16	0.16	0.15	0.15	55
Area 22, Army Well No. 1	(a)	0.21	0.21	0.22	0.21	78
Area 23, Building 650 Storage Room	0.17	0.19	0.18	0.17	0.18	64
Area 23, Building 650 Dosimetry	0.12	0.15	0.14	0.14	0.14	51
Area 23, Building 650 Roof	0.12	0.14	0.15	0.14	0.14	50
Area 23, Post Office	0.17	0.18	0.18	0.17	0.18	64

(a) TLD missing from sampling location.
(b) TLD damaged at sampling location.
(c) Location inaccessible due to snow.

Attachment 5.1 (TLD Gamma Exposure Rates - 1996, cont.)

Area/Location	First Quarter mR/day	Second Quarter mR/day	Third Quarter mR/day	Fourth Quarter mR/day	Annual Average mR/day	Annual Total mR/Yr
Area 23, Building 610 Gate	0.13	0.14	0.15	0.18	0.15	56
Area 23, Gate 100	0.13	0.14	0.16	0.15	0.15	53
Area 25, NRDS Warehouse	0.32	0.33	0.32	0.31	0.32	115
Area 25, 25-4-P Gate	0.36	0.35	0.35	0.35	0.35	128
Area 25, 25-7-P Gate	0.34	0.32	0.32	0.35	0.33	121
Area 25, E-MAD North	0.29	0.28	0.28	0.27	0.28	102
Area 25, E-MAD East	0.32	0.31	0.32	0.31	0.32	115
Area 25, E-MAD South	0.32	0.31	0.30	0.28	0.30	110
Area 25, E-MAD West	0.30	0.29	0.30	0.28	0.29	106
Area 25, HENRE Site	0.33	0.32	0.33	0.37	0.34	123
Area 25, Jct. Jackass Flats & A27 Roads	0.21	0.21	0.21	0.24	0.22	80
Area 25, Guard Station 510	0.31	0.38	0.33	0.36	0.35	126
Area 25, Yucca Mountain	0.35	0.34	0.34	0.38	0.35	129
Area 27, Cafeteria	0.34	0.34	0.34	0.35	0.34	124
Area 30, Gate 30-3P in Cat Canyon	[a]	0.44	0.43	0.51	0.45	165

(a) TLD missing from sampling location.
(b) TLD damaged at sampling location.
(c) Location inaccessible due to snow.

6.0 HISTORICAL TRENDS IN ONSITE THERMOLUMINESCENT DOSIMETER DATA

Film badges were used during early activities on the Nevada Test Site (NTS) for ambient gamma exposure monitoring. Thermoluminescent dosimeters (TLDs) replaced the film badges in 1977, with ten monitoring stations (locations) chosen to be near work sites. By 1981, this network had expanded to 163 locations covering most operational areas of the NTS. Since 1981, a few locations have been added or removed. From 1977 to 1987, the TLDs used were manufactured by the Harshaw Chemical Company. In 1987, a changeover was made to TLDs manufactured by Panasonic. Because of this changeover, a comparison of the early years to current years is not totally appropriate. The designated background and control locations are not comparable between the two types of TLDs because of the calibration procedures. In late 1988, a calibration problem was discovered that may have caused inaccurate results in the 1988 data. At the end of 1996, there were a total of 158 active TLD locations.

In 1996, 24 TLD locations were placed in inactive status due to reductions in funding levels. Some of these changes in status occurred at the beginning of the year, some at the beginning of the second quarter, and some at the beginning of the third quarter. Fifteen new TLD locations were established to satisfy requirements in the NTS Radiological Control Manual. The new locations are at the corners of three facilities that process radiological waste: the Area 3 Radiological Waste Management Site (RWMS-3), the Area 6 Decontamination Pad, and the Waste Examination Facility (WEF) in Area 5. In addition, a new TLD location was established at Gate 30-3P, at the junction of Cat Canyon Road and Buggy Road in Area 30, which replaces Boundary Station 349, which is now inaccessible, and two TLD locations were established at RWMS Pit 5.

BACKGROUND DATA

Table 6.1 displays the annual average millirem per year data from the 27 background and control locations for the current year and the previous ten years. An alphabetic notation (b) in this table denotes that no monitoring was performed at that location for the year. Most of the alphabetic notations (b) represent the boundary stations established in 1993, 1994, and 1995 which replaced locations that could only be reached by helicopter with locations that could be reached by truck. For comparison, the average external exposure for the United States is generally assumed to be 100 to 120 millirem per year, and the 1996 NTS average of all environmental locations was 120 mR/year. Figure 6.1 is a time series of boxplots of the data in Table 6.1. Boxplots consist of a box, whiskers, and outliers. A line is drawn across the box at the median. The bottom of the box is at the first quartile, and the top is at the third quartile value of the data. The whiskers are lines that extend from the top and bottom of the box to adjacent values. Adjacent values are the lowest and highest data values that are less that one and one-half times the interquartile range from the ends of the box. Outliers are data values outside the adjacent values and are plotted with an asterisk. Figure 6.1 and Table 6.1 reveal no obvious trends in the background TLD data. The years 1988 and 1993 show slightly elevated values compared to other years, and the other years have means and medians that are within generally accepted norms.

A review of the statistical properties of all TLD data (Chapter 5 herein and the corresponding chapters of previous annual reports) concludes that historically TLD data have lognormal statistical distributions. The reports for 1994, 1995, and 1996 found normal statistical distributions in those years. This presents a statistical problem since all parametric statistical

methods assume that all data have the same statistical distribution. Nonparametric methods have to be used otherwise. However, for just the background and control locations, the data for the individual years from 1986 through 1996 are reasonably fit by both lognormal and normal statistical distributions. Thus it is reasonable to use the untransformed data values for statistical test. A one-way analysis of variance (ANOVA) is the appropriate parametric statistical method to determine if there are any significant differences between years. This type of test will determine if there are any significant differences between years caused by any type of trend. If significance is found, then an evaluation for the type of trend can be done. Table 6.2 gives the results of the ANOVA on TLD mR/year to test for differences among the years 1986 through 1996 at the control and boundary locations. This table indicates that there is a significant difference among years. A probability value of less than 0.05 indicates that the hypothesis of no differences can be rejected with at least 95 percent confidence.

The next step is to determine what the significant differences are. An examination of the means and confidence intervals part of Table 6.2, along with the Tukey's multiple comparisons tests of this data indicate that the significance is due to the differences between the lowest annual average for 1986 and the two highest annual averages for 1988 and 1993. No other pairwise differences between annual mean values are statistically significant. This finding along with an examination of the boxplots in Figure 6.1 suggest that, although there are significant differences among years, no consistent trend is present in the control and background data.

ENVIRONMENTAL SAMPLING STATIONS

The historic data for the present year and the previous five years for all TLD sampling locations is presented in Attachment 6.1. The data are presented as annual exposures, mR/year. The background and control data analyzed in the previous section are included in this attachment. The attachment also contains the historical data for the operational monitoring TLDs at the waste management facilities. These locations are also identified in Table 5.2, in the previous chapter. An alphabetic notation (a) in this attachment indicates that no TLDs were placed at a location for the year. The pattern of the alphabetic notations (a) shows how monitoring locations have been added and removed over the years. The operational monitoring locations were removed from the data analyses discussed below because their exposures reflect operational activities rather than ambient exposures. The statistical procedures used to analyze the data in Attachment 6.1 are essentially the same as those used for only the background and control locations. Because substantially more data are available in Attachment 6.1 than the background and control locations, some additional analyses were performed.

The previous chapter discussed the statistical distribution of the control and background data, and concluded that the data could be analyzed using methods that assumed the data have a normal statistical distribution. The current year and past five years data were examined for statistical distribution using the same methods. The normal plot of the combined data for the six years showed two approximately linear segments that have a junction at a value between 200 and 250 mR/year. An examination of the data values that composed the two segments revealed that the upper segment contained the data from the operational monitoring locations and the locations that have been found to consistently yield atypical values. When this non-environmental data is removed from the data set the combined six years of data has an approximately normal statistical distribution. Thus parametric statistical methods can be used to test for historical trends.

A two-way ANOVA was used to test for differences in millirem per year due to differences among years or differences between operational areas or both of these effect variables. The test for both effects simultaneously is the interaction term of the ANOVA and in this case it is a test to determine if any time series trends are the same for all operational areas. Chapter 5, and the

corresponding chapters of previous years data reports, have found that there are significant differences in TLD gamma exposures among NTS operational areas. The areas are included in this ANOVA to remove that source of variability from the residual error and thus increase the power of the analysis. This effect could be considered a blocking variable. Both the classification variables were specified as fixed effects. It might be argued that the years considered, 1991 through 1996, are a sampling of all the years of historical data and thus should be a random ANOVA effect. However, any trend found in these six years of data is not likely to be a trend that is representative of longer time periods. Since the data is statistically unbalanced and rank deficient (there is no data for Area 30 in 1996), a General Linear Model program was used to compute the ANOVA.

The results of this ANOVA are presented in Table 6.3. This table shows no significant interaction and very significant effects for differences among years and differences among operational areas. Figure 6.2 is a normal probability plot of the residuals from this ANOVA. This plot is approximately linear and thus the assumption of normality is reasonable for this data. The significant differences between years were further examined graphically and with a one-way ANOVA. Figure 6.3 is a time series plot of boxplots of the data used in the ANOVA on environmental TLD data. The one-way ANOVA grouped the years into three nonoverlapping clusters. The first cluster is composed of the data from 1991 and 1992 and has a mean value of 147 mR/year. The second cluster contains only the data from 1993 and has a mean value of 167 mR/year. A calibration problem was discovered in the 1993 data. This problem was never resolved. The final cluster includes the data from 1994, 1995, and 1996 and has a mean value of 121 mR/year. This pattern of two years of intermediate gamma exposure levels, then a year of higher levels, followed by three years of lower exposure levels can be seen in Figure 6.3. This pattern is also present in the background data displayed in Figure 6.1. The boxes of the boxplots in Figure 6.3 show substantial overlapping of the interquartile ranges of the several years, thus the trend is not remarkable even though it is statistically significant. These results are consistent with the trends reported in the previous years data report. Note that the annual averages beginning in 1994 are approximately at the level that is generally considered to be worldwide background which is about 10 mR per month or 120 mR per year.

CONCLUSIONS

Two types of TLD data were analyzed to see if any significant historical trends might be detected. The analysis of the data from the control and background monitoring locations for the current year and the previous ten years found statistically significant differences between the lowest annual average from the 1986 data and the two highest annual averages from the 1988 and 1993 data. No consistent trend was found, and except for the two high annual averages, the background data values averaged within the generally accepted range of worldwide background exposure levels. There was a calibration problem in 1988, and thus the data for that year may less reliable than the data from other years. The second type of data consisted of all of the data from the NTS environmental monitoring TLDs for the current year and the previous five years. These data can be divided into three nonoverlapping groups of annual mean values: 1991 and 1992 annual means form the first group, then a significantly higher annual mean in 1993, followed by significantly lower annual means from 1994 through 1996. No consistent trend was noted, and the recent annual averages are at worldwide background levels.

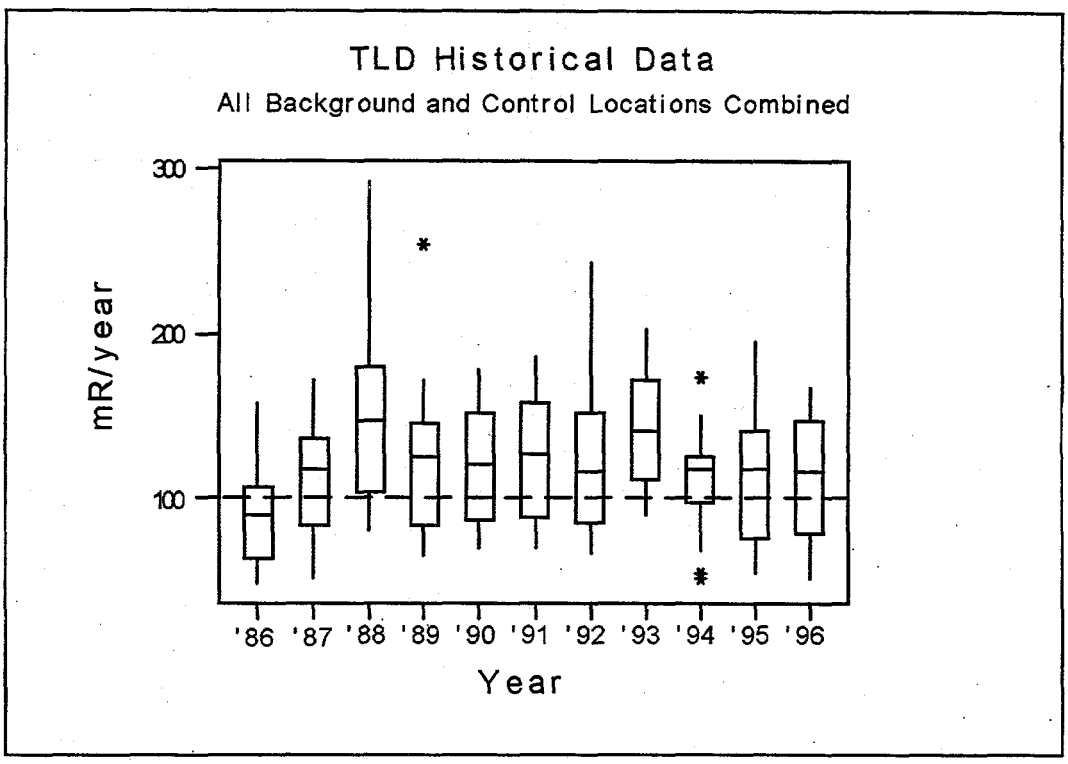


Figure 6.1 Time Series of Boxplots of Historical Background TLD Data

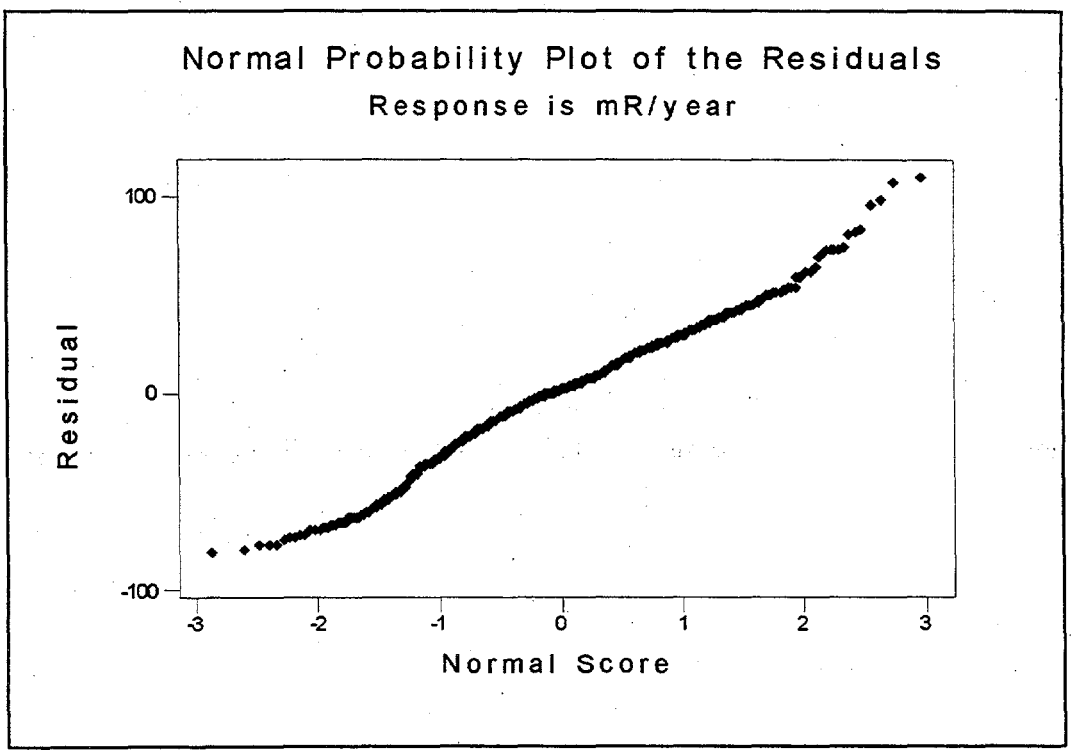


Figure 6.2 Probability Plot of Residuals from Two-Way ANOVA

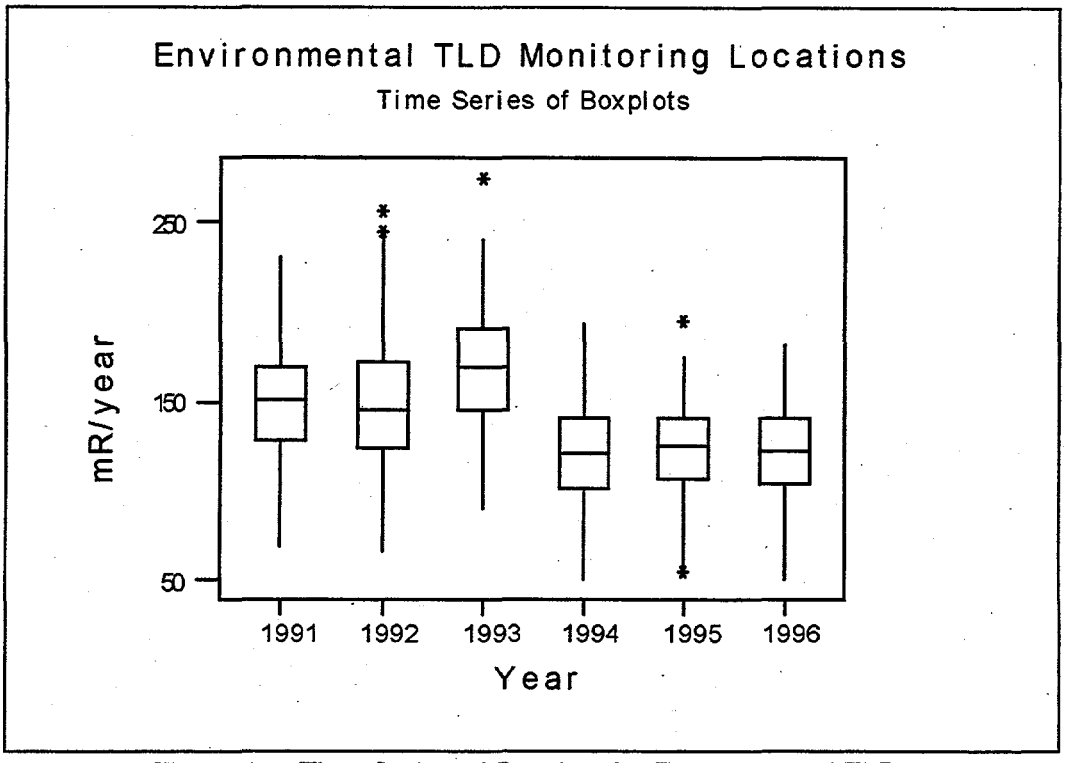


Figure 6.3 Time Series of Boxplots for Environmental TLDs

Table 6.1 Average Annual Millirem per Year for Designated Background and Control Locations

Area/Location	Year										
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Area 3, Hill Top	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	131	128
Area 5, Well 5B	79	119	157	129	125	133	113	144	125	108	109
Area 5, 3.3 Miles SE of Aggregate Pit	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	58	61
Area 6, CP-6	49	76	131	100	90	86	84	109	69	71	75
Area 6, Yucca Oil Storage	79	112	106	115	116	120	113	136	98	96	102
Area 9, Papoose Lake Road	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	116	77	76
Area 11, East of U11B	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	114	115
Area 12, Gold Meadows	99	115	135	135	114	119	117	135	97	95	102
Area 15, U-15e Substation	67	129	137	254	109	111	113	135	104	103	93
Area 18, Stake A-106	(b)	(b)	292	120	177	186	179	202	150	157	154
Area 19, Stake C-31	137	(a)689	262	264	174	178	176	183	123	195	146
Area 19, Stake R-29	158	172	179	172	170	167	242	197	142	140	147
Area 19, Gate 19-3P	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	108	135	147
Area 20, Stake J-41	(b)	(b)	(b)	(b)	(b)	(b)	(b)	186	143	140	129
Area 20, Stake LC-4	(b)	(b)	(b)	(b)	(b)	(b)	(b)	237	124	161	166
Area 20, Stake A-118	(b)	(b)	(b)	(b)	(b)	(b)	(b)	218	142	126	146
Area 22, Army Well No. 1	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	80	78
Area 23, Building 650 Dosimetry	112	51	95	69	73	69	66	95	53	54	51
Area 23, Building 650 Roof	47	62	86	64	69	69	66	90	51	54	50
Area 23, Post Office	57	89	106	83	83	86	84	109	78	71	64
Area 25, NRDS Warehouse	100	144	166	139	142	144	135	167	121	130	115
Area 25, Jackass Flats & A27 Rds.	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	71	80
Area 25, HENRE Site	99	123	170	138	143	147	132	163	115	119	123
Area 25, Guard Station 510	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	122	126
Area 25, Yucca Mountain	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	155	129
Area 27, Area 27 Cafeteria	89	139	179	118	146	154	143	169	121	121	124
Area 30, Gate 30-3P	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	(b)	165
Annual Averages	91	111	154	127	124	127	126	145	111	112	111

(a) Denotes a statistical outlier that was not used in the statistical analyses.

(b) Missing data values.

Table 6.2 One-Way ANOVA on Background Locations for Differences Among Years

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Ratio	Probability Value
Year	10	44135	4414	2.69	0.004
Error	170	278470	1638		
Total	180	322606			

Year	N	mR/Year Mean	Deviation	Individual 95 Percent Confidence Intervals for Mean Based on Pooled Standard Deviation
1986	13	90.85	32.02	(------*-------)
1987	12	111.33	35.07	(-------*-------)
1988	14	153.57	62.76	(------*------)
1989	14	127.36	49.09	(------*-------)
1990	14	123.50	36.78	(------*------)
1991	14	126.50	38.66	(------*------)
1992	14	125.93	48.43	(------*------)
1993	14	145.29	36.05	(------*-------)
1994	19	111.05	32.08	(-----*-----)
1995	26	111.77	37.70	(----*----)
1996	27	111.04	34.89	(----*----)

Pooled Standard Deviation = 40.47

90 120 150

Table 6.3 ANOVA on mR/year for Effects of Years and Operational Areas

Source Term	Degrees of Freedom	Sum of Squares	Mean Square	F-Ratio	Probability Value
Year	5	92592.98	18518.6	39.10	0.0
Area	21	523446.6	24926.03	52.63	0.0
Year x Area	105	19501.76	185.7311	0.39	1.0
Error	746	353335.2	473.6397		
Total	877	1188098			

Attachment 6.1 Average Millirem per Year for NTS Thermoluminescent Dosimeters

Sampling Location	Year					
	1991	1992	1993	1994	1995	1996
Area 1, BJY	112	113	132	100	92	87
Area 1, Stake TH-27/28	125	113	136	84	95	96
Area 1, Sandbag Storage Hut	135	135	161	109	113	115
Area 2, Stake M-140	150	154	173	141	129	122
Area 2, Stake N-8	1130	1116	1046	835	841	779
Area 2, Stake L-9	230	220	237	194	175	170
Area 2, Stake M-150	153	161	180	134	139	123
Area 2, Stake TH-58	114	110	130	83	88	88
Area 3, Stake OB-20	106	102	121	85	84	86
Area 3, U-3ax/bl South	181	179	195	137	152	139
Area 3, U-3ax/bl Southeast	198	190	208	146	161	154
Area 3, U-3ax/bl Northeast	321	282	286	210	228	204
Area 3, U-3ax/bl Northwest	210	190	202	152	166	153
Area 3, LANL Trailers	147	139	159	117	133	112
Area 3, Stake A-6.5	195	179	209	142	174	145
Area 3, U-3du South	202	187	210	155	149	156
Area 3, U-3by South	190	176	202	144	150	182
Area 3, U-3bz South	165	161	184	133	137	172
Area 3, U-3ez South	164	154	196	127	136	166
Area 3, U-3cj North	165	157	191	129	129	166
Area 3, U-3bz North	217	220	252	187	180	225
Area 3, U-3by North	311	289	315	242	225	241
Area 3, U-3co North	827	981	1051	814	771	931
Area 3, U-3co South	708	641	680	515	509	611
Area 3, U-3du North	190	172	205	152	148	134
Area 3, Boundary Station 358	79	88	102	63	(a)	(a)
Area 3, Hill Top	(a)	(a)	(a)	(a)	131	128
Area 3, RWMS North	(a)	(a)	(a)	(a)	(a)	125
Area 3, RWMS East	(a)	(a)	(a)	(a)	(a)	157
Area 3, RWMS South	(a)	(a)	(a)	(a)	(a)	554
Area 3, RWMS West	(a)	(a)	(a)	(a)	(a)	130
Area 3, U-3ah/at North	158	150	175	126	124	141
Area 3, U-3ah/at South	231	198	217	192	175	130
Area 3, U-3ah/at East	145	154	193	124	127	146
Area 3, U-3ah/at West	158	143	182	122	130	122
Area 3, U-3ah/at South Gate	172	150	175	131	128	134
Area 4, Stake A-9	1115	1274	1288	1094	1059	906
Area 4, Stake M-130	145	146	157	121	131	107
Area 4, Stake TH-38	139	132	154	102	109	108
Area 4, Stake TH-48	146	135	163	106	110	113
Area 5, WELL 5B	133	113	144	125	108	109
Area 5, RWMS East 1500'	145	139	163	117	131	117

(a) No TLD at location for the year.

Attachment 6.1 (Average Millirem per Year for NTS Thermoluminescent Dosimeters, cont.)

Sampling Location	Year					
	1991	1992	1993	1994	1995	1996
Area 5, RWMS East 1000'	137	139	169	120	132	129
Area 5, RWMS East 500'	148	135	158	113	120	119
Area 5, RWMS Northeast Corner	132	128	159	110	115	115
Area 5, RWMS North 1500'	146	132	170	127	123	122
Area 5, RWMS North 1000'	152	146	183	126	132	125
Area 5, RWMS North 500'	158	139	177	129	131	131
Area 5, RWMS Northwest Corner	151	143	170	122	146	125
Area 5, RWMS West 500'	151	135	173	126	130	129
Area 5, RWMS West 1000'	160	146	185	131	127	125
Area 5, RWMS West 1500'	154	146	173	125	121	120
Area 5, RWMS Southwest Corner	143	157	162	115	118	114
Area 5, RWMS South 500'	150	146	168	121	121	120
Area 5, RWMS South Gate	146	132	156	107	110	104
Area 5, RWMS East Gate	273	253	273	216	151	129
Area 5, RWMS Office	140	128	184	145	122	116
Area 5, Boundary Station 360	74	77	96	54	(a)	(a)
Area 5, 3.3 miles SE of Aggregate Pit	(a)	(a)	(a)	(a)	58	61
Area 5, WEF West	(a)	(a)	(a)	(a)	(a)	106
Area 5, WEF South	(a)	(a)	(a)	(a)	(a)	123
Area 5, WEF East	(a)	(a)	(a)	(a)	(a)	115
Area 5, WEF North	(a)	(a)	(a)	(a)	(a)	112
Area 5, RWMS Pit 3 North Side	168	146	262	127	133	(a)
Area 5, RWMS Pit 3 South Side	149	139	263	122	133	(a)
Area 5, RWMS Pit 4 West Side	161	154	192	192	(a)	(a)
Area 5, RWMS Pit 4 East Side	161	146	195	165	(a)	(a)
Area 5, RWMS TRU Pad Northeast	286	286	631	1051	554	1290
Area 5, RWMS TRU Pad North	466	466	325	162	301	317
Area 5, RWMS TRU Pad Northwest	225	231	217	128	120	105
Area 5, RWMS TRU Pad Southwest	325	190	225	124	378	114
Area 5, RWMS TRU Pad South	562	655	408	183	192	161
Area 5, RWMS TRU Pad Southeast	325	238	406	307	118	119
Area 5, RWMS MSM-1 Southeast	609	604	788	606	662	664
Area 5, RWMS MSM-1 East	1196	1121	1340	838	1165	1179
Area 5, RWMS MSM-1 Northeast	689	659	1054	612	673	708
Area 5, RWMS MSM-1 NNE	2406	3052	2668	2779	3086	3604
Area 5, RWMS MSM-1 NNW	958	1039	1214	866	994	1102
Area 5, RWMS MSM-1 Northwest	1041	1098	1077	993	1066	1086
Area 5, RWMS MSM-1 West	2196	2196	2751	2166	2573	2804
Area 5, RWMS MSM-1 Southwest	1111	1109	1228	1031	1142	1123
Area 5, RWMS MSM-1 SSW	1090	1054	1199	995	1091	1155
Area 5, RWMS MSM-1 SSE	1549	1493	2137	1594	1535	1664
Area 5, RWMS MSM-2 Northeast	1583	1208	1795	1425	1562	1560

(a) No TLD at location for the year.

Attachment 6.1 (Average Millirem per Year for NTS Thermoluminescent Dosimeters, cont.)

Sampling Location	Year					
	1991	1992	1993	1994	1995	1996
Area 5, RWMS MSM-2 North	2292	2657	2931	2036	2321	2937
Area 5, RWMS MSM-2 Northwest	1647	1665	1862	1544	1619	1694
Area 5, RWMS MSM-2 West	2605	2605	4313	3503	3947	4446
Area 5, RWMS MSM-2 Southwest	1294	1270	1424	1173	1301	1327
Area 5, RWMS MSM-2 South	2062	2072	2174	1723	2149	2263
Area 5, RWMS MSM-2 Southeast	1163	1274	1444	1234	1378	1336
Area 5, RWMS MSM-2 East	3883	4081	4284	3681	4223	4420
Area 5, RWMS Pit 5 West Side	(a)	(a)	(a)	(a)	(a)	346
Area 5, RWMS Pit 5 East Side	(a)	(a)	(a)	(a)	(a)	554
Area 6, CP-6	86	84	109	69	71	75
Area 6, CP-2 Logistic Desk	88	84	111	67	68	72
Area 6, CP-50 Calibration Door	186	161	153	118	95	81
Area 6, CP-50 Calibration Bench	88	91	118	66	85	72
Area 6, Yucca Oil Storage Area	120	113	136	98	96	102
Area 6, Decon Pad Office	123	95	142	90	97	98
Area 6, Decon Pad Back Room	106	91	111	87	69	77
Area 6, Stake OB-11.5	148	135	168	119	122	123
Area 6, Well 3	128	132	146	121	109	99
Area 6, Stake TH-1	91	91	106	66	70	73
Area 6, Stake TH-9	127	121	143	97	100	97
Area 6, Stake TH-18	112	110	128	82	84	89
Area 6, DAF NE	(a)	(a)	(a)	(a)	86	(a)
Area 6, DAF E	(a)	(a)	(a)	(a)	80	(a)
Area 6, DAF SE	(a)	(a)	(a)	(a)	84	(a)
Area 6, DAF W	(a)	(a)	(a)	(a)	88	(a)
Area 6, Decon Pad Northwest	(a)	(a)	(a)	(a)	(a)	136
Area 6, Decon Pad Southwest	(a)	(a)	(a)	(a)	(a)	124
Area 6, Decon Pad Southeast	(a)	(a)	(a)	(a)	(a)	141
Area 6, Decon Pad Northeast	(a)	(a)	(a)	(a)	(a)	122
Area 7, 7-300 Bunker	376	373	392	(a)	281	266
Area 7, UE-7ns	130	146	157	112	126	107
Area 7, Reitman Seep	134	143	172	88	120	118
Area 7, Crater U-9cw (South)	121	132	145	102	99	99
Area 8, Cable Yard	167	183	187	143	134	129
Area 8, Stake CA-14	148	154	162	89	125	(a)
Area 8, Stake K-25	124	128	143	100	102	98
Area 9, 9-300 Bunker	147	154	177	122	125	116
Area 9, Papoose Lake Road	(a)	(a)	(a)	117	77	76
Area 9, Gate 19-3P	(a)	(a)	(a)	108	135	147
Area 9, V & G Roads Junction	128	121	146	99	113	104
Area 10, SEDAN West	459	436	436	348	329	301
Area 10, SEDAN East Visitors Box	175	168	194	137	135	123

(a) No TLD at location for the year.

Attachment 6.1 (Average Millirem per Year for NTS Thermoluminescent Dosimeters, cont.)

Sampling Location	Year					
	1991	1992	1993	1994	1995	1996
Area 10, Stake A-24	186	198	214	172	141	143
Area 10, Circle & L Roads	147	154	162	99	120	105
Area 10, Boundary Station 357	94	102	127	70	(a)	(a)
Area 11, Gate 293	151	143	167	123	124	124
Area 11, Boundary Station 359	165	172	200	133	(a)	(a)
Area 11, East of U11b	(a)	(a)	(a)	(a)	114	115
Area 12, Stake TH-68.5	122	117	138	88	93	94
Area 12, T Tunnel #2 Pond	527	483	571	251	268	264
Area 12, Building 12-10	147	146	166	112	125	(a)
Area 12, Upper N Pond	156	146	172	118	120	123
Area 12, Stake M-168	153	143	161	110	115	117
Area 12, Upper Haines Lake	130	117	152	97	116	118
Area 12, Stake M-170	139	128	150	103	105	(a)
Area 12, Stake M-175	149	135	167	111	125	125
Area 12, Gold Meadows Hilltop	119	117	135	97	95	102
Area 15, EPA Complex	129	128	153	112	112	100
Area 15, Office	125	124	145	106	112	116
Area 15, Lamp Shack	147	157	173	128	127	(a)
Area 15, Substation U15E	111	113	135	104	103	93
Area 15, Boundary Station 356	170	172	147	143	(a)	(a)
Area 17, Stake M-185	153	139	166	104	122	(a)
Area 17, Stake M-190	177	165	188	126	135	142
Area 18, Stake M-196	177	157	190	126	138	(a)
Area 18, Stake P-35	176	168	183	140	142	141
Area 18, Stake P-39	171	154	184	134	124	(a)
Area 18, Stake A-83	(a)	(a)	(a)	142	126	136
Area 18, Gate 30-3P, Cat Canyon Rd	(a)	(a)	(a)	(a)	(a)	165
Area 19, Stake P-41	169	176	206	149	151	152
Area 19, Stake P-46	166	157	176	111	125	(a)
Area 19, Stake P-54	160	157	168	115	125	132
Area 19, Stake P-59	194	183	209	132	150	(a)
Area 19, Stake P-66	191	176	212	133	146	158
Area 19, Stake P-71	182	172	192	126	142	145
Area 19, Upper Well U19C Reservoir	179	154	172	123	124	(a)
Area 19, Stake C-31	178	176	181	123	195	146
Area 19, Stake C-27	185	172	175	126	142	151
Area 19, Stake C-25	175	168	179	122	142	147
Area 19, Stake C-16	170	168	183	127	139	146
Area 19, Boundary Station 353	171	150	170	144	(a)	(a)
Area 19, Boundary Station 354	163	154	163	138	(a)	(a)

(a) No TLD at location for the year.

Attachment 6.1 (Average Millirem per Year for NTS Thermoluminescent Dosimeters, cont.)

Sampling Location	Year					
	1991	1992	1993	1994	1995	1996
Area 19, Stake P-77	185	187	226	180	(a)	162
Area 19, Stake P-88	196	209	231	156	173	170
Area 19, Stake P-91	193	198	218	191	173	172
Area 19, Stake P-98	173	176	212	143	161	(a)
Area 19, Stake R-29/31	167	242	197	142	140	147
Area 19, Stake R-26/27	172	245	200	155	147	156
Area 19, Stake R-18/20	165	227	186	158	141	142
Area 19, Stake R-7/8/9	184	256	205	178	155	163
Area 19, Stake R-3	190	256	185	166	163	163
Area 20, Boundary Station 350	193	205	240	163	(a)	(a)
Area 20, Boundary Station 351	169	187	179	146	(a)	(a)
Area 20, Boundary Station 352	101	117	131	85	(a)	(a)
Area 20, P & K Roads Junction	170	168	191	154	128	(a)
Area 20, Stake P-116.5	170	172	200	140	142	141
Area 20, Stake P-120.5	162	165	196	145	141	(a)
Area 20, Stake P-124	157	176	206	158	148	148
Area 20, Stake P-129.5	180	179	217	160	149	(a)
Area 20, Stake P-134.5	166	172	206	153	147	141
Area 20, Stake J-24	168	176	204	148	146	(a)
Area 20, Stake J-31	360	360	325	262	221	191
Area 20, Stake J-16	165	168	197	154	152	139
Area 20, Stake J-6	184	161	275	170	160	146
Area 20, Stake A-106	186	179	202	150	157	154
Area 20, Stake J-41	(a)	(a)	(a)	143	140	129
Area 20, Stake LC-4	(a)	(a)	(a)	173	161	166
Area 20, Stake A-118	(a)	(a)	(a)	124	151	146
Area 22, Desert Rock Control Tower	87	77	101	59	58	55
Area 22, Boundary Station 346	74	81	95	58	(a)	(a)
Area 22, Army Well #1	(a)	(a)	(a)	(a)	80	78
Area 23, Bldg. 650 Storage Room	110	95	104	61	69	64
Area 23, Bldg. 650 Dosimetry	69	66	95	53	54	51
Area 23, Bldg. 650 Roof	69	66	90	51	54	50
Area 23, Post Office	86	84	109	78	71	64
Area 23, Bldg. 610 Gate	71	73	94	57	55	56
Area 23, Bldg. 610 Bay	928	1153	1125	701	614	(a)
Area 23, Gate 100	71	66	91	54	69	53
Area 23, Bldg. 190 Bench Drawer	97	99	130	71	79	(a)
Area 23, Bldg. 180 Scaler Room	127	132	131	87	121	(a)
Area 25, NRDS Warehouse	144	135	167	121	130	115
Area 25, 25-4P Gate	151	139	170	119	135	128
Area 25, 25-7P Gate	161	132	163	114	117	121
Area 25, E-MAD North	128	117	149	100	106	102

(a) No TLD at location for the year.

Attachment 6.1 (Average Millirem per Year for NTS Thermoluminescent Dosimeters, cont.)

Sampling Location	Year					
	1991	1992	1993	1994	1995	1996
Area 25, E-MAD East	141	128	160	108	114	115
Area 25, E-MAD South	140	124	161	109	111	110
Area 25, E-MAD West	134	121	156	103	110	106
Area 25, HENRE	147	132	163	115	119	123
Area 25, Boundary Station 347	110	117	128	92	(a)	(a)
Area 25, Boundary Station 348	137	172	164	130	(a)	(a)
Area 25, Jct Jackass Flats Rd & A27 Rd	(a)	(a)	(a)	(a)	71	80
Area 25, Guard Station 510	(a)	(a)	(a)	(a)	122	126
Area 25, Yucca Mountain	(a)	(a)	(a)	(a)	155	129
Area 27, Area 27 Cafeteria	154	143	169	121	121	124
Area 30, Boundary Station 349	155	179	195	140	(a)	(a)

(a) No TLD at location for the year.

7.0 RADIOACTIVE NOBLE GASES IN AIR ONSITE

The 1996 data consist of krypton-85 concentrations from three permanent sampling stations. The locations of these noble gas sampling stations are shown in Figure 7.1. (All tables, figures, and attachments, in that order, are located at the end of the chapter.) The unlabeled sampling locations in Figure 7.1 show the locations of inactive noble gas sampling stations. Analyses for xenon were discontinued at the beginning of 1995, and the stations located at the DDZ77 transformer, Gravel Pit, U.S. Environmental Protection Agency (EPA) Farm, and E-MAD were shut down. In October 1995, the stations at Gate 200 South, Area 12 Camp, and Gate 400 were discontinued, leaving three stations in operation for the last quarter of 1995 and for 1996. The three stations now operating are: BJY, Area 20 Camp, and Pahute Substation. At these three locations, weekly air samples were collected and analyzed for Krypton-85 using liquid scintillation counting.

The 1996 results for krypton-85 are consistent with the number of counts from the liquid scintillation counter. Quench standards for krypton-85 are currently not available to determine the degree of quenching and the true counting efficiency; therefore, the values reported have not been compensated for any quench caused by the matrix. The data user should be aware of this limitation.

The information given in Attachment 7.1, consists of: (1) an alphabetic station description; (2) the dates of sample collection given as the date sample collection began and ended (samples were collected for approximately a one week period); (3) the krypton concentrations in $\mu Ci/mL \times 10^{-12}$ with one standard deviation (1s, counting error); and (4) the analytical detection limit (DL). The detection limit is defined at the beginning of this report. The units of 10^{-12} $\mu Ci/mL$ are equivalent to pCi/m^3. Attachment 7.1 contains these data for the calendar year 1996. An alphabetic notation denotes a missing value. Five categories of causes for the missing values are identified by the footnote codes and defined at the bottom of each page of the attachment. Ninety-four percent of the krypton concentrations are above the corresponding DL. The average DL is 6.35×10^{-12} $\mu Ci/mL$. The DLs have a lognormal statistical distribution with a median of 5.84×10^{-12} $\mu Ci/mL$. The standard deviation of the krypton DL's is 2.52×10^{-12} $\mu Ci/mL$.

Figures 7.2 through 7.5 are time series plots of the data in Attachment 7.1. Figure 7.2 contains the data for all the stations combined. Figures 7.3 through 7.5 provide one plot for each station. Note that these time series plots have one of two ordinate scales: either 0 to 1.0×10^{-10} or 0 to 5.0×10^{-11}. The plots for the individual stations contain the detection limits, indicated by the solid line. In previous years' reports, the approximate 95 percent confidence interval of the concentrations were indicated in the individual station plots. These were not used in this 1996 report, because over time, noble gas concentrations have decreased to a level such that the standard deviations are approximately an order of magnitude smaller than the result values; thus, the confidence limits tend to plot as overlapping lines. The abscissa value is the date sampling started. In general, these plots show most of the values around environmental background levels (approximately 27). Figure 7.2, containing the time series of all three sampling locations combined, also contains a "locally weighted scatterplot smoother" line. This type of graphic line is a statistical device intended to smooth out the variability in the data and approximate the underlying trend in the data. Figure 7.2 also shows an obvious outlier about mid-year from the Phaute Substation. This value of 9.56×10^{-11} was from the sample collection beginning on July 10, 1996. The records for this sample were checked and no analytical problems were found; however, the value is an obvious outlier and was not used in the statistical analyses.

An exploratory data analysis was performed on the krypton data for each of the stations using probability plot and goodness of fit test methods. All stations combined fit a normal but not a lognormal distribution when the high outlying observation at Pahute Substation was deleted from the data. The normal distribution was chosen for further statistical analyses to satisfy the underlying assumptions of the analysis of variance (ANOVA) methods. Table 7.1 gives the basic descriptive statistics of the stations where annual krypton data were collected. The overall mean given in this table is typical of environmental conditions at NTS. A one-way ANOVA was used to compare the three locations for equality of krypton means. The ANOVA output is shown in Table 7.2. In an ANOVA table, the degrees of freedom, sum of squares, mean squares, and the computed value of the F-statistic are shown; the p-value is the probability associated with the F-statistic. This is the probability that significant differences among the stations would be found if the null hypothesis were true. Since this probability is much larger than the usual 5 percent critical value, the conclusion is that there are no significant differences.

DUPLICATE ANALYSES

In 1996, 55 duplicate analyses of krypton-85 samples were performed. Of these, 42 were valid analyses that can be matched to valid results. In the remaining cases, there were analytical problems with either the first analysis or the duplicate analysis. The differences between the results (the value reported in Attachment 7.1) and the corresponding duplicates were subjected to several statistical analyses. These differences were shown to have a normal distribution using a probability plot. An ANOVA showed no significant differences due to sampling location. A time series plot showed no evidence of any time dependent trends. The mean value of these differences is -1.28×10^{-12} µCi/mL, the standard deviation is 14.24×10^{-12} µCi/mL, and the standard error is 2.20×10^{-12} µCi/mL. A one-sample t-test showed that the mean of the differences is not significantly different from zero.

HISTORICAL TRENDS

Krypton concentrations have been reported in NTS annual environmental reports since 1982, from three to eleven stations annually. Before 1982, EPA operated the noble gas network. The krypton historical data is shown in Table 7.3. Note that data for the PILE DRIVER location exist only for the years 1987 through 1990, and these are the years in which no data was collected at the EPA Farm. For these years, a noble gas sampler was moved 1.5 miles northwest from the EPA Farm to the vicinity of the PILE DRIVER event. PILE DRIVER was a weapons effects test detonated on June 2, 1966. The move from the EPA Farm was made when the farm was closed and the move back was made when electrical power was disconnected from the PILE DRIVER location. An assumption can be made that these stations were close enough together that the moves would not significantly affect the concentrations; thus, these stations probably can be considered as one.

Table 7.3 shows that most of the data is clustered between 20 and 30 µCi/mL $\times 10^{-12}$, with a few values in the 40 to 50 range. These three high values occurred at the Area 20 Camp in 1985, 1986, and 1987. During this time period, there were several accidental ventings within three miles of this camp. The remaining data in Table 7.3 shows a very consistent pattern of values clustered about 25 µCi/mL $\times 10^{-12}$. Including the high values from the Area 20 Camp, the data in Table 7.3 have an average of 26.7×10^{-12} µCi/mL and a standard deviation of 4.6×10^{-12} µCi/mL; thus, most of the data is within one standard deviation of the mean. This is unusual consistency for environmental data and indicates that for the years 1982 through 1996 there has been no historical trend in krypton concentrations on the NTS.

CONCLUSION

The 1996 krypton-85 concentrations in NTS air were all around the world-wide background concentration of 27×10^{-12} µCi/mL, except for one outlying value. This value was a concentration of 95.6×10^{-12} µCi/mL at Pahute Substation for the sample collected between August 10 and 17, 1996. No reason is known for this atypical value, and samples immediately preceding and following it were at background levels. Historical krypton-85 data is also typically at background levels, except for the atypical values at Area 20 Camp in 1985, 1986, and 1987 which were attributed to atmospheric pumping of krypton seeping upward from underground tests on Pahute Mesa.

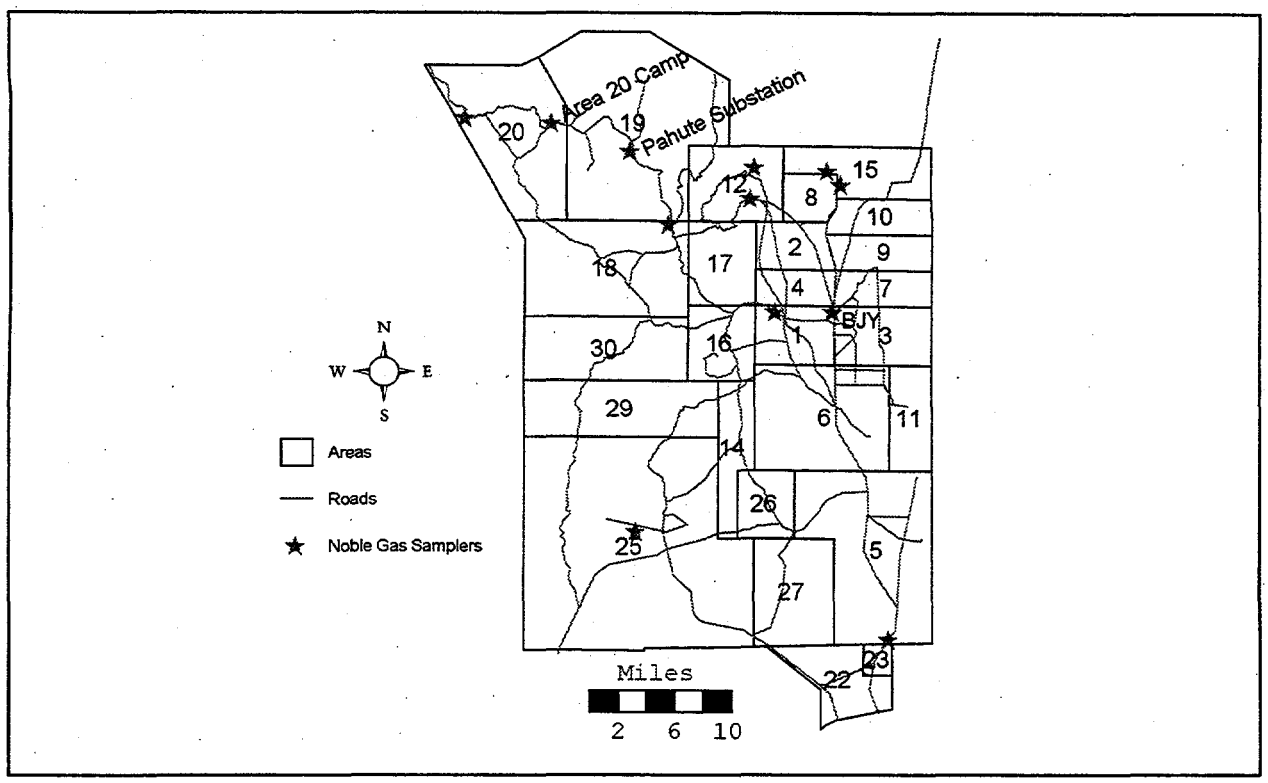


Figure 7.1 Nevada Test Site Map With Noble Gas Sampling Locations

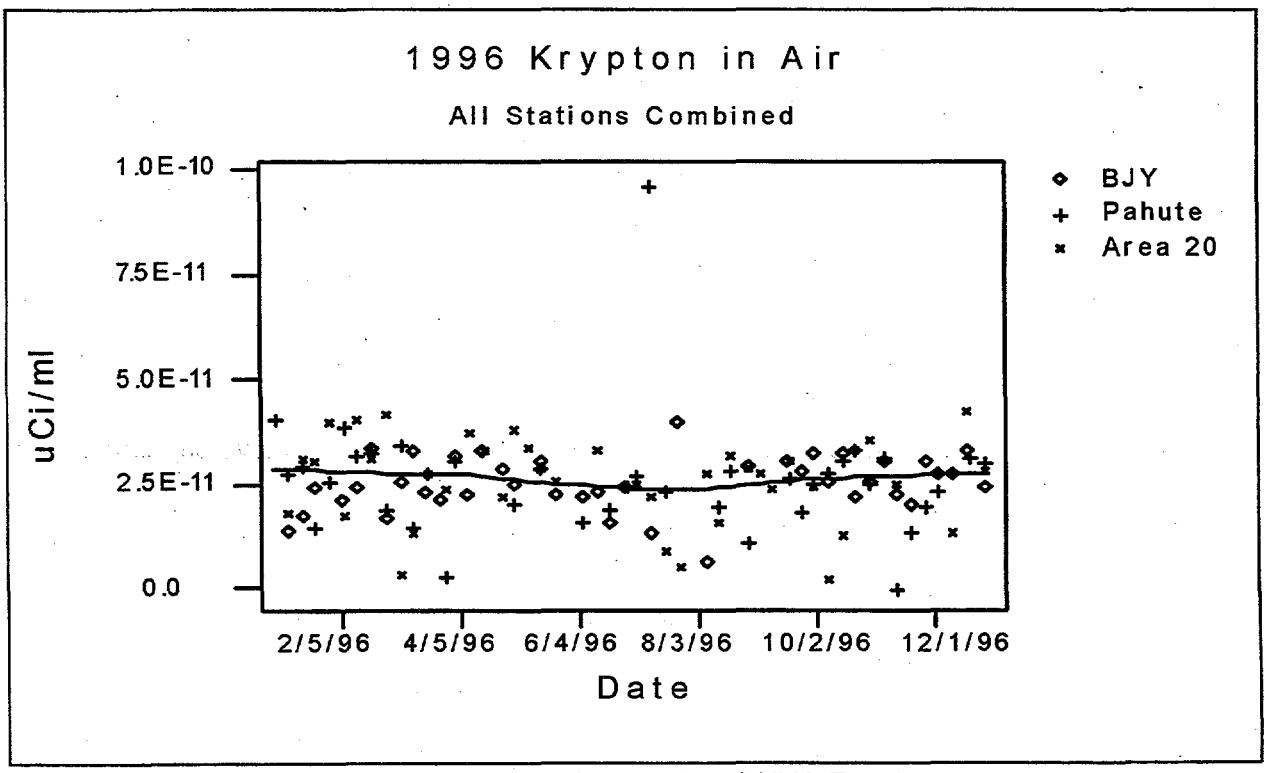


Figure 7.2 Time Series Plot of All Kr Results

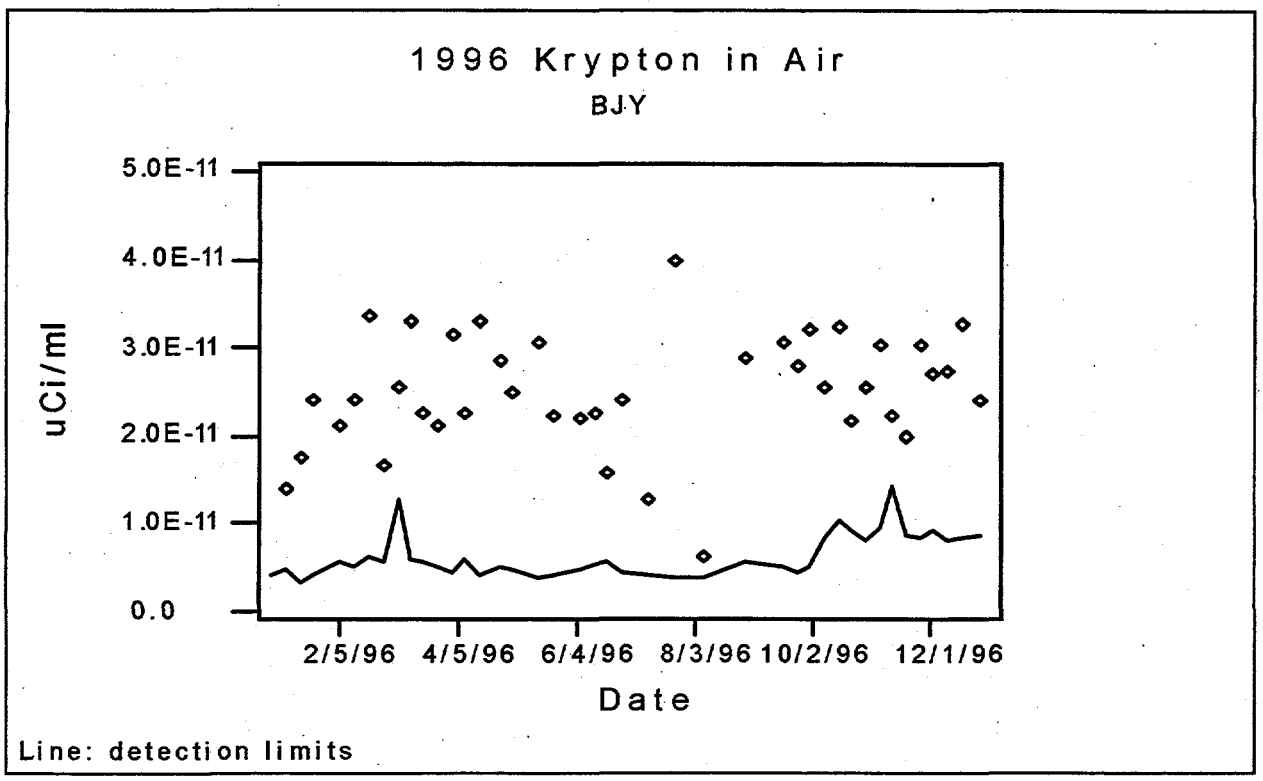


Figure 7.3 Time Series Plot of BJY Kr Results

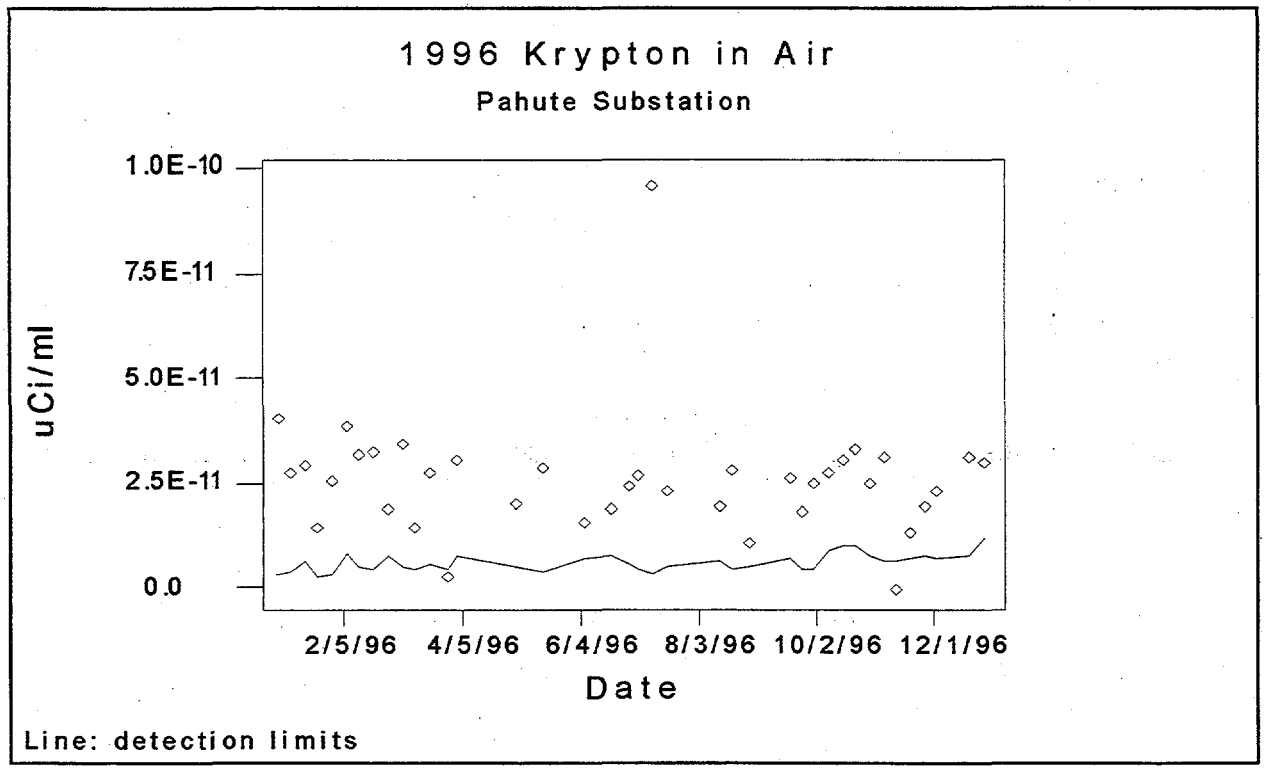


Figure 7.4 Time Series Plot of Pahute Substation Kr Results

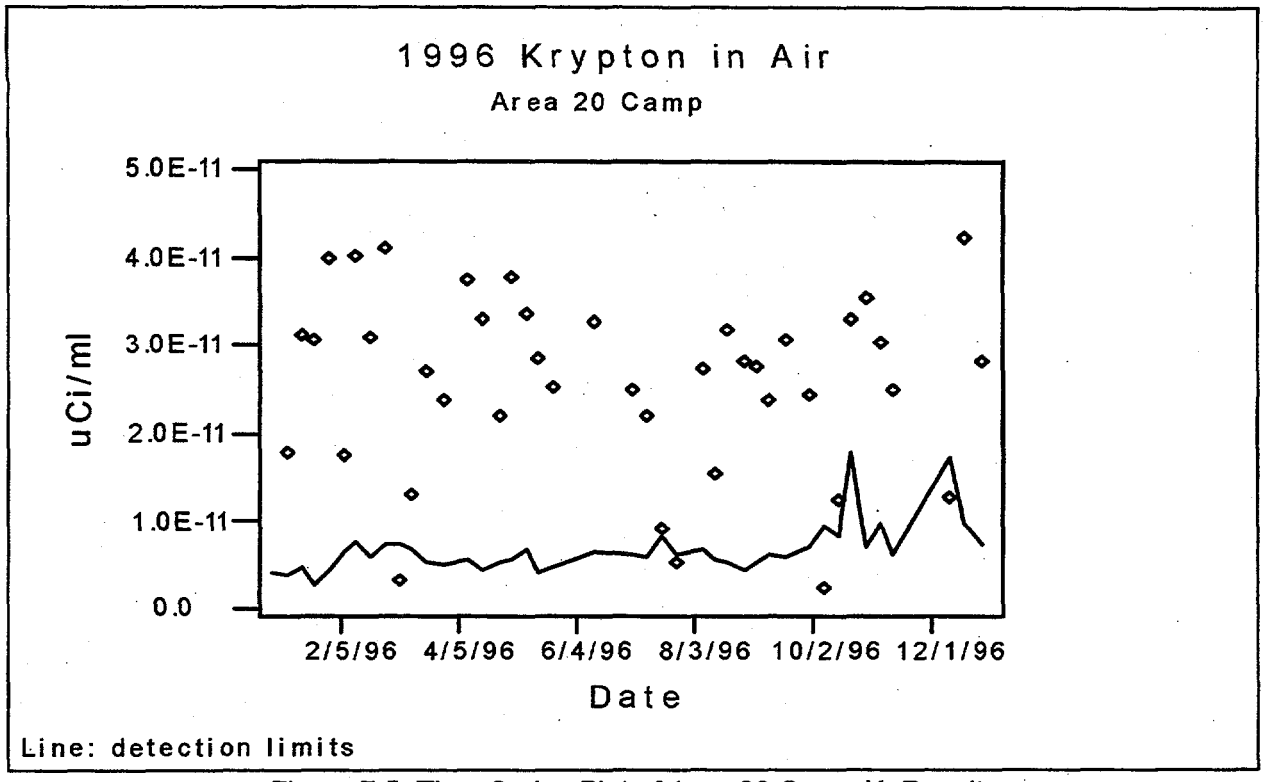


Figure 7.5 Time Series Plot of Area 20 Camp Kr Results

Table 7.1 Descriptive Statistics of 1996 Krypton Data ($\mu Ci/mL \times 10^{-12}$)

Environmental Stations	N	Mean	Median	Standard Deviation	1st Quartile	3rd Quartile	Maximum
BJY	42	25.4	25.6	7.2	21.8	30.6	45.6
Pahute Substation	39	24.8	24.2	8.7	18.8	30.2	40.5
Area 20, Camp	42	25.9	26.2	10.3	21.0	33.1	42.2
All	123	25.3	26.2	8.8	21.2	31.0	45.6

Table 7.2 One-Way ANOVA on Krypton Concentrations for Differences between Stations ($\mu Ci/mL \times 10^{-12}$)

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Statistic	p-Value
Station	2	84.5	42.2	0.54	0.586
Error	120	9426.9	78.6		
Total	122	9511.3			

Level	N	Mean	Standard Deviation
BJY	42	25.597	7.228
Pahute Sub	39	24.167	8.734
Area 20	42	26.157	10.343

Pooled Standard Deviation = 8.863

Individual 95% Confidence Intervals For Means Based on Pooled Standard Deviation

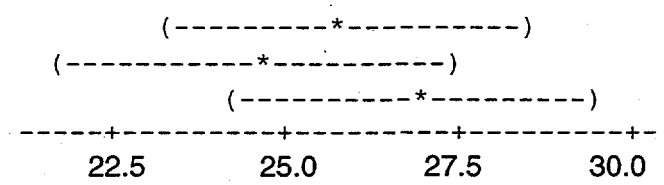


Table 7.3 NTS Krypton History

Historical Krypton Annual Averages, $\mu Ci/mL \times 10^{-12}$

Location	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
BJY	25.4	26.5	28.0	29.0	30.0	25.3	23.7	24.1	23.3	24.0	25.8	26.9	25.3	27.5	25.4
Gravel Pit	*	*	*	30.0	29.0	26.2	22.8	22.4	24.8	24.0	26.6	26.8	26.1	*	*
Gate 200 South	*	25.3	26.0	27.0	27.0	27.3	23.4	22.7	22.6	22.5	26.6	26.8	23.8	28.4	*
Area 12 Camp	24.5	24.8	27.0	28.0	30.0	25.7	26.9	22.9	23.9	23.6	25.9	25.7	24.3	27.4	*
EPA Farm	25.4	24.9	28.0	30.0	31.0	*	*	*	*	23.4	26.3	26.0	26.0	*	*
PILEDRIVER	*	*	*	*	*	26.2	24.4	22.3	24.2	*	*	*	*	*	*
Gate 400	*	*	*	*	*	*	*	*	*	*	24.5	26.5	24.6	27.0	*
Pahute Substation	*	*	*	*	*	*	*	*	*	*	24.4	27.3	23.1	27.2	24.8
Area 20 Camp	*	22.5	31.0	46.0	58.0	39.3	28.8	26.8	29.3	31.7	29.5	28.4	26.5	33.7	25.9
DDZ77 Trans.	*	*	*	*	*	*	*	*	*	*	24.3	27.4	29.7	*	*
E-MAD North	24.4	25.3	27.0	29.0	32.0	26.4	22.5	22.1	21.4	23.8	27.7	25.6	25.8	*	*

* Missing data value, station inactive for the year.

Attachment 7.1 Sample Results for ^{85}Kr - 1996

Sampling Location	Sampling Dates Start	End	10^{-12} µCi/mL Concentration	Standard Deviation	Detection Limit
Area 1, BJY	12/26/95	01/03/96	45.6	1.35	3.57
Area 1, BJY	01/03/96	01/08/96	(b)		
Area 1, BJY	01/08/96	01/16/96	14.0	1.51	4.72
Area 1, BJY	01/16/96	01/22/96	17.6	1.06	3.14
Area 1, BJY	01/22/96	01/31/96	24.1	2.43	4.26
Area 1, BJY	01/31/96	02/05/96	(d)		
Area 1, BJY	02/05/96	02/12/96	21.2	3.13	5.78
Area 1, BJY	02/12/96	02/20/96	24.2	2.82	5.04
Area 1, BJY	02/20/96	02/27/96	33.7	3.59	6.38
Area 1, BJY	02/27/96	03/05/96	16.8	3.01	5.64
Area 1, BJY	03/05/96	03/11/96	25.6	6.53	12.7
Area 1, BJY	03/11/96	03/18/96	32.9	3.44	6.07
Area 1, BJY	03/18/96	03/25/96	22.7	3.03	5.52
Area 1, BJY	03/25/96	04/01/96	21.2	2.71	4.92
Area 1, BJY	04/01/96	04/08/96	31.5	2.66	4.53
Area 1, BJY	04/08/96	04/15/96	22.6	3.27	6.02
Area 1, BJY	04/15/96	04/25/96	32.9	2.47	4.12
Area 1, BJY	04/25/96	05/01/96	28.5	2.88	5.02
Area 1, BJY	05/01/96	05/09/96	25.0	2.71	4.83
Area 1, BJY	05/09/96	05/15/96	(c)		
Area 1, BJY	05/15/96	05/23/96	30.6	2.36	3.87
Area 1, BJY	05/23/96	06/05/96	22.3	2.40	4.27
Area 1, BJY	06/05/96	06/12/96	21.9	2.72	4.88
Area 1, BJY	06/12/96	06/19/96	22.7	2.95	5.34
Area 1, BJY	06/19/96	06/26/96	15.7	2.98	5.65
Area 1, BJY	06/26/96	07/03/96	24.1	2.54	4.51
Area 1, BJY	07/03/96	07/10/93	(c)		
Area 1, BJY	07/10/96	07/17/96	12.9	2.22	4.15
Area 1, BJY	07/17/96	07/24/96	(a)		
Area 1, BJY	07/24/96	07/31/96	38.8	2.39	3.74
Area 1, BJY	07/31/96	08/08/96	(c)		
Area 1, BJY	08/08/96	08/20/96	6.19	1.95	3.81
Area 1, BJY	08/20/96	08/28/96	(b)		
Area 1, BJY	08/28/96	09/04/96	29.0	3.22	5.71
Area 1, BJY	09/04/96	09/10/96	(b)		
Area 1, BJY	09/10/96	09/17/96	(c)		

Missing value code, due to:
(a) Instrument malfunction.
(b) Sample lost in analysis.
(c) No sample collected, insufficient sample, no pressure in sample bottle, sampler failed, loss of power.
(d) Unknown or undocumented cause.

Attachment 7.1 (Sample Results for ^{85}Kr - 1996, cont.)

Sampling Location	Sampling Dates Start	End	10^{-12} µCi/mL Concentration	Standard Deviation	Detection Limit
Area 1, BJY	09/17/96	09/24/96	17.8	2.68	5.00
Area 1, BJY	09/24/96	09/30/96	28.0	2.56	4.44
Area 1, BJY	09/30/96	10/08/96	32.1	2.95	5.13
Area 1, BJY	10/08/96	10/15/96	25.5	2.82	8.22
Area 1, BJY	10/15/96	10/22/96	32.3	3.55	10.3
Area 1, BJY	10/22/96	10/29/96	21.8	3.07	9.20
Area 1, BJY	10/29/96	11/05/96	25.6	2.78	8.07
Area 1, BJY	11/05/96	11/12/96	30.3	3.24	9.45
Area 1, BJY	11/12/96	11/19/96	22.3	4.58	14.3
Area 1, BJY	11/19/96	11/26/96	19.8	2.82	8.50
Area 1, BJY	11/26/96	12/03/96	30.4	2.98	8.47
Area 1, BJY	12/03/96	12/10/96	27.1	3.16	9.25
Area 1, BJY	12/10/96	12/17/96	27.3	2.76	7.89
Area 1, BJY	12/17/96	12/26/96	32.7	2.96	8.34
Area 1, BJY	12/26/96	01/02/97	24.0	2.93	8.60
Area 19, Pahute Substation	12/26/95	01/03/96	30.2	1.34	3.84
Area 19, Pahute Substation	01/03/96	01/08/96	40.5	1.22	3.26
Area 19, Pahute Substation	01/08/96	01/16/96	27.4	1.29	3.74
Area 19, Pahute Substation	01/16/96	01/22/96	28.9	2.09	6.32
Area 19, Pahute Substation	01/22/96	01/29/96	14.6	1.66	2.97
Area 19, Pahute Substation	01/29/96	02/06/96	25.3	2.07	3.47
Area 19, Pahute Substation	02/06/96	02/12/96	38.1	4.57	8.20
Area 19, Pahute Substation	02/12/96	02/20/96	31.8	2.89	5.04
Area 19, Pahute Substation	02/20/96	02/27/96	32.1	2.07	4.60
Area 19, Pahute Substation	02/27/96	03/05/96	18.8	3.97	7.58
Area 19, Pahute Substation	03/05/96	03/12/96	34.1	3.09	5.30
Area 19, Pahute Substation	03/12/96	03/19/96	14.4	2.56	4.80
Area 19, Pahute Substation	03/19/96	03/28/96	27.1	3.27	5.90
Area 19, Pahute Substation	03/28/96	04/02/96	2.82	2.17	4.39
Area 19, Pahute Substation	04/02/96	04/09/96	30.7	4.28	7.83
Area 19, Pahute Substation	04/09/96	04/16/96	(c)		
Area 19, Pahute Substation	04/16/96	04/25/96	(c)		
Area 19, Pahute Substation	04/25/96	05/02/96	(a)		
Area 19, Pahute Substation	05/02/96	05/09/96	20.2	2.88	5.30
Area 19, Pahute Substation	05/09/96	05/15/96	(c)		
Area 19, Pahute Substation	05/15/96	05/23/96	28.8	2.32	3.86

Missing value code, due to:
(a) Instrument malfunction.
(b) Sample lost in analysis.
(c) No sample collected, insufficient sample, no pressure in sample bottle, sampler failed, loss of power.
(d) Unknown or undocumented cause.

Attachment 7.1 (Sample Results for ^{85}Kr - 1996, cont.)

Sampling Location	Sampling Dates Start	End	10^{-12} µCi/mL Concentration	Standard Deviation	Detection Limit
Area 19, Pahute Substation	05/23/96	06/05/96	(c)		
Area 19, Pahute Substation	06/05/96	06/19/96	15.7	3.67	7.07
Area 19, Pahute Substation	06/19/96	06/27/96	18.5	4.04	7.73
Area 19, Pahute Substation	06/27/96	07/03/96	24.4	3.25	5.93
Area 19, Pahute Substation	07/03/96	07/10/96	26.7	2.46	4.22
Area 19, Pahute Substation	07/10/96	07/17/96	95.6	2.86	3.51
Area 19, Pahute Substation	07/17/96	07/25/96	23.2	2.80	5.04
Area 19, Pahute Substation	07/25/96	07/31/96	(c)		
Area 19, Pahute Substation	07/31/96	08/07/96	(c)		
Area 19, Pahute Substation	08/07/96	08/13/96	(c)		
Area 19, Pahute Substation	08/13/96	08/20/96	19.0	3.27	6.13
Area 19, Pahute Substation	08/20/96	08/28/96	27.8	2.53	4.36
Area 19, Pahute Substation	08/28/96	09/04/96	10.4	2.71	5.28
Area 19, Pahute Substation	09/04/96	09/10/96	(c)		
Area 19, Pahute Substation	09/10/96	09/19/96	(c)		
Area 19, Pahute Substation	09/19/96	09/24/96	26.2	2.44	6.90
Area 19, Pahute Substation	09/24/96	09/30/96	18.1	2.50	4.58
Area 19, Pahute Substation	09/30/96	10/08/96	25.1	2.66	4.75
Area 19, Pahute Substation	10/08/96	10/15/96	27.2	3.03	8.94
Area 19, Pahute Substation	10/15/96	10/22/96	30.1	3.37	9.77
Area 19, Pahute Substation	10/22/96	10/29/96	33.0	3.51	10.2
Area 19, Pahute Substation	10/29/96	11/05/96	24.9	2.56	7.38
Area 19, Pahute Substation	11/05/96	11/12/96	31.0	2.28	6.15
Area 19, Pahute Substation	11/12/96	11/19/96	-0.60	1.83	6.23
Area 19, Pahute Substation	11/19/96	11/26/96	13.1	2.20	6.73
Area 19, Pahute Substation	11/26/96	12/03/96	19.5	2.64	7.88
Area 19, Pahute Substation	12/03/96	12/10/96	22.8	2.44	7.05
Area 19, Pahute Substation	12/10/96	12/19/96	(c)		
Area 19, Pahute Substation	12/19/96	12/26/96	31.0	2.81	7.86
Area 19, Pahute Substation	12/26/96	01/02/97	29.6	4.08	12.2
Area 20, Camp	12/26/95	01/03/96	38.3	1.57	4.42
Area 20, Camp	01/03/96	01/08/96	(c)		
Area 20, Camp	01/08/96	01/16/96	18.0	1.28	3.90
Area 20, Camp	01/16/96	01/22/96	31.3	1.67	4.89
Area 20, Camp	01/22/96	01/29/96	30.7	1.70	2.61
Area 20, Camp	01/29/96	02/06/96	39.8	2.85	4.61

Missing value code, due to:
(a) Instrument malfunction.
(b) Sample lost in analysis.
(c) No sample collected, insufficient sample, no pressure in sample bottle, sampler failed, loss of power.
(d) Unknown or undocumented cause.

Attachment 7.1 (Sample Results for ^{85}Kr - 1996, cont.)

Sampling Location	Sampling Dates Start	End	10^{-12} µCi/mL Concentration	Standard Deviation	Detection Limit
Area 20, Camp	02/06/96	02/12/96	17.5	3.48	6.64
Area 20, Camp	02/12/96	02/20/96	40.3	4.41	7.84
Area 20, Camp	02/20/96	02/27/96	30.9	3.37	5.98
Area 20, Camp	02/27/96	03/05/96	41.2	4.22	7.41
Area 20, Camp	03/05/96	03/12/96	3.17	3.68	7.49
Area 20, Camp	03/12/96	03/19/96	13.1	3.58	6.98
Area 20, Camp	03/19/96	03/28/96	27.1	2.98	5.30
Area 20, Camp	03/28/96	04/02/96	23.7	2.75	4.96
Area 20, Camp	04/02/96	04/09/96	(a)		
Area 20, Camp	04/09/96	04/16/96	37.4	3.37	5.75
Area 20, Camp	04/16/96	04/25/96	33.1	2.66	4.51
Area 20, Camp	04/25/96	05/02/96	22.0	2.88	5.23
Area 20, Camp	05/02/96	05/09/96	37.9	3.28	5.59
Area 20, Camp	05/09/96	05/15/96	33.5	3.80	6.81
Area 20, Camp	05/15/96	05/23/96	28.6	2.45	4.16
Area 20, Camp	05/23/96	05/30/96	25.3	2.63	4.64
Area 20, Camp	05/30/96	06/05/96	(c)		
Area 20, Camp	06/05/96	06/12/96	(c)		
Area 20, Camp	06/12/96	06/19/96	32.8	3.37	6.57
Area 20, Camp	06/19/96	06/27/96	(c)		
Area 20, Camp	06/27/96	07/03/96	(a)		
Area 20, Camp	07/03/96	07/10/96	25.1	3.46	6.34
Area 20, Camp	07/10/96	07/18/96	22.0	3.29	6.05
Area 20, Camp	07/18/96	07/25/96	9.09	4.16	8.30
Area 20, Camp	07/25/96	07/31/96	5.35	3.13	6.27
Area 20, Camp	07/31/96	08/07/96	(c)		
Area 20, Camp	08/07/96	08/13/96	27.3	3.79	6.97
Area 20, Camp	08/13/96	08/20/96	15.5	3.05	5.78
Area 20, Camp	08/20/96	08/28/96	31.9	3.03	5.26
Area 20, Camp	08/28/96	09/04/96	28.4	2.63	4.53
Area 20, Camp	09/04/96	09/10/96	27.6	3.06	5.50
Area 20, Camp	09/10/96	09/18/96	23.7	3.34	6.18
Area 20, Camp	09/18/96	09/24/96	30.7	3.36	6.01
Area 20, Camp	09/24/96	09/30/96	(c)		
Area 20, Camp	09/30/96	10/08/96	24.4	3.82	7.12
Area 20, Camp	10/08/96	10/15/96	2.30	2.90	9.65

Missing value code, due to:
(a) Instrument malfunction.
(b) Sample lost in analysis.
(c) No sample collected, insufficient sample, no pressure in sample bottle, sampler failed, loss of power.
(d) Unknown or undocumented cause.

Attachment 7.1 (Sample Results for ^{85}Kr - 1996, cont.)

Sampling Location	Sampling Dates Start	End	10^{-12} µCi/mL Concentration	Standard Deviation	Detection Limit
Area 20, Camp	10/15/96	10/22/96	12.4	2.72	8.48
Area 20, Camp	10/22/96	10/29/96	33.1	5.81	17.9
Area 20, Camp	10/29/96	11/05/96	35.4	2.64	7.12
Area 20, Camp	11/05/96	11/12/96	30.3	3.41	9.89
Area 20, Camp	11/12/96	11/19/96	25.1	2.21	6.22
Area 20, Camp	11/19/96	11/21/96	(b)		
Area 20, Camp	11/21/96	11/26/96	(b)		
Area 20, Camp	11/26/96	12/03/96	(c)		
Area 20, Camp	12/03/96	12/10/96	(d)		
Area 20, Camp	12/10/96	12/17/96	12.9	5.31	17.2
Area 20, Camp	12/17/96	12/26/96	42.2	3.54	9.81
Area 20, Camp	12/26/96	01/02/97	28.2	2.66	7.51

Missing value code, due to:
(a) Instrument malfunction.
(b) Sample lost in analysis.
(c) No sample collected, Insufficient sample, No pressure in sample bottle, sampler failed, loss of power.
(d) Unknown or undocumented cause.

8.0 ONSITE GAMMA-EMITTING RADIONUCLIDES IN AIR AND WATER AND RADIUM AND STRONTIUM IN WATER

Data for gamma emitting radionuclides in air and water of the Nevada Test Site (NTS) are obtained from gamma spectroscopy of air filters and water samples. Over 1,000 water samples and 2,000 air filters were submitted for gamma spectroscopy in 1996. A computer program identifies specific isotopes from the spectra. Of the thousands of spectra that are analyzed annually, only a few show identifiable isotopes that are not naturally occurring. This chapter reports the results of these analyses along with the results of radium and strontium in water analyses.

GAMMA EMITTING RADIONUCLIDES IN AIR

Naturally occurring radionuclides not in equilibrium at the time of counting, such as ^{208}Tl, ^{212}Pb, ^{214}Pb, and ^{214}Bi, were omitted from this data report. This leaves no gamma emitting radioisotopes other than the naturally occurring ^{7}Be and ^{40}K, and the non-naturally occurring ^{137}Cs. Descriptive statistics, in units of µCi/mL, for these radionuclides appear in Table 8.1. Only 7 of the 2,278 analytical results for ^{7}Be are less than the individual detection limits; thus, the statistics for this isotope in Table 8.1 summarize environmental levels. However, 87 percent of the ^{40}K results and 44 percent of the ^{137}Cs results are below individual detection limits; thus, the statistics for these isotopes in Table 8.1 may not quantitatively represent environmental levels. The individual analytical results for the naturally occurring radioisotopes ^{7}Be and ^{40}K are not presented in this report. The analytical results for ^{137}Cs are presented in Attachment 8.1. The very limited number of ^{137}Cs data that are above detection limits, five values, precludes any further statistical analysis of this data.

The median detection limit for ^{7}Be in air was 6.2×10^{-14} µCi/mL in 1996. For ^{40}K, it was 1.2×10^{-13} µCi/mL, and for ^{137}Cs, the detection, limit was 7.7×10^{-15} µCi/mL.

GAMMA EMITTING RADIONUCLIDES IN WATER

The only non-naturally occurring gamma emitter found in NTS water samples was ^{137}Cs. This was found in five samples, all from Area 12 E Tunnel effluent and Pond No. 2. The presence of non-naturally occurring radionuclides in these waters is not surprising, since nuclear experiments formerly occurred within this tunnel. Descriptive statistics for these data are presented in Table 8.2, and the data appear in Attachment 8.2. Four of the five results are above the minimum detectable concentration (MDC). The median MDC for these five analyses is 1.2×10^{-7} µCi/mL.

RADIUM-226 AND RADIUM-228 IN WATER

Radium concentrations were measured quarterly at 11 supply wells around the NTS in 1996. Water samples from other types of sources are not analyzed for radium. The data for ^{226}Ra appear in Attachment 8.3, and for ^{228}Ra, the data appear in Attachment 8.4. Descriptive statistics for radium in water for all locations and dates combined appear in Table 8.3. For ^{226}Ra, the median MDC is 2.2×10^{-9} µCi/mL and 86 percent of the results are less than the corresponding MDC. For ^{228}Ra, the median MDC is 9.9×10^{-10} µCi/mL and 88 percent of the results are less than the individual MDC.

Tables 8.4 and 8.5 summarize the radium data by the quarter that the samples were collected. Examination of these tables indicates that second quarter results have larger mean values and standard deviations for both radium isotopes. This situation was investigated, and it was found that the radium tracer used in the analyses contained impurities. The effects of the impurities cannot be compensated for and result in the observed larger variability in the data for the second quarter.

Since over 85 percent of the results for both radium isotopes are less than the corresponding MDC, no further statistical analyses were performed.

STRONTIUM-90 IN WATER

In 1996, ^{90}Sr concentrations were measured in samples from 45 locations on the NTS. Samples were collected quarterly from 12 supply wells, and an annual sample for 1996 was collected from 7 potable water end points, 7 natural springs, 9 open reservoirs, 2 containment ponds, and 8 sewage ponds. A total of 78 ^{90}Sr analyses were performed in 1996. The locations in each of these classes of water samples are identified in Attachment 8.5.

The ^{90}Sr data are presented in Attachment 8.5. An examination of the data in this attachment will show that all concentrations are below the individual MDC, except those from the containment ponds, and these two values are substantially above the MDC. Water from inside the E-Tunnel, where nuclear experiments formerly occurred, drains into the effluent and then into the pond. Thus it is not surprising to find non-naturally occurring radionuclides in these waters. Descriptive statistics by type of sampling location for the ^{90}Sr results, except for the containment ponds, are given in Table 8.4. The median MDC for the sampling locations in Table 8.6 combined is 3.06×10^{-11} µCi/mL. Table 8.7 contains summary annual statistics for the supply wells. Since the remaining locations were sampled for ^{90}Sr only once during 1996, no statistics can be computed.

Since all the ^{90}Sr results from the environmental water sampling locations, that is all locations excluding the containment ponds, are less than the individual MDC and 76 percent of those results are negative, any statistical analyses or further data descriptions are unreasonable. This data simply shows that, except for the containment ponds, no ^{90}Sr was detected in NTS water samples.

CONCLUSIONS

The only non-naturally occurring gamma emitting radionuclide found in air in 1996 was ^{137}Cs. This isotope was detected in nine air samples from a total of over 2,000 samples analyzed. The maximum of these nine cesium concentrations was 1.5×10^{-14} µCi/mL, about twice the detection limit. The only non-naturally occurring gamma emitting radionuclide found in water was also ^{137}Cs, which was found only in E Tunnel effluents. ^{226}Ra and ^{228}Ra were found in supply well waters. Eighty-six percent of the ^{226}Ra analyses results were below the individual MDC, and 88 percent of the ^{228}Ra results were below MDC. All ^{90}Sr results in 1996 were below MDC, except the samples collected from containment ponds.

Table 8.1 Descriptive Statistics for Gamma Emitting Radionuclides in Air (µCi/mL) - 1996

Nuclide	Number of Samples Containing	Mean	Median	Standard Deviation	Minimum	Maximum
^{7}Be	2278	2.5×10^{-13}	2.4×10^{-13}	7.7×10^{-14}	2.3×10^{-14}	8.8×10^{-13}
^{40}K	15	9.6×10^{-14}	8.6×10^{-14}	4.0×10^{-14}	6.4×10^{-14}	2.2×10^{-13}
^{137}Cs	9	8.2×10^{-15}	7.8×10^{-15}	2.8×10^{-15}	5.1×10^{-15}	1.5×10^{-14}

Table 8.2 Descriptive Statistics for Gamma Emitting Radionuclides in Water (µCi/mL) - 1996

Nuclide	Number of Samples Containing	Mean	Median	Standard Deviation	Minimum	Maximum
^{137}Cs	5	2.1×10^{-7}	1.7×10^{-7}	1.5×10^{-7}	1.0×10^{-7}	4.7×10^{-7}

Table 8.3 Descriptive Statistics for Radium in Water (µCi/mL) - 1996

Nuclide	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
^{226}Ra	42	1.1×10^{-9}	0.8×10^{-9}	1.5×10^{-9}	-2.4×10^{-9}	5.5×10^{-9}
^{228}Ra	42	1.3×10^{-10}	0.5×10^{-10}	5.0×10^{-10}	-14.9×10^{-10}	16.3×10^{-10}

Table 8.4 Descriptive Statistics for ^{226}Ra in Water by Quarter (µCi/mL x 10^{-9}) - 1996

Quarter	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	10	1.16	1.14	0.84	0.00	2.57
2	10	2.37	2.87	2.57	-2.37	5.53
3	11	0.91	0.88	0.90	0.16	1.78
4	11	0.26	0.32	0.58	-1.01	1.32

Table 8.5 Descriptive Statistics for ^{228}Ra in Water by Quarter (µCi/mL x 10^{-10}) - 1996

Quarter	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	10	1.26	1.24	1.90	-0.20	4.84
2	10	3.98	7.59	9.62	-14.90	16.30
3	11	-0.28	0.00	1.73	-2.44	3.14
4	11	0.50	0.50	1.92	-2.44	3.14

Table 8.6 Descriptive Statistics for ^{90}Sr in Water at Environmental Locations (µCi/mL x 10^{-11}) - 1996

Location Type	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
Supply Wells	45	-3.7	-3.9	8.0	-23.5	17.0
Potable Water	7	-7.1	-5.5	5.5	-15.7	0.9
Natural Springs	7	-8.4	-7.6	7.2	-19.0	2.0
Open Reservoirs	9	-6.0	-5.5	6.7	-18.4	5.7
Sewage Lagoons	8	-8.0	-6.0	10.0	-28.5	3.6
All Types Combined	76	-5.2	-4.6	7.9	-28.5	17.0

Table 8.7 Descriptive Statistics for ^{90}Sr in Water From Supply Wells (µCi/mL x 10^{-11}) - 1996

Area/Location	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
Area 5, Well 5B	4	-3.5	-2.3	6.2	-11.9	1.65
Area 5, Well 5C	4	-4.8	-5.9	4.2	-8.3	1.0
Area 5, Well UE-5C	4	-3.3	-7.2	12.9	-6.6	6.9
Area 6, Well No. 4A	4	2.6	0.6	6.7	-2.8	12.2
Area 6, Well No. 4	4	-8.4	-9.4	4.0	-12.1	-2.7
Area 6, Well C-1	4	-0.6	-1.4	6.0	-6.6	6.9
Area 16, Well UE-16D	4	-2.6	-3.8	8.9	-10.1	7.4
Area 18, Well HTH No. 8	4	-4.5	-3.2	6.5	-13.4	1.9
Area 22, Army Well No. 1	4	-5.1	-10.5	15.7	-16.3	17.0
Area 25, Well J-12	4	-1.7	-2.4	3.0	-4.5	2.5
Area 25, Well J-13	4	-4.2	-3.7	4.0	-9.5	0.1

Attachment 8.1 ^{137}Cs in Air ($\mu Ci/mL \times 10^{-15}$) - 1996

Sampling Location	Sampling Period Start	Sampling Period End	Concentration	Standard Deviation	Detection Limit
Area 3, U-3ah/at South	10/29/96	11/06/96	5.9	2.7	5.4
Area 3, U-3ah/at North	10/09/96	10/15/96	7.1	3.7	7.7
Area 3, U-3ah/at West	12/10/96	12/17/96	8.1	3.8	11.0
Area 3, U-3ah/at West	12/17/96	12/30/96	9.6	5.1	17.8
Area 5, RWMS No. 9	07/16/96	07/23/96	7.3	3.2	6.8
Area 5, DOD Yard	01/16/96	01/22/96	8.2	4.0	7.9
Area 9, 9-300	06/05/96	06/12/96	7.8	3.4	7.2
Area 10, Sedan Crater	03/19/96	03/26/96	5.1	2.4	5.7
Area 27, Camp	06/18/96	06/24/96	14.8	4.9	9.1

Attachment 8.2 ^{137}Cs in Water ($\mu Ci/mL \times 10^{-7}$) - 1996

Sampling Location	Sampling Date	Concentration	Standard Deviation[(a)]	MDC
Area 12, E Tunnel Effluent	02/07/96	1.7	0.6	1.5
Area 12, E Tunnel Effluent	05/30/96	1.8	0.6	1.0
Area 12, E Tunnel Effluent	07/25/96	1.0	0.4	1.2
Area 12, E Tunnel Effluent	10/31/96	1.4	0.4	1.0
Area 12, E Tunnel Pond No. 2	07/25/96	4.7	0.7	1.2

(a) Derived from counting error

Attachment 8.3 ^{226}Ra in Water ($\mu Ci/mL \times 10^{-9}$) - 1996

Sampling Location	Sampling Date	Concentration	Standard Deviation	MDC
Area 5, Well 5B	01/17/96	1.1	0.7	2.2
Area 5, Well 5B	05/09/96	2.5	0.9	2.8
Area 5, Well 5B	07/15/96	1.5	0.6	1.9
Area 5, Well 5B	10/07/96	-0.2	0.6	2.1
Area 5, Well 5C	01/17/96	0.4	0.7	2.4
Area 5, Well 5C	05/09/96	-2.4	1.5	5.3
Area 5, Well 5C	07/15/96	0.5	0.9	3.1
Area 5, Well 5C	10/07/96	0.5	0.6	1.9
Area 5, Well UE-5c	05/09/96	0.9	1.2	4.1
Area 5, Well UE-5c	07/15/96	1.5	0.6	2.0
Area 5, Well UE-5c	10/07/96	0.3	0.6	1.9

Attachment 8.3 (^{226}Ra in Water [µCi/mL x 10^{-9}] - 1996, cont.)

Sampling Location	Sampling Date	Concentration	Standard Deviation	MDC
Area 6, Well No. 4A	01/17/96	1.7	0.7	2.2
Area 6, Well No. 4A	07/15/96	1.0	0.8	2.8
Area 6, Well No. 4A	10/07/96	0.5	0.5	1.8
Area 6, Well No. 4	01/17/96	1.3	0.6	1.9
Area 6, Well No. 4	05/09/96	4.4	1.2	3.6
Area 6, Well No. 4	07/15/96	0.2	0.7	2.6
Area 6, Well No. 4	10/07/96	0.1	0.6	2.1
Area 6, Well C-1	01/17/96	2.3	0.6	1.6
Area 6, Well C-1	05/09/96	5.5	1.1	3.0
Area 6, Well C-1	07/15/96	1.8	0.8	2.5
Area 6, Well C-1	10/07/96	0.5	0.6	1.9
Area 16, Well UE-16d	01/17/96	2.6	0.7	2.0
Area 16, Well UE-16d	05/09/96	4.6	1.0	2.8
Area 16, Well UE-16d	07/15/96	0.9	0.9	3.0
Area 16, Well UE-16d	10/07/96	1.3	0.7	2.2
Area 18, Well HTH No. 8	01/17/96	0.6	0.5	1.8
Area 18, Well HTH No. 8	05/09/96	3.6	1.2	3.7
Area 18, Well HTH No. 8	07/15/96	0.2	0.8	2.7
Area 18, Well HTH No. 8	10/07/96	0.1	0.5	1.8
Area 22, Army Well No. 1	01/17/96	0.4	0.6	2.1
Area 22, Army Well No. 1	05/09/96	1.1	1.2	4.7
Area 22, Army Well No. 1	07/15/96	0.4	0.7	2.5
Area 22, Army Well No. 1	10/07/96	-1.0	0.6	2.4
Area 25, Well J-12	01/17/96	1.2	0.7	2.2
Area 25, Well J-12	05/09/96	0.2	1.4	4.9
Area 25, Well J-12	07/15/96	1.8	0.6	1.9
Area 25, Well J-12	10/07/96	0.6	0.6	1.9
Area 25, Well J-13	01/17/96	0.0	0.7	2.4
Area 25, Well J-13	05/09/96	3.2	1.0	3.1
Area 25, Well J-13	07/15/96	0.3	0.6	2.0
Area 25, Well J-13	10/07/96	0.1	0.6	2.2

Attachment 8.4 ^{228}Ra in Water (µCi/mL x 10^{-10}) - 1996

Sampling Location	Sampling Date	Concentration	Standard Deviation	MDC
Area 5, Well 5B	01/17/96	1.6	2.8	10.6
Area 5, Well 5B	05/09/96	5.6	2.1	2.4
Area 5, Well 5B	07/15/96	-0.7	2.4	10.2
Area 5, Well 5B	10/07/96	-1.1	1.8	8.0
Area 5, Well 5C	01/17/96	0.9	2.9	11.6

Attachment 8.4 (^{228}Ra in Water [µCi/mL x 10^{-10}] - 1996, cont)

Sampling Location	Sampling Date	Concentration	Standard Deviation	MDC
Area 5, Well 5C	05/09/96	9.0	3.0	3.0
Area 5, Well 5C	07/15/96	0.9	3.3	13.2
Area 5, Well 5C	10/07/96	-1.5	1.5	7.1
Area 5, Well UE-5c	05/09/96	-6.5	4.3	18.5
Area 5, Well UE-5c	07/15/96	-1.4	2.2	10.2
Area 5, Well UE-5c	10/07/96	0.5	1.9	7.5
Area 6, Well No. 4A	01/17/96	0.0	0.4	10.7
Area 6, Well No. 4A	07/15/96	3.1	3.1	11.3
Area 6, Well No. 4A	10/07/96	0.5	1.8	7.1
Area 6, Well No. 4	01/17/96	2.1	2.5	9.2
Area 6, Well No. 4	05/09/96	-5.2	5.8	23.6
Area 6, Well No. 4	07/15/96	0.0	0.2	11.6
Area 6, Well No. 4	10/07/96	-0.6	2.0	8.6
Area 6, Well C-1	01/17/96	4.8	2.6	8.1
Area 6, Well C-1	05/09/96	8.0	3.9	12.4
Area 6, Well C-1	07/15/96	0.0	0.2	11.2
Area 6, Well C-1	10/07/96	5.6	2.4	7.1
Area 16, Well UE-16D	01/17/96	2.9	2.7	9.7
Area 16, Well UE-16D	05/09/96	10.4	2.8	2.2
Area 16, Well UE-16D	07/15/96	1.6	3.1	11.7
Area 16, Well UE-16D	10/07/96	1.1	2.0	7.5
Area 18, Well HTH No. 8	01/17/96	-2.0	1.7	8.8
Area 18, Well HTH No. 8	05/09/96	-14.9	6.8	28.9
Area 18, Well HTH No. 8	07/15/96	0.0	0.2	12.3
Area 18, Well HTH No. 8	10/07/96	-1.1	1.7	7.8
Area 22, Army Well No. 1	01/17/96	2.3	2.7	10.1
Area 22, Army Well No. 1	05/09/96	16.3	4.1	3.1
Area 22, Army Well No. 1	07/15/96	-2.1	2.1	10.2
Area 22, Army Well No. 1	10/07/96	0.6	2.1	8.0
Area 25, Well J-12	01/17/96	0.0	0.4	10.7
Area 25, Well J-12	05/09/96	7.2	3.0	3.6
Area 25, Well J-12	07/15/96	-2.1	2.1	10.0
Area 25, Well J-12	10/07/96	0.5	1.7	6.6
Area 25, Well J-13	01/17/96	0.0	0.4	11.8
Area 25, Well J-13	05/09/96	9.9	4.5	20.5
Area 25, Well J-13	07/15/96	-2.4	1.7	8.8
Area 25, Well J-13	10/07/96	1.1	2.1	8.0

Attachment 8.5 ^{90}Sr in Water (µCi/mL x 10^{-11}) - 1996

Sampling Location	Sampling Date	Concentration	Standard Deviation	MDC
SUPPLY WELLS				
Area 5, Well 5B	01/17/96	-3.8	8.9	32.7
Area 5, Well 5B	05/09/96	2.5	7.7	27.3
Area 5, Well 5B	07/15/96	-11.9	7.2	28.5
Area 5, Well 5B	10/07/96	-0.8	7.5	27.0
Area 5, Well 5C	01/17/96	1.0	9.2	32.8
Area 5, Well 5C	05/09/96	-8.3	8.3	31.4
Area 5, Well 5C	07/15/96	-7.4	8.0	30.6
Area 5, Well 5C	10/07/96	-4.3	7.7	28.6
Area 5, Well UE-5c	01/31/96	15.3	12.9	43.5
Area 5, Well UE-5c	05/09/96	-5.9	7.3	27.8
Area 5, Well UE-5c	07/15/96	-14.2	7.9	31.4
Area 5, Well UE-5c	10/07/96	-8.5	9.5	36.1
Area 6, Well No. 4A	01/17/96	12.2	10.2	34.7
Area 6, Well No. 4A	06/04/96	-1.1	10.8	38.8
Area 6, Well No. 4A	07/15/96	-2.8	8.0	29.8
Area 6, Well No. 4A	10/07/96	2.2	7.2	25.4
Area 6, Well No. 4	01/17/96	-2.7	8.4	30.7
Area 6, Well No. 4	05/09/96	-9.9	7.9	30.3
Area 6, Well No. 4	07/15/96	-12.1	8.0	31.5
Area 6, Well No. 4	10/07/96	-8.9	8.0	30.4
Area 6, Well C-1	01/17/96	1.3	12.4	44.6
Area 6, Well C-1	05/09/96	6.9	8.3	28.8
Area 6, Well C-1	07/15/96	-4.2	7.6	28.2
Area 6, Well C-1	10/07/96	-6.6	6.6	25.1
Area 16, Well UE-16d	01/17/96	7.4	9.2	31.7
Area 16, Well UE-16d	05/09/96	2.4	7.8	27.6
Area 16, Well UE-16d	07/15/96	-10.1	7.3	28.4
Area 16, Well UE-16d	10/07/96	-10.0	5.7	22.5
Area 18, Well HTH No. 8	01/17/96	1.9	9.1	32.4
Area 18, Well HTH No. 8	05/09/96	-1.7	7.9	29.0
Area 18, Well HTH No. 8	07/15/96	-13.4	7.7	30.5
Area 18, Well HTH No. 8	10/07/96	-4.6	7.0	26.0
Area 20, Well U-20	01/29/96	-23.5	9.8	40.2
Area 22, Army Well No. 1	01/17/96	17.0	9.0	29.3
Area 22, Army Well No. 1	05/07/96	-16.2	6.4	26.4
Area 22, Army Well No. 1	07/15/96	-4.8	7.0	26.3
Area 22, Army Well No. 1	10/07/96	-16.3	6.4	26.7
Area 25, Well J-12	01/17/96	-2.1	10.0	36.5
Area 25, Well J-12	05/09/96	2.5	7.6	27.0
Area 25, Well J-12	07/15/96	-2.7	8.2	30.2
Area 25, Well J-12	10/07/96	-4.5	6.8	25.3
Area 25, Well J-13	01/17/96	-3.5	7.8	28.9
Area 25, Well J-13	05/09/96	-3.9	7.1	26.5
Area 25, Well J-13	07/15/96	-9.5	7.5	29.0
Area 25, Well J-13	10/07/96	0.1	6.4	23.0

Attachment 8.5 (^{90}Sr in Water [$\mu Ci/mL \times 10^{-11}$] - 1996, cont.)

Sampling Location	Sampling Date	Concentration	Standard Deviation	MDC
POTABLE WATER END POINTS				
Area 1, Ice House	07/11/96	-12.1	8.0	31.6
Area 2, Restroom	07/11/96	-15.7	6.9	28.0
Area 6, Area Cafeteria	07/11/96	-8.3	7.9	30.5
Area 6, Building 6-900	07/11/96	-5.5	8.4	31.1
Area 12, Building 12-23	07/11/96	-3.6	7.7	28.8
Area 23, Mercury Cafeteria	07/11/96	-5.1	7.6	28.4
Area 25, Building 4221	07/11/96	0.9	8.7	31.2
NATURAL SPRINGS				
Area 5, Cane Spring	07/15/96	-7.6	8.3	31.4
Area 7, Reitman Seep	07/15/96	-3.0	13.7	50.2
Area 12, White Rock Spring	07/22/96	1.9	9.4	33.3
Area 12, Captain Jack Spring	07/22/96	-4.2	7.6	28.4
Area 15, Tub Spring	07/22/96	-13.1	7.1	28.0
Area 16, Tippipah Spring	07/15/96	-13.5	8.4	32.9
Area 29, Topopah Spring	07/15/96	-19.0	7.8	32.2
OPEN RESERVOIRS				
Area 2, Mud Plant Pond	07/22/96	5.7	8.7	30.6
Area 3, Well A Reservoir	07/22/96	-1.6	7.4	26.9
Area 5, Well 5B Reservoir	07/15/96	-5.5	8.1	30.4
Area 5, UE-5c Reservoir	07/15/96	-7.3	9.2	34.6
Area 6, Well 3 Reservoir	07/15/96	-12.2	8.0	31.6
Area 6, Well C-1 Reservoir	07/15/96	-18.4	7.6	31.4
Area 18, Camp 17 Reservoir	07/22/96	-4.3	19.6	71.7
Area 25, Well J11 Reservoir	07/15/96	-6.3	8.2	30.7
Area 25, Well J12 Reservoir	07/15/96	-3.9	8.9	33.0
CONTAINMENT PONDS				
Area 12, E Tunnel Effluent	07/25/96	75.1	13.3	35.5
Area 12, E Tunnel Pond No. 2	07/25/96	138.0	14.8	32.7
SEWAGE LAGOONS				
Area 5, RWMS Sewage Pond	08/08/96	3.6	11.4	40.3
Area 6, Yucca Sewage Pond	08/08/96	-4.5	10.4	38.5
Area 6, DAF Sewage Pond	08/08/96	-4.9	11.0	40.8
Area 11, LANL Sewage Pond	08/08/96	-28.5	10.1	42.4
Area 12, Sewage Pond	08/08/96	-7.1	10.5	39.3
Area 22, Sewage Pond	08/08/96	-7.0	12.7	47.4
Area 23, Sewage Pond	08/08/96	0.1	10.2	37.1
Area 25, Central Sewage Pond	08/08/96	-15.2	8.7	34.2

9.0 ONSITE GROSS ALPHA AND GROSS BETA IN WATER

Water sampling for gross alpha and gross beta levels is done quarterly. For data analysis purposes, the sampling locations are divided into seven types. The types of water sampling stations are listed below.

- Potable water or supply wells are the wells that supply water for human consumption. These wells may also be used to supply water for industrial and construction purposes. In 1996, samples were collected quarterly from ten supply wells.

- Industrial wells or non-potable water wells are wells that supply water only for industrial and construction purposes. Samples were collected quarterly from two industrial wells.

- Potable water end points or water supply distribution end points are locations where water is drawn for human consumption. These are typically faucets in buildings such as offices and cafeterias. In 1996, samples were collected quarterly from seven end points.

- Natural springs are places where ground water comes to the surface. They are used by the fauna of the NTS and sometimes are dry when visited for sampling. Samples were collected annually, in July, from eight natural springs.

- Sewage lagoons are the end points for the several sanitary sewage systems operated on the NTS. Water is lost from these lagoons primarily by evaporation. Samples are collected quarterly from nine lagoons.

- Open reservoirs are man-made water storage ponds for waters. Most are adjacent to wells, but this type also includes the reservoirs that supply the concrete batch plants (Mud Plants) and the Area 23 recreational swimming pool (which is now empty). Samples are collected annually, in July, from nine open reservoirs. An additional six open reservoirs were scheduled for sampling but were dry on the sampling date.

- Containment ponds are used to contain the effluents from the tunnels. The water in these typically has elevated levels of tritium. Loss of water is primarily by evaporation. In 1996, the only tunnel that had an effluent seepage was the E tunnel. It has an effluent flow and two containment ponds, which are arranged so that the first pond overflow is collected in the second pond. These waters are collectively named the E Tunnel Containment Ponds. They are sampled quarterly.

Gross alpha analyses are performed only for potable water wells and water supply distribution end points. Gross beta analyses are performed for all types of samples; however, open reservoirs and natural springs are sampled only once a year. The names of the sampling locations in each of these type classifications are given in the attachments to this chapter.

Sampling locations, sampling dates, measured concentrations, analytic standard deviations, and minimal detectable concentrations (MDC) for gross alpha and gross beta in water appear in Attachments 9.1 and 9.2. (Figures, tables and attachments, in that order, are found at the end of the chapter.) Figure 9.1 is a map of the NTS showing the water sampling locations.

Several changes were made in the sampling network during 1996 in response to the reduced level of activities on the NTS. Well C in Area 6 broke down in early 1996 and was taken out of service rather than repaired. Well U-20 in Area 20 is operated only when needed and thus is

usually out of service when visited for sampling. Both Well C and Well U-20 are industrial water wells. Often, faucet sampling locations are inside buildings that are locked when visited for water sampling. When this occurs, the samplers usually collect samples from adjacent locations that are on the same water supply, such as the building across the street or next door. Thus the data attachments contain Area 1 samples collected from Building 101 and the Area 1 Ice House. Likewise the Area 12 samples were collected at Building 12-23, the Medical Aid station, and the Area 12 Ice House.

GROSS ALPHA IN WATER

Gross alpha levels in water for 1996 were measured quarterly at 10 potable water supply wells, 2 industrial water wells, and 7 potable water end points for a total of 19 locations not counting the use of adjacent buildings. The data are presented in Attachment 9.1. Note that alpha analyses are not done for the open waters: reservoirs, ponds, lagoons, and springs. Descriptive statistics by location and type are given in Table 9.1. Table 9.2 presents descriptive statistics by quarter. The mean for all sampling locations combined is slightly smaller than that reported for 1995, but the 1996 median is slightly larger. For the entire network, all results are positive, and approximately 10 percent are less than their individual detection limits.

Time series plots of the alpha levels versus date of sampling showed no interesting patterns. The data for each quarter is approximately uniformly spread over a range of zero to 15×10^{-9} µCi/mL with no distinction for the type of sampling location. Figure 9.3 shows the alpha levels by sampling date.

In previous years, except for 1994, neither the normal nor lognormal statistical distribution has characterized the observed gross alpha concentrations particularly well. This has necessitated the use of nonparametric statistics to test for the significance of differences between subgroups within the data. Concentrations observed in 1996 follow this pattern of not fitting a regular statistical distribution, as illustrated in the normal probability plot of the gross alpha data from all sampling stations combined, as shown in Figure 9.2. This figure shows a good fit to a normal distribution for results above a value of 5.0×10^{-9} but below this value the data appear to have the shape of a lognormal distribution. This change point is not related to the detection limits. The median MDC is 1.39×10^{-9} µCi/mL, which is about the point at which the line of data values crosses the solid line just above the zero value.

The Kruskal-Wallis test is the nonparametric equivalent of the one way analysis of variance (ANOVA). It is valid for a wide variety of distributional shapes, at the price of lower statistical power (less ability to detect differences when they exist) than classical ANOVA. Table 9.3 gives the results of a Kruskal-Wallis test for differences between the types of water samples. In the Kruskal-Wallis test, a statistic is calculated for each level of the grouping variable, which, if concentrations within groups had the same median, has a standard normal distribution. This statistic appears in the output under the heading "Z-value." The Z-values for each row of the test output indicate, on a scale of a standardized normal variable, how much the ranks of that row deviate from the overall mean rank. The Kruskal-Wallis statistic has approximately a Chi-square distribution with degrees of freedom equal to one less than the number of categories. Table 9.3 shows that none of the groups have a median that is significantly different from the overall median. The dotplots of the data values that appear in Table 9.3 show that the data for the three types of samples are spread over the range of values but somewhat clustered at lower values. The data were also analyzed using a parametric ANOVA. Because the data are not normal, this analysis can only be considered suggestive. This analysis found a significant difference between sampling locations but no differences between types of sampling stations or between times of sample collection.

To quantify measurement errors for gross alpha in water, the empirical coefficients of variation was calculated for each measurement from the counting statistics. The coefficient of variation is defined as the standard deviation divided by the corresponding mean value. These are displayed as a histogram in Figure 9.4. This figure shows that most of the coefficients of variation are less than 0.4, hence one can say that in general the standard deviations are less than half the mean values.

The MDC are a measure of the sensitivity of an analytical procedure. The MDC is defined at the beginning of this report, on page Ex-3. Figure 9.5 presents a histogram of the 1996 gross alpha in water MDCs. This figure shows that, except for two outliers, the detection limits are less than 2×10^{-9} µCi/mL. The two outliers are from samples collected at Well C-1 on May 9, 1997, and October 7, 1997. An examination of these data points in Attachment 9.1 shows that these high detection limits are associated with measured concentrations that are also high, and that the MDCs are substantially lower than the corresponding measured values. The median MDC is 1.39×10^{-9} µCi/mL.

GROSS ALPHA HISTORICAL TRENDS

Alpha in water measurements were begun in 1984 and data exist from 1984 to the present for only three sampling locations. Data exist from 1990 to the present for an additional eleven sampling locations. Because of this scarcity of data, the historical trends are presented graphically in Table 9.4 and Figure 9.6 as the annual averages from five of the sampling stations. In Figure 9.6 the solid line is a "locally weighted scatterplot smoother line," a graphical tool for eliciting trends in data. An obvious feature in Figure 9.6 is the peak in the line occurring in 1987. No physical explanation of this peak has been found. The legend entry for Area 23 Cafeteria is for the data from the Mercury Cafeteria. Mercury is in Area 23. A notable feature of the historical data evident in Figure 9.6 is the layering of the annual averages by sampling location. The highest data values are mostly from the Area 6 Cafeteria. The second highest layer is mostly from the Area 23 Cafeteria and the data from both cafeterias are almost all above the smoother line. The rest of the sampling location averages are below the line and layered from highest to lowest as Well J-13, Building 4221, and Area 2 Restroom.

GROSS BETA IN WATER

Gross beta concentrations in water were measured at 10 supply wells, 2 industrial wells, 7 potable water end points, 9 open reservoirs, 7 natural springs, 9 sewage lagoons, and 3 containment ponds, for a total of 47 sampling locations. The individual sample collection dates, sample values, analytical standard deviations, and MDCs appear in Attachment 9.2. Descriptive statistics are given in Table 9.5. In this table, no individual location statistics are given for the open reservoirs and natural springs because these locations were sampled only once during the year. The sample values for these locations appear in Attachment 9.2. The values in Table 9.5 for the containment pond statistics are about an order of magnitude higher than the values from the other types of sampling locations. This is to be expected since the containment ponds were constructed to contain the effluents from nuclear experiments performed inside the tunnels and thus have a source of radioactivity other than environmental exposure. The median MDC for all sampling locations and all sample collection dates is 1.23×10^{-9} µCi/mL. All sample results were positive and exceeded the individual MDCs.

Table 9.6 summarizes the gross beta in water data by the quarter of the year of sample collection and by type of sampling location. First quarter collection dates range from January 9 to February 13, 1996; second quarter from May 7 to May 30, 1996; third quarter from July 11 to August 8, 1996; and fourth quarter from October 1 to November 6, 1996. Figure 9.7 presents a time series plot of the gross beta in water results for the supply Wells and drinking water end points.

Statistical hypothesis testing must account for the statistical distribution of the data in order to yield valid conclusions. ANOVA tests assume that the residuals are normally distributed. This assumption is checked by probability plotting and normality testing on the residuals from an ANOVA. The residuals are the differences between the observed data and the values predicted by the ANOVA model. In Figure 9.8, the residuals from the ANOVA test described in the next paragraph are plotted. This test used the natural logarithms of the gross beta in water data. The straightness of the plot indicates the lognormal probability distribution is a good approximation to the probability distribution of these data. The bottom right of Figure 9.8 show the results of a normality test of these residuals. These results show a very good fit to a normal statistical distribution. The lognormal distribution has been found to be appropriate for gross beta in water results in previous years reports. Hence the 1996 gross beta in water data will be treated as lognormally distributed for statistical testing.

Table 9.7 presents the results of a two-way ANOVA performed on the logarithms of observed gross beta in water concentrations. This analysis tested for differences between sampling location types and quarter of sample collection. Since the data are statistically unbalanced and contain some empty cells, a General Linear Model procedure was used for this analysis. The containment pond data were deleted from this analysis since these data are not actually environmental in origin. The results of this analysis indicated no differences between quarters and very significant differences between location types. An interaction term could not be used since this results in a rank deficient ANOVA with this data set. The pattern of differences among the location types that caused the significance can be elicited using a one-way ANOVA.

Results of a one-way ANOVA comparing the natural logarithms of gross beta concentrations among types of sampling locations appears in Table 9.8. Containment pond data were deleted from this analysis. This analysis showed the same level of significance as the two-way analysis of the previous paragraph. The advantage of the one-way analysis is that the program used for this analysis provides a Tukey's multiple comparison procedure that shows the pattern of differences between types of locations that caused the significant results. The Tukey's test showed that the sewage lagoons have significantly higher concentrations than the other types of locations.

An analysis of time trends in concentrations over the year was done for the 1994 and earlier reports. During those years, weekly samples were collected. In 1995 and 1996, only quarterly samples were collected. Four time periods a year are not adequate to find a statistical significance for moderate time trends over a year. Thus the investigation of such trends ceased in 1995.

Measurement error for gross beta in water is generally small. This is quantified by means of empirical coefficients of variation, which is the analytical standard deviation divided by the measured concentration. Empirical coefficients of variation for gross beta in water appear in Figure 9.9. This figure indicates that analytic standard deviations tend to be approximately an order of magnitude less than the observed concentrations.

Analytic standard deviations only account for counting variability. Other sources of variability include sample preparation variability, sample collection variability, and variability in the sampled waters. Prior to 1995, these types of variation were investigated using sampling duplicates. Because of reduced budgets, the duplicates program was significantly reduced in 1995 and thus the statistical analysis of duplicates was discontinued.

GROSS BETA IN WATER HISTORICAL TRENDS

Detailed reporting of historical trends for all sampling locations would result in an unwieldy document. Instead, two representative locations were chosen from the open reservoirs, natural springs, supply wells, and potable water end points. The wells chosen for this report differ from those used in previous reports. The choices for this report emphasize a continuous record from the beginning of the historically available data, in 1967. The sampling stations chosen for this report are:

Water Source	Operational Area	Sampling Location
End Point	6	Cafeteria
End Point	23	Cafeteria
Supply Well	6	Well C-1
Supply Well	5	Well 5C
Natural Springs	5	Cane Spring
Natural Springs	12	Captain Jack Spring
Open Reservoir	5	Well 5B Reservoir
Open Reservoir	18	Camp 17 Reservoir

Table 9.9 lists the historical gross beta in water data. The Area 23 Cafeteria is an alternate name for the Mercury Cafeteria. Time series plots of the data in Table 9.9 appear in Figures 9.10 through 9.13, one plot for each of the types of sampling locations. Note that Figure 9.12 has a different ordinate scale than the other gross beta time series plots. Also, the 1997 annual average for Captain Jack Spring, a value of 65.8 $\mu Ci/mL \times 10^{-9}$, is not plotted in Figure 9.12. This high value is due to a single weekly sample that was an order of magnitude higher than the remaining weekly values for that year. No historical trends were analyzed for waters from sewage lagoons or containment ponds. There is relatively little variability in concentrations of samples taken from sewage lagoons. Concentrations from containment ponds vary greatly among years, depending upon the type of experimental activities conducted within the tunnels during the years, so few meaningful conclusions could be drawn.

In general, historical trends for levels of gross beta in water are not as clear as those of gross beta in air. Underground waters, such as samples from wells, would not have been affected by atmospheric nuclear testing. Gross beta in air shows declining levels since 1970, about the time atmospheric testing ended (see Figure 2.8). No such trend is evident in the water data. There are obvious differences between sampling locations, but no long term trends are evident.

Concentrations of gross beta, as well as other contaminants, observed at Reitman Seep are typically greater than those from the other natural springs. This occurs because samples from Reitman Seep usually contain sediment, which carries more contaminants than clear water.

CONCLUSIONS

Gross alpha and beta levels in water in 1996 are approximately the same as the levels reported in 1995. No statistically significant differences were found between quarter of sample collection, but there were very significant differences between sample collection locations and types of locations. The sitewide annual average for gross alpha for 1996 is 5.83×10^{-9} $\mu Ci/mL$, and the median is 5.95×10^{-9} $\mu Ci/mL$. For gross beta the sitewide annual average, excluding containment ponds, for 1996 is 11.60×10^{-9} $\mu Ci/mL$, and the median is 7.38×10^{-9} $\mu Ci/mL$.

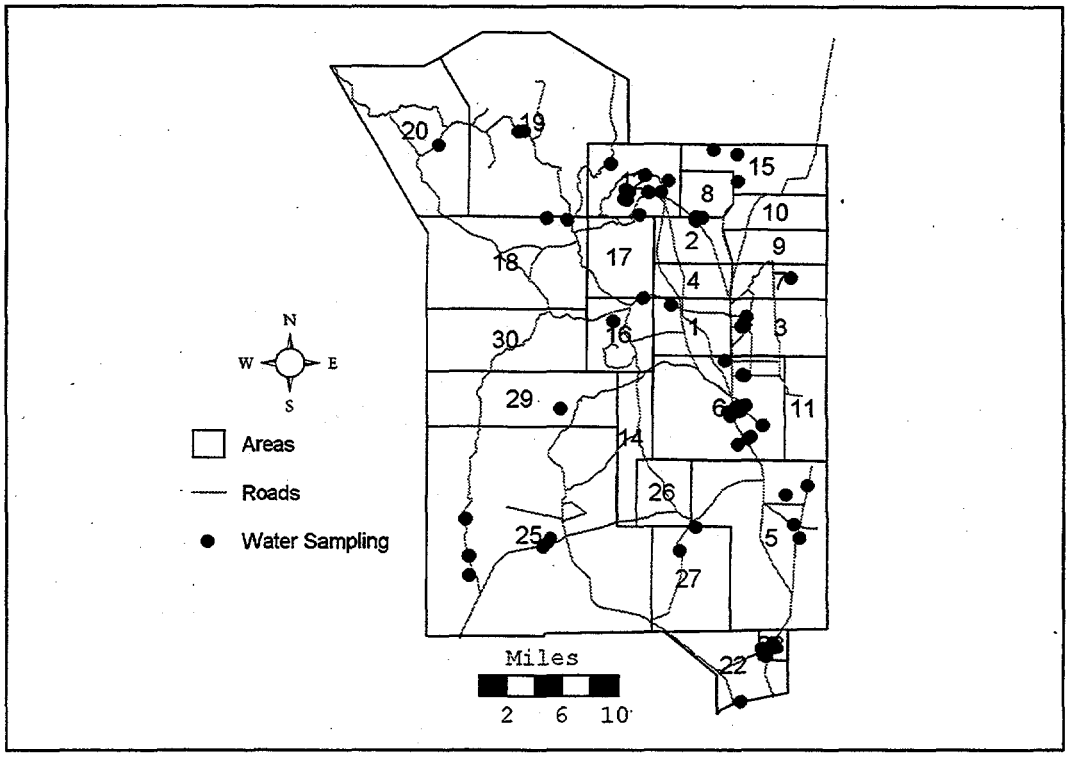


Figure 9.1 Locations of Water Sampling Stations on NTS

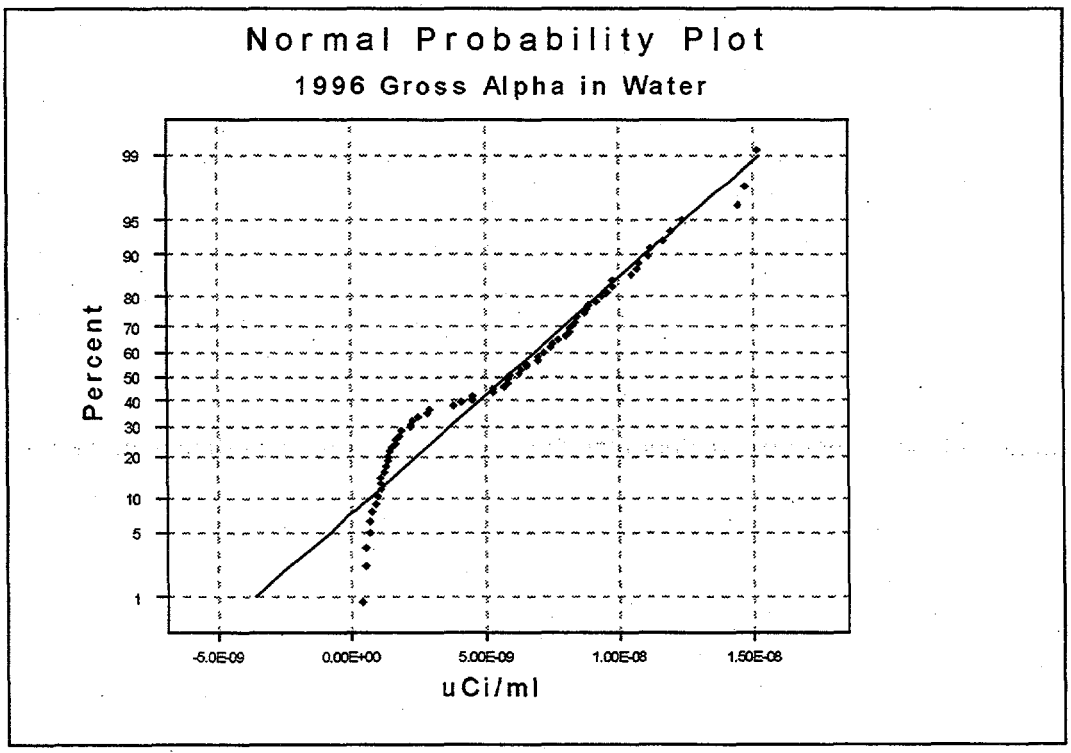


Figure 9.2 Probability Plot of All Gross Alpha in Water Results

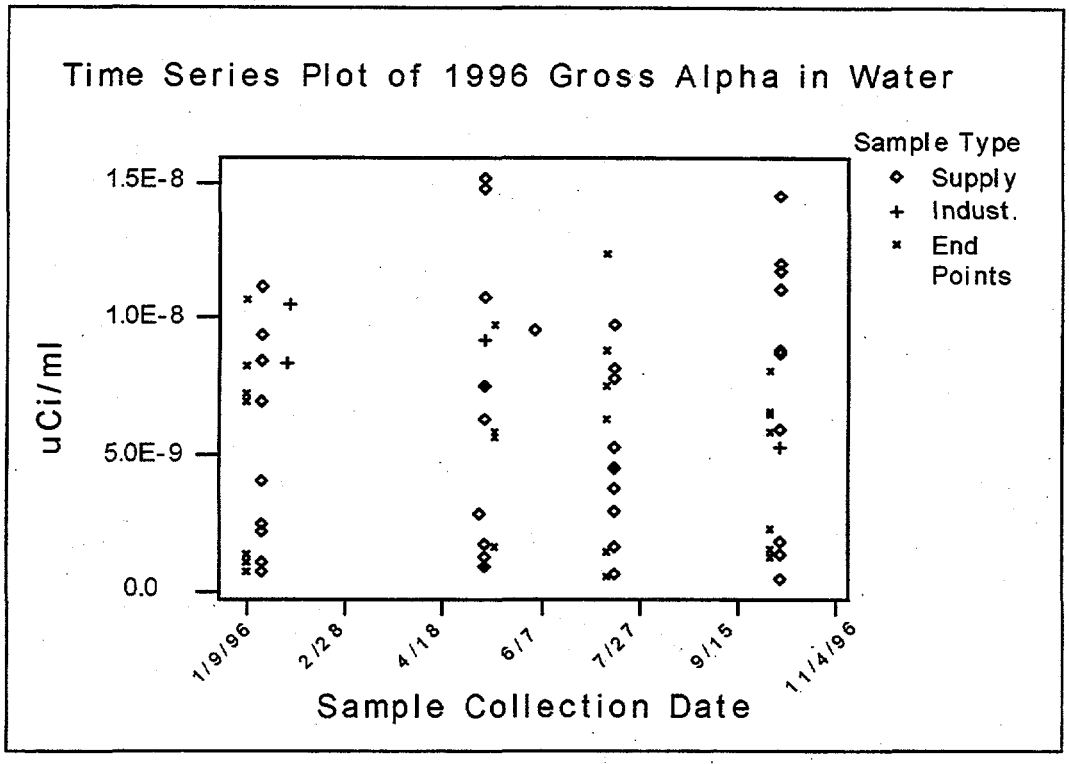


Figure 9.3 Time Series Plot of Gross Alpha in Water Results

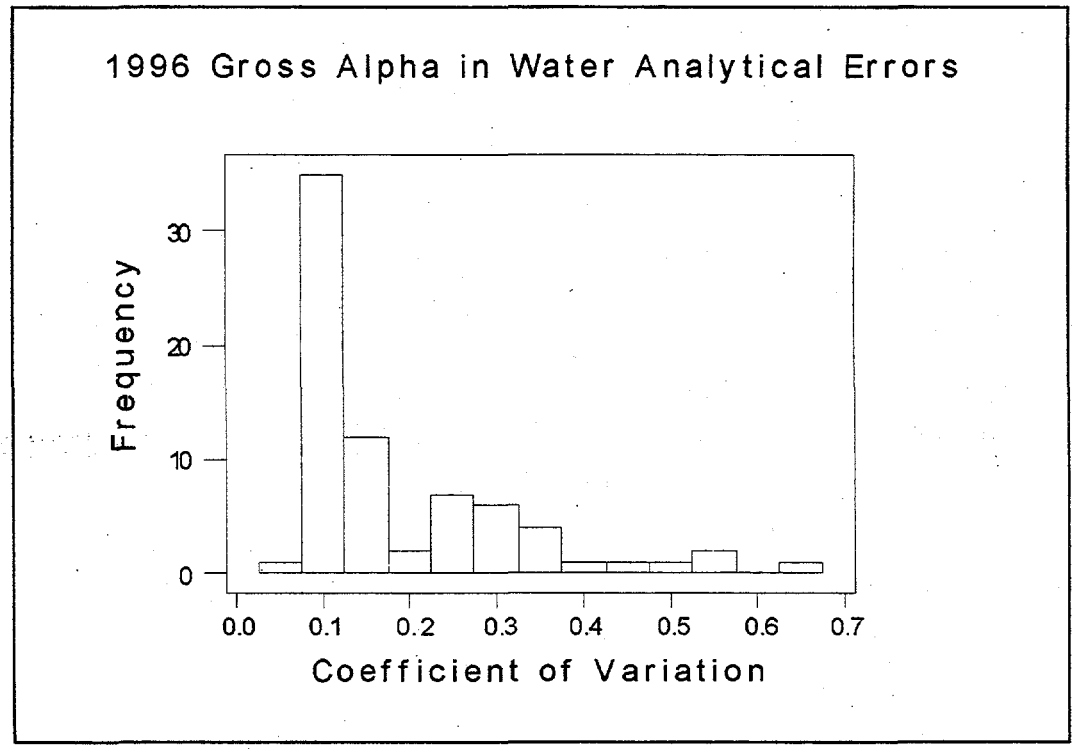


Figure 9.4 Histogram of 1996 Gross Alpha in Water Analytical Errors

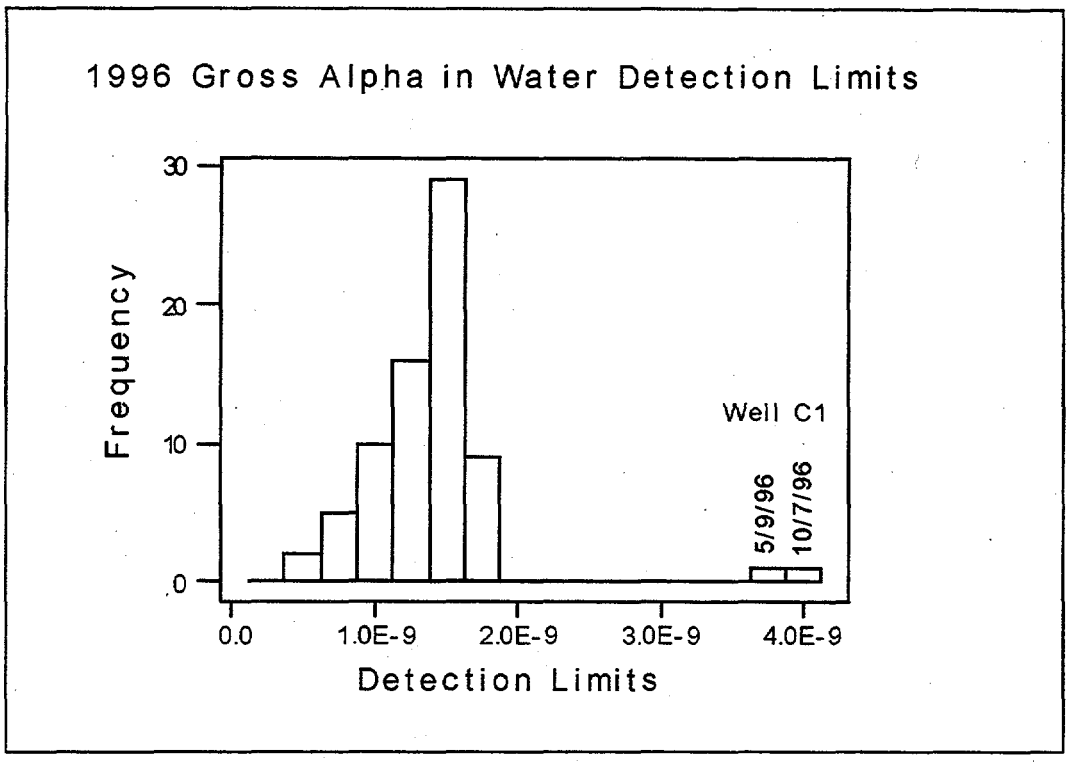


Figure 9.5 Histogram of 1996 Gross Alpha in Water Detection Limits

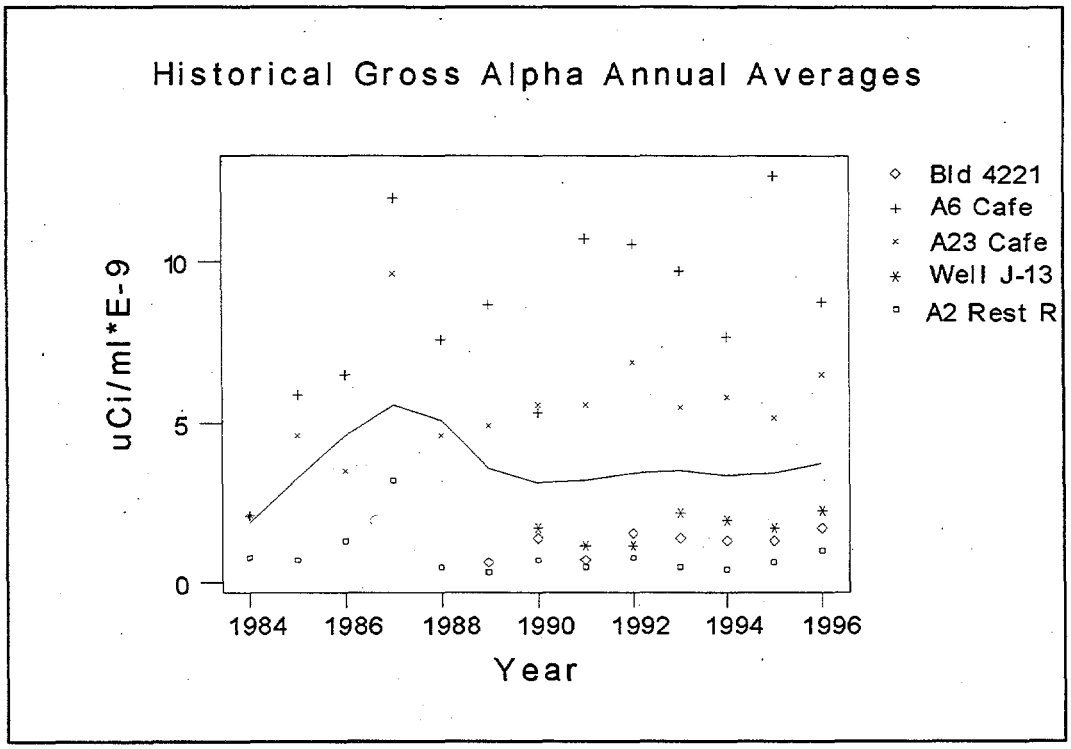


Figure 9.6 Time Series Plot of Historical Gross Alpha in Water Data

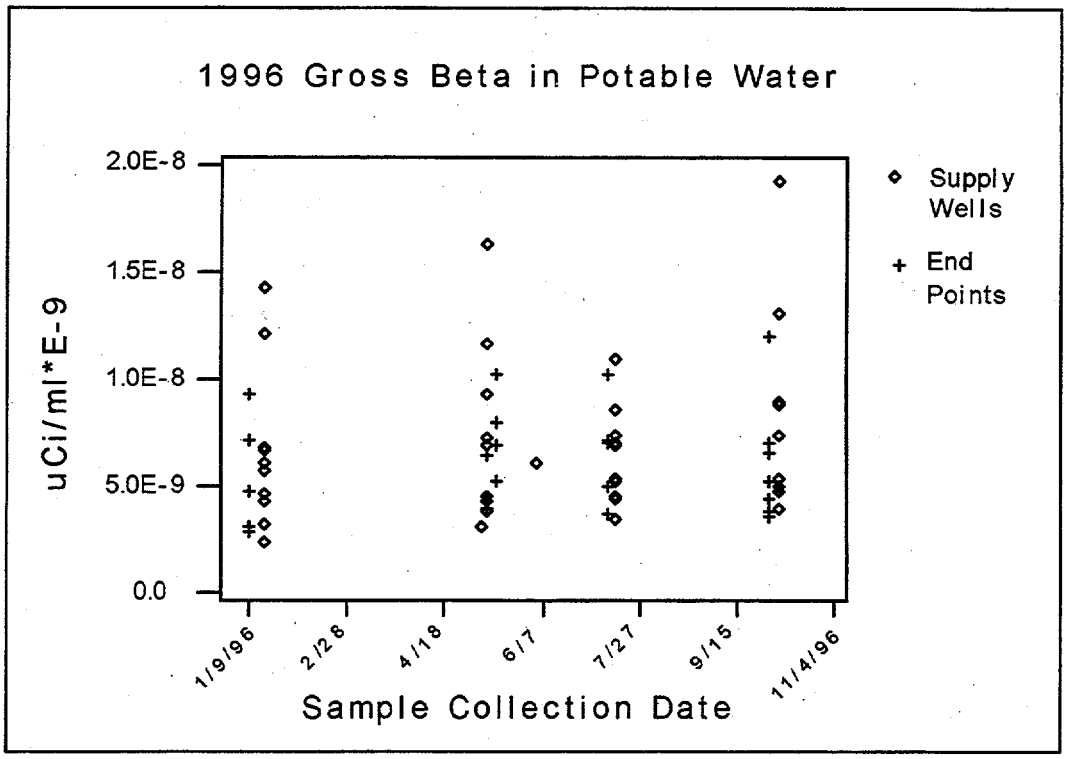


Figure 9.7 Time Series Plot for Gross Beta in Water

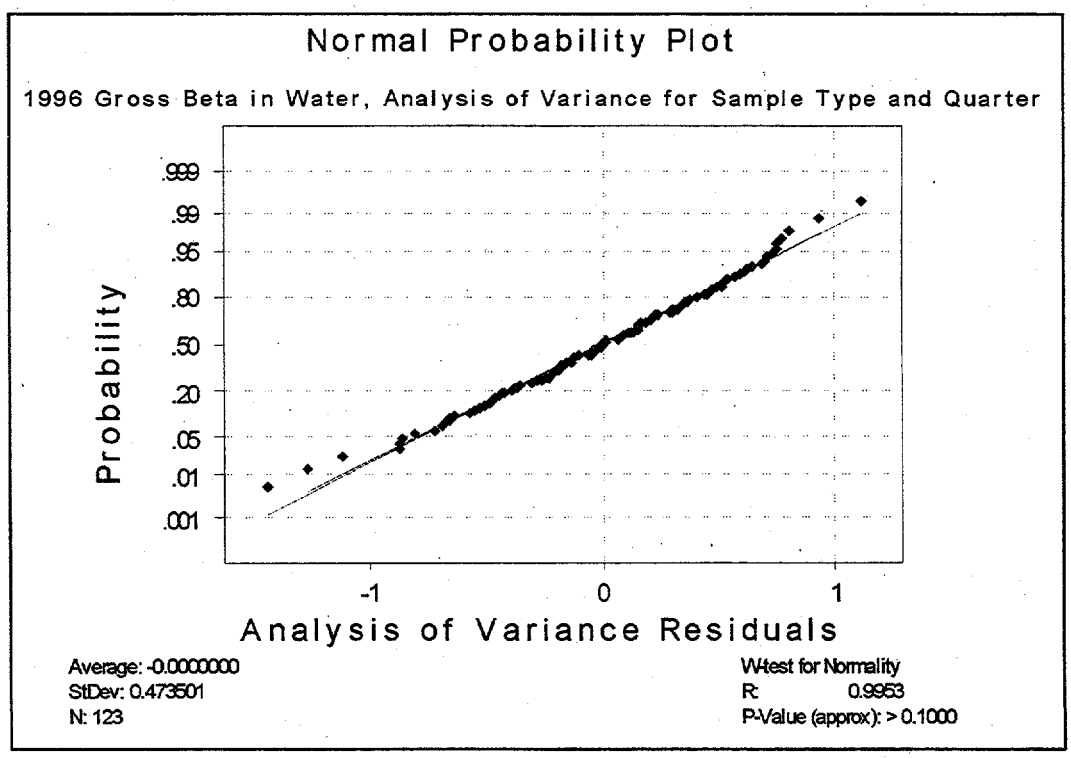


Figure 9.8 Probability Plot of ANOVA Residuals

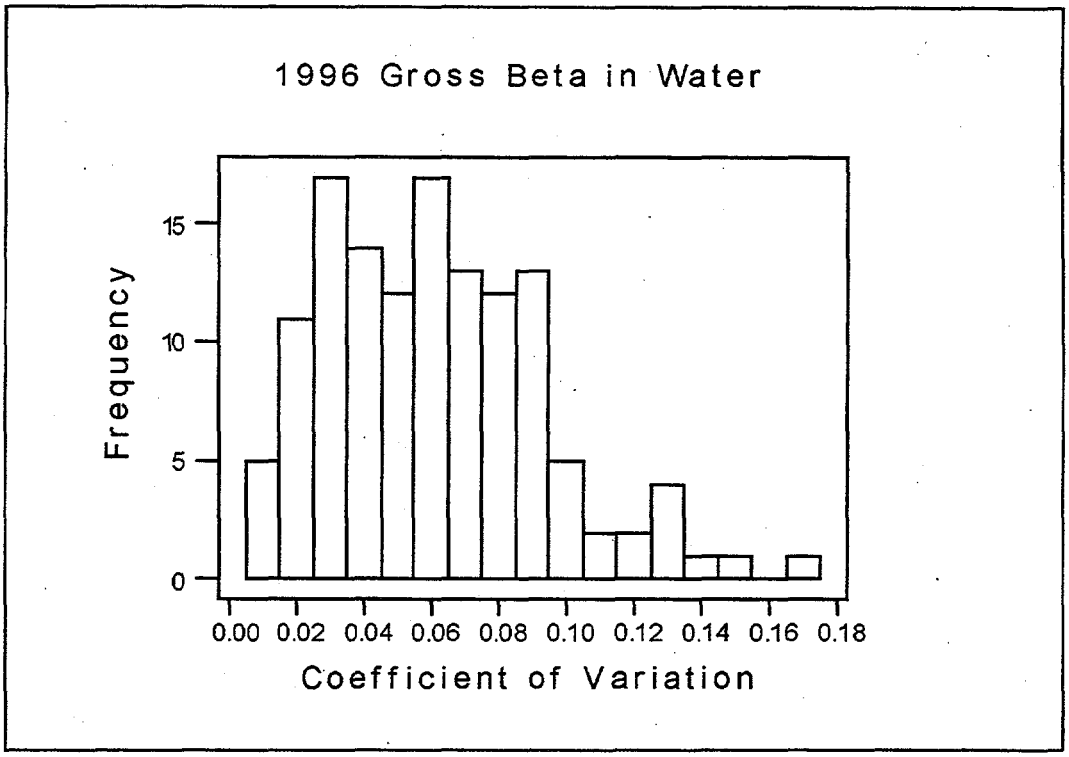


Figure 9.9 Histogram of Gross Beta in Water Relative Errors

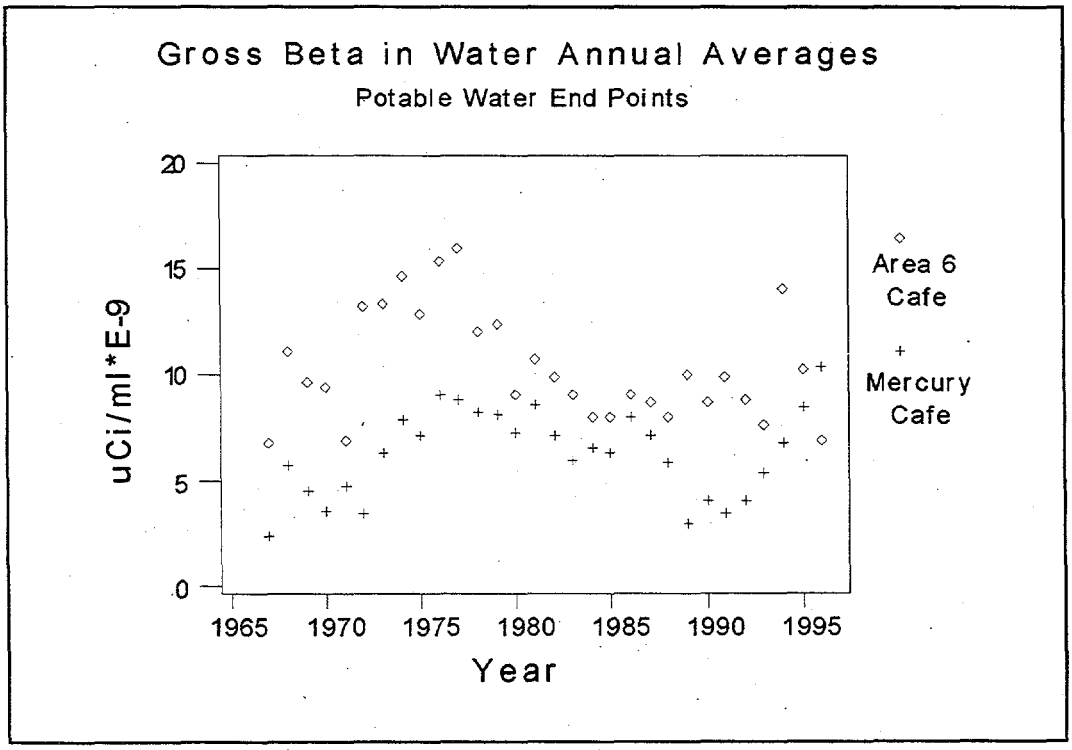


Figure 9.10 Time Series Plot of Annual Averages

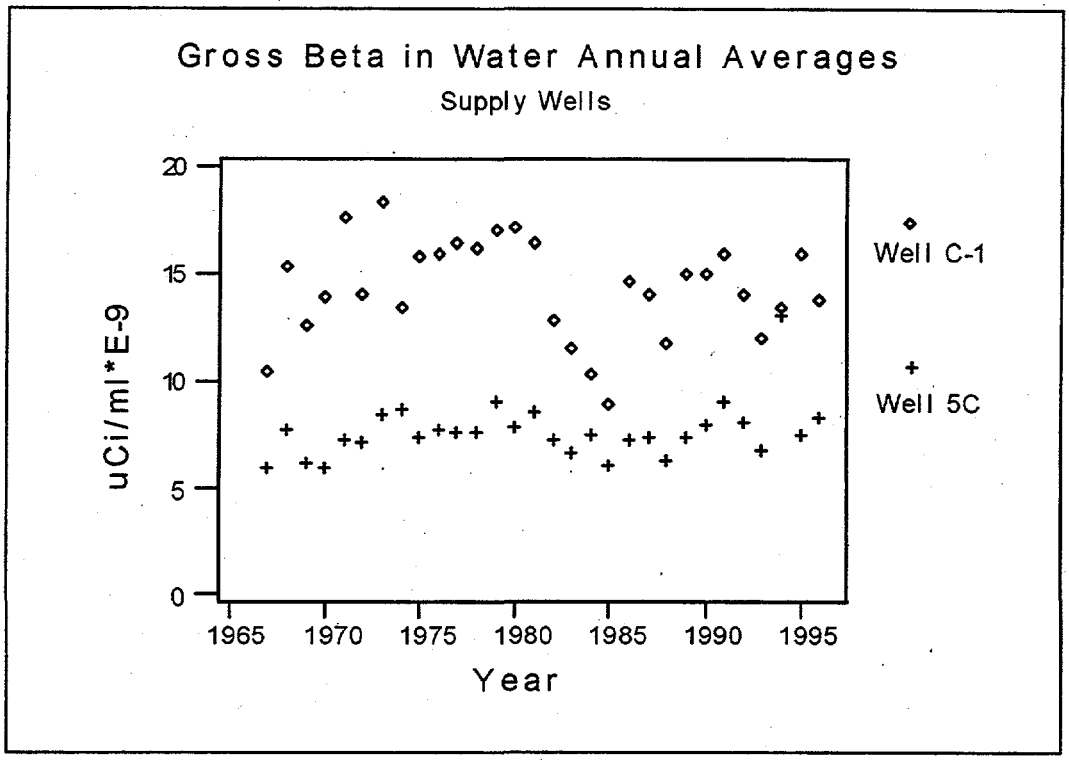


Figure 9.11 Time Series Plot of Annual Averages

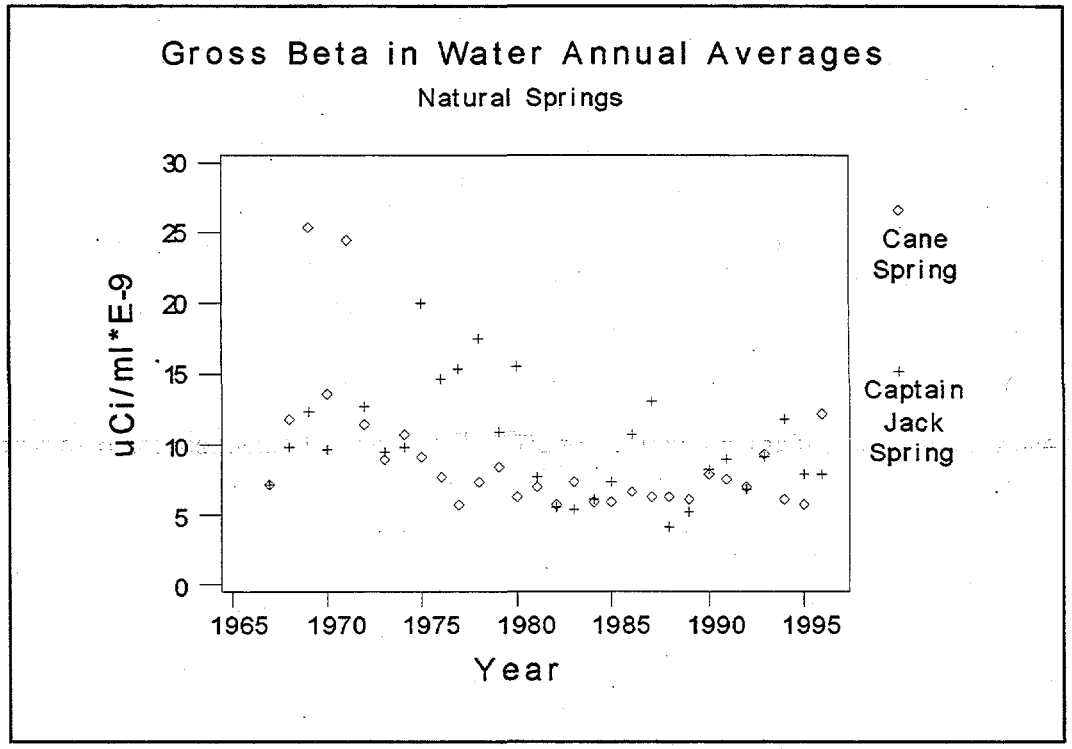


Figure 9.12 Time Series Plot of Annual Averages

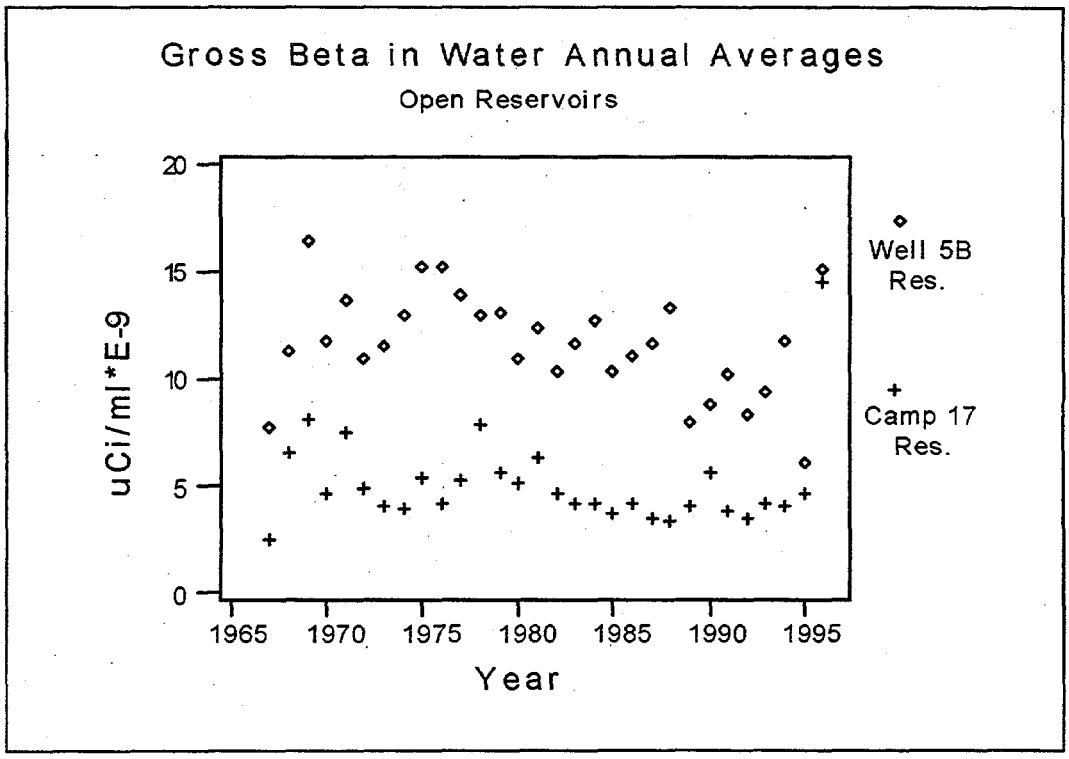


Figure 9.13 Time Series Plot of Annual Averages

Table 9.1 Descriptive Statistics for Gross Alpha in Water by Sampling Location, ($\mu Ci/mL \times 10^{-9}$)

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
SUPPLY WELLS						
Well 5B	4	6.12	6.11	0.71	5.27	6.99
Well 5C	4	11.99	12.16	3.37	8.43	15.20
Well No. 4A	4	9.91	10.33	1.61	7.78	11.20
Well No. 4	4	9.28	9.06	1.12	8.19	10.80
Well C-1	4	8.28	7.90	6.04	2.52	14.80
Well UE-16D	4	6.66	7.83	3.03	2.19	8.79
Well HTH No. 8	4	0.77	0.79	0.29	0.41	1.08
Army Well No. 1	4	5.40	3.52	4.24	2.86	11.70
Well J-12	4	1.48	1.70	0.54	0.69	1.83
Well J-13	4	2.33	1.77	1.54	1.25	4.54
All Supply Wells	40	6.22	6.11	4.42	0.41	15.20
INDUSTRIAL WELLS						
Well UE-5C	4	11.99	12.16	3.37	8.43	15.20
Well U-20	1	8.36				
All Industrial Wells	5	7.56	8.36	2.57	4.50	10.50
POTABLE WATER						
Building 101	4	7.52	7.52	0.45	6.96	8.07
Area 2, Restroom	4	1.02	1.00	0.41	0.54	1.53
Area 6, Cafeteria	4	8.84	8.65	0.41	0.54	1.53
Building 6-900	4	8.18	8.55	1.68	5.85	9.78
Building 12-23	4	0.90	0.88	0.35	0.53	1.31
Mercury Cafeteria	4	6.48	6.45	0.57	5.83	7.21
Building 4221	4	1.70	1.55	0.42	1.38	2.31
All Potable Water	24	4.69	4.00	3.84	0.53	12.40
All Stations Combined	73	5.83	5.95	4.05	0.41	15.20

Table 9.2 Descriptive Statistics for Gross Alpha in Water by Quarter of Year, ($\mu Ci/mL \times 10^{-9}$)

Quarter	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
1	19	5.47	6.96	3.84	0.69	11.20
2	18	6.25	6.05	4.67	0.89	15.20
3	18	5.28	4.91	3.57	0.53	12.40
4	18	6.33	6.34	4.28	0.41	14.50

Table 9.3 Kruskal-Wallis Test for Equality of Gross Alpha Results by Type of Water Source

Type	N	Median	Average Rank	Z
Supply Wells	40	6.110	39.1	0.95
Industrial Wells	5	8.360	47.4	1.14
End Points	28	5.840	32.1	-1.56
Overall	73	37.0		

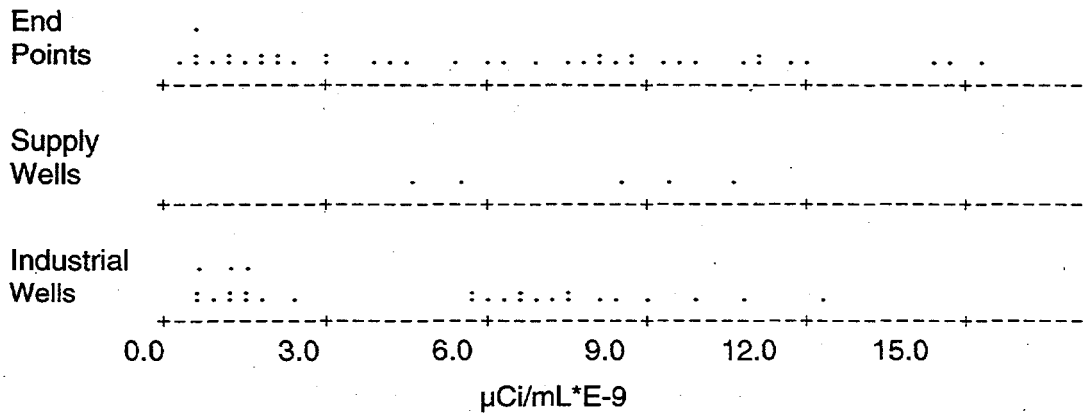


Table 9.4 Historical Gross Alpha Annual Averages from Selected Sampling Locations, ($\mu Ci/mL \times 10^{-9}$)

Year	Building 4221	Area 6 Cafeteria	Mercury Cafeteria	Well J-13	Area 2 Restroom
1984	-	2.1	2.1	-	0.8
1985	-	5.9	4.6	-	0.7
1986	-	6.5	3.5	-	1.3
1987	-	12.0	9.6	-	3.2
1988	-	7.6	4.6	-	0.5
1989	0.6	8.7	4.9	-	0.3
1990	1.4	5.3	5.6	1.7	0.7
1991	0.7	10.7	5.6	1.2	0.5
1992	1.6	10.6	6.9	1.2	0.8
1993	1.4	9.7	5.5	2.2	0.5
1994	1.3	7.7	5.8	2.0	0.4
1995	1.3	12.7	5.2	1.7	0.6
1996	1.7	8.8	6.5	2.3	1.0

Table 9.5 Descriptive Statistics for Gross Beta in Water by Sampling Location, ($\mu Ci/mL \times 10^{-9}$)

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
SUPPLY WELLS						
Well 5B	4	11.98	11.95	0.92	10.90	13.10
Well 5C	4	8.35	8.75	1.16	6.65	9.23
Well 4A	4	6.62	6.53	0.63	6.07	7.34
Well 4	4	7.10	7.13	0.31	6.77	7.38
Well C-1	4	13.78	15.30	6.06	5.23	19.30
Well UE-16D	4	6.38	7.18	2.77	2.39	8.77
Well HTH No. 8	4	3.57	3.58	0.30	3.24	3.89
Army Well No. 1	4	4.85	5.33	1.20	3.06	5.67
Well J-12	4	4.55	4.59	0.21	4.27	4.74
Well J-13	4	4.58	4.48	0.32	4.32	5.04
All Supply Wells	40	7.18	6.39	3.76	2.39	19.30
INDUSTRIAL WELLS						
Well UE-5C	4	7.62	7.58	1.46	6.31	9.00
Well U-20	1	2.68				
All Industrial Wells	5	6.63	6.39	2.55	2.68	9.00
POTABLE WATER						
Building 101	4	6.23	6.54	0.99	4.80	7.05
Area 2, Restroom	4	3.73	3.83	0.66	2.84	4.42
Area 6, Cafeteria	4	6.91	7.17	1.15	5.28	8.00
Building 6-900	4	7.09	7.10	0.09	6.96	7.18
Building 12-23	4	3.71	3.62	0.56	3.12	4.47
Mercury Cafeteria	4	10.43	10.20	1.13	9.31	12.00
Building 4221	4	4.71	4.91	0.62	3.81	5.19
All Potable Water	28	6.11	5.88	2.35	2.84	12.00
OPEN RESERVOIRS						
All Open Reservoirs	9	11.90	14.50	5.94	4.63	18.80
NATURAL SPRINGS						
All Natural Springs	7	9.21	8.06	2.53	6.26	13.40

Table 9.5 (Descriptive Statistics for Gross Beta in Water by Sampling Location, [µCi/mL x 10^{-9}], cont.)

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
CONTAINMENT PONDS						
E Tunnel Effluent	4	120.5	97.8	71.8	61.2	225.0
E Tunnel Pond No. 2	1	92.6				
E Tunnel Pond No. 1	2	135.0	135.0	1.4	134.0	136.0
All Containment Ponds	7	120.6	99.6	52.7	61.2	225.0
SEWAGE LAGOONS						
RWMS	4	29.80	31.40	11.44	14.80	41.60
Yucca	4	16.94	19.45	8.85	4.56	24.30
DAF	4	23.35	21.15	6.13	18.90	32.20
LANL	4	30.12	29.30	6.92	22.60	39.30
Area 12	4	7.71	6.95	2.83	5.43	11.50
Area 22	4	33.33	32.95	10.09	22.00	45.40
Area 23	4	25.38	19.95	13.14	16.90	44.70
Reactor Control	2	14.75	14.75	1.06	14.00	15.50
Area 25 Central Supply	4	16.93	14.55	6.23	12.70	25.90
All Sewage Lagoons	34	22.46	22.10	11.07	4.56	45.40
All Sampling Locations Combined Except Containment Ponds	123	11.60	7.38	9.45	2.39	45.40

Table 9.6 Gross Beta in Water Averages by Type of Sampling Location and 1996 Quarter of Sample Collection, (µCi/mL x 10^{-9})

Location Type	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Supply Wells	6.63	7.31	6.38	8.38
Industrial Wells	5.72	6.31	6.39	9.00
Potable Water	5.60	6.46	6.29	6.10
Open Reservoirs			11.90	
Natural Springs			9.21	
Containment Ponds	180.5	61.2	115.1	96.1
Sewage Lagoons	18.93	29.94	23.24	18.65

Table 9.7 Two Way ANOVA for Differences Between Sample Types and Quarter of Sample Collection on Ln (µCi/mL) - 1996

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value	Probability
Type	5	31.7616	6.3523	26.48	0.0
Quarter	3	0.8846	0.2949	1.23	0.303
Error	114	27.3527	0.2399		
Total	122	59.9197			

Table 9.8 One Way ANOVA for Differences Between Sample Types on Ln (µCi/mL) - 1996

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value	Probability
Type	5	31.682	6.336	26.25	0.0
Error	117	28.237	0.241		
Total	122	59.920			

Type	N	Mean of Ln	Standard Deviation	Individual 95 Percent Confidence Intervals for Mean Based on Pooled Standard Deviation
End Points	28	-18.983	0.381	(--*---)
Industrial	5	-18.913	0.490	(--------*-------)
Supply	40	-18.868	0.476	(--*--)
Springs	7	-18.534	0.267	(------*-------)
Reservoirs	9	-18.386	0.591	(-----*------)
Lagoons	34	-17.754	0.585	(--*--)

Pooled Standard Deviation = 0.491

-19.00 -18.50 -18.00

Table 9.9 Historical Gross Beta Annual Averages for Representative Locations (µCi/mL x 10^{-9}) - 1996

Year	Area 6 Cafeteria	Mercury Cafeteria	Well C-1	Well 5C	Cane Spring	Capt. Jack Spring	Well 5B Reservoir	Camp 17 Reservoir
1967	6.8	2.4	10.5	6.0	7.2	7.2	7.7	2.5
1968	11.1	5.7	15.3	7.7	11.7	9.8	11.3	6.5
1969	9.6	4.5	12.6	6.2	25.4	12.4	16.4	8.1
1970	9.4	3.6	13.9	6.0	13.5	9.7	11.8	4.6
1971	6.9	4.8	17.6	7.3	24.5	65.8	13.7	7.5
1972	13.2	3.5	14.0	7.1	11.5	12.7	10.9	4.9

Table 9.9 (Historical Gross Beta Annual Averages for Representative Locations [μCi/mL × 10^{-9}] - 1996, cont.)

Year	Area 6 Cafeteria	Mercury Cafeteria	Well C-1	Well 5C	Cane Spring	Capt Jack Spring	Well 5B Res.	Camp 17 Res.
1973	13.3	6.3	18.3	8.4	8.9	9.5	11.6	4.0
1974	14.6	7.8	13.5	8.7	10.7	9.8	13.0	3.9
1975	12.8	7.1	15.8	7.4	9.1	20.0	15.2	5.3
1976	15.3	9.0	15.9	7.7	7.6	14.6	15.2	4.2
1977	15.9	8.8	16.4	7.6	5.8	15.3	13.9	5.2
1978	12.0	8.2	16.2	7.6	7.3	17.5	13.0	7.8
1979	12.4	8.1	17.0	9.0	8.4	10.9	13.1	5.6
1980	9.0	7.3	17.1	7.8	6.2	15.5	10.9	5.1
1981	10.7	8.6	16.4	8.6	7.0	7.7	12.4	6.3
1982	9.9	7.2	12.9	7.3	5.8	5.6	10.3	4.7
1983	9.1	6.0	11.6	6.7	7.3	5.3	11.7	4.2
1984	8.0	6.5	10.4	7.5	5.9	6.1	12.7	4.2
1985	8.0	6.3	8.9	6.1	5.9	7.4	10.3	3.7
1986	9.0	8.0	14.6	7.3	6.6	10.7	11.1	4.2
1987	8.7	7.2	14.1	7.4	6.2	13.1	11.7	3.4
1988	8.0	5.8	11.8	6.3	6.3	4.1	13.3	3.3
1989	10.0	3.0	15.0	7.4	6.1	5.1	8.0	4.0
1990	8.7	4.0	15.0	8.0	7.9	8.3	8.8	5.6
1991	9.9	3.5	16.0	9.0	7.5	9.0	10.2	3.8
1992	8.8	4.1	14.0	8.1	6.9	6.8	8.3	3.5
1993	7.6	5.4	12.0	6.8	9.3	9.1	9.4	4.2
1994	14.0	6.8	13.4	13.1	6.1	11.7	11.8	4.1
1995	10.2	8.5	16.0	7.5	5.7	7.8	6.1	4.6
1996	6.9	10.4	13.8	8.3	12.1	7.8	15.1	14.5

Attachment 9.1 Gross Alpha in Water - 1996

Sampling Location	Collection Date	μCi/mL x 10^{-9} Concentration	Standard Deviation	MDC
SUPPLY WELLS				
Area 5, Well 5B	01/17/96	6.99	0.807	1.56
Area 5, Well 5B	05/09/96	6.27	0.734	1.35
Area 5, Well 5B	07/15/96	5.27	0.688	1.41
Area 5, Well 5B	10/07/96	5.95	0.776	1.64
Area 5, Well 5C	01/17/96	8.43	0.906	1.69
Area 5, Well 5C	05/09/96	15.20	1.132	1.52
Area 5, Well 5C	07/15/96	9.81	0.898	1.48
Area 5, Well 5C	10/07/96	14.50	1.146	1.79
Area 6, Well No. 4A	01/17/96	11.20	0.946	1.49
Area 6, Well No. 4A	06/04/96	9.56	0.913	1.58
Area 6, Well No. 4A	07/15/96	7.78	0.762	1.32
Area 6, Well No. 4A	10/07/96	11.10	0.932	1.51
Area 6, Well No. 4	01/17/96	9.35	0.874	1.49
Area 6, Well No. 4	05/09/96	10.80	0.913	1.35
Area 6, Well No. 4	07/15/96	8.19	0.811	1.41
Area 6, Well No. 4	10/07/96	8.77	0.921	1.73
Area 6, Well C-1	01/17/96	2.52	0.266	0.49
Area 6, Well C-1	05/09/96	14.80	1.880	3.64
Area 6, Well C-1	07/15/96	3.80	0.606	1.38
Area 6, Well C-1	10/07/96	12.00	1.758	4.00
Area 16, Well UE-16d	01/17/96	2.19	0.235	0.44
Area 16, Well UE-16d	05/09/96	7.48	0.853	1.55
Area 16, Well UE-16d	07/15/96	8.17	0.886	1.64
Area 16, Well UE-16d	10/07/96	8.79	0.967	1.87
Area 18, Well HTH No. 8	01/17/96	1.08	0.313	0.89
Area 18, Well HTH No. 8	05/09/96	0.92	0.291	0.83
Area 18, Well HTH No. 8	07/15/96	0.66	0.271	0.83
Area 18, Well HTH No. 8	10/07/96	0.41	0.271	0.90
Area 22, Army Well No. 1	01/17/96	4.11	0.711	1.69
Area 22, Army Well No. 1	05/07/96	2.86	0.505	1.16
Area 22, Army Well No. 1	07/15/96	2.93	0.560	1.37
Area 22, Army Well No. 1	10/07/96	11.70	0.971	1.56
Area 25, Well J-12	01/17/96	0.69	0.377	1.21
Area 25, Well J-12	05/09/96	1.78	0.410	1.05
Area 25, Well J-12	07/15/96	1.61	0.405	1.10
Area 25, Well J-12	10/07/96	1.83	0.449	1.22
Area 25, Well J-13	01/17/96	2.21	0.507	1.34
Area 25, Well J-13	05/09/96	1.25	0.360	1.00
Area 25, Well J-13	07/15/96	4.54	0.606	1.26
Area 25, Well J-13	10/07/96	1.33	0.466	1.39

Attachment 9.1 (Gross Alpha in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL × 10^{-9} Concentration	Standard Deviation	MDC
INDUSTRIAL WELLS				
Area 5, Well UE-5c	01/31/96	10.50	0.908	1.46
Area 5, Well UE-5c	05/09/96	9.17	0.848	1.34
Area 5, Well UE-5c	07/15/96	4.50	0.643	1.38
Area 5, Well UE-5c	10/07/96	5.28	0.718	1.55
Area 20, Well U-20	01/29/96	8.36	0.790	1.35
Area 20, Well U-20	05/09/96		Out of Service	
Area 20, Well U-20	07/15/96		Out of Service	
Area 20, Well U-20	10/07/96		Out of Service	
POTABLE WATER				
Area 1, Building 101	01/09/96	6.96	0.769	1.45
Area 1, Building 101	05/09/96	7.48	0.830	1.50
Area 1, Ice House	07/11/96	7.56	0.847	1.59
Area 1, Building 101	10/01/96	8.07	0.920	1.81
Area 2, Restroom	01/09/96	1.10	0.361	1.05
Area 2, Restroom	05/09/96	0.89	0.299	0.87
Area 2, Restroom	07/11/96	0.54	0.292	0.93
Area 2, Restroom	10/01/96	1.53	0.360	0.97
Area 6, Cafeteria	01/09/96	10.7	0.926	1.49
Area 6, Cafeteria	05/14/96	5.69	0.725	1.43
Area 6, Cafeteria	07/11/96	12.4	0.936	1.35
Area 6, Cafeteria	10/01/96	6.59	0.738	1.44
Area 6, Building 6-900	01/09/96	8.25	0.833	1.49
Area 6, Building 6-900	05/14/96	9.78	0.851	1.31
Area 6, Building 6-900	07/11/96	8.85	0.823	1.38
Area 6, Building 6-900	10/01/96	5.85	0.720	1.48
Area 12, Building 12-23	01/09/96	0.71	0.346	1.09
Area 12, Medical Aid Station	05/09/96	1.05	0.299	0.83
Area 12, Building 12-23	07/11/96	0.53	0.228	0.70
Area 12, Ice House	10/01/96	1.31	0.361	1.01
Area 23, Mercury	01/09/96	7.21	0.836	1.62
Area 23, Mercury	05/14/96	5.83	0.737	1.45
Area 23, Mercury	07/11/96	6.35	0.740	1.43
Area 23, Mercury	10/01/96	6.54	0.817	1.69
Area 25, Building 4221	01/09/96	1.38	0.469	1.37
Area 25, Building 4221	05/14/96	1.65	0.433	1.17
Area 25, Building 4221	07/11/96	1.45	0.414	1.16
Area 25, Building 4221	10/01/96	2.31	0.534	1.42

Attachment 9.2 Gross Beta in Water - 1996

Sampling Location	Collection Date	µCi/mL x 10^{-9} Concentration	Standard Deviation	MDC
SUPPLY WELLS				
Area 5, Well 5B	01/17/96	12.20	0.51	1.22
Area 5, Well 5B	05/09/96	11.70	0.49	1.19
Area 5, Well 5B	07/15/96	10.90	0.49	1.18
Area 5, Well 5B	10/07/96	13.10	0.53	1.27
Area 5, Well 5C	01/17/96	6.65	0.45	1.23
Area 5, Well 5C	05/09/96	9.23	0.49	1.29
Area 5, Well 5C	07/15/96	8.62	0.46	1.18
Area 5, Well 5C	10/07/96	8.88	0.48	1.27
Area 6, Well No. 4A	01/17/96	6.12	0.44	1.22
Area 6, Well No. 4A	06/04/96	6.07	0.47	1.32
Area 6, Well No. 4A	07/15/96	6.94	0.42	1.13
Area 6, Well No. 4A	10/07/96	7.34	0.47	1.26
Area 6, Well No. 4	01/17/96	6.77	0.45	1.22
Area 6, Well No. 4	05/09/96	6.90	0.47	1.28
Area 6, Well No. 4	07/15/96	7.36	0.52	1.41
Area 6, Well No. 4	10/07/96	7.38	0.53	1.47
Area 6, Well C-1	01/17/96	14.30	0.52	1.19
Area 6, Well C-1	05/09/96	16.30	1.36	3.86
Area 6, Well C-1	07/15/96	5.23	0.42	1.18
Area 6, Well C-1	10/07/96	19.30	1.19	3.16
Area 16, Well UE-16d	01/17/96	2.39	0.36	1.10
Area 16, Well UE-16d	05/09/96	7.30	0.47	1.27
Area 16, Well UE-16d	07/15/96	7.07	0.46	1.26
Area 16, Well UE-16d	10/07/96	8.77	0.50	1.31
Area 18, Well HTH No. 8	01/17/96	3.24	0.40	1.22
Area 18, Well HTH No. 8	05/09/96	3.75	0.43	1.28
Area 18, Well HTH No. 8	07/15/96	3.41	0.44	1.31
Area 18, Well HTH No. 8	10/07/96	3.89	0.43	1.27
Area 22, Army Well No. 1	01/17/96	5.67	0.44	1.23
Area 22, Army Well No. 1	05/07/96	3.06	0.41	1.23
Area 22, Army Well No. 1	07/15/96	5.30	0.41	1.15
Area 22, Army Well No. 1	10/07/96	5.35	0.43	1.21
Area 25, Well J-12	01/17/96	4.67	0.42	1.22
Area 25, Well J-12	05/09/96	4.27	0.42	1.23
Area 25, Well J-12	07/15/96	4.50	0.41	1.17
Area 25, Well J-12	10/07/96	4.74	0.45	1.29
Area 25, Well J-13	01/17/96	4.32	0.42	1.22
Area 25, Well J-13	05/09/96	4.54	0.42	1.21
Area 25, Well J-13	07/15/96	4.42	0.41	1.17
Area 25, Well J-13	10/07/96	5.04	0.45	1.30

Attachment 9.2 (Gross Beta in Water - 1996, cont.)

Sampling Location	Collection Date	µCi/mL×10^{-9} Concentration	Standard Deviation	MDC
INDUSTRIAL WELLS				
Area 5, Well UE-5c	01/31/96	8.76	0.46	1.19
Area 5, Well UE-5c	05/09/96	6.31	0.46	1.27
Area 5, Well UE-5c	07/15/96	6.39	0.43	1.18
Area 5, Well UE-5c	10/07/96	9.00	0.47	1.21
Area 20, Well U-20	01/29/96	2.68	0.44	1.37
POTABLE WATER				
Area 1, Building 101	01/09/96	4.80	0.42	1.22
Area 1, Building 101	05/09/96	6.47	0.44	1.20
Area 1, Ice House	07/11/96	7.05	0.43	1.14
Area 1, Building 101	10/01/96	6.60	0.48	1.32
Area 2, Restroom	01/09/96	2.84	0.40	1.22
Area 2, Restroom	05/09/96	3.92	0.41	1.19
Area 2, Restroom	07/11/96	3.73	0.38	1.12
Area 2, Restroom	10/01/96	4.42	0.42	1.21
Area 6, Cafeteria	01/09/96	7.20	0.45	1.22
Area 6, Cafeteria	05/14/96	8.00	0.46	1.22
Area 6, Cafeteria	07/11/96	7.14	0.43	1.13
Area 6, Cafeteria	10/01/96	5.28	0.43	1.22
Area 6, Building 6-900	01/09/96	7.12	0.45	1.22
Area 6, Building 6-900	05/14/96	6.96	0.45	1.20
Area 6, Building 6-900	07/11/96	7.18	0.44	1.18
Area 6, Building 6-900	10/01/96	7.08	0.45	1.22
Area 12, Building 12-23	01/09/96	3.12	0.41	1.22
Area 12, Medical Aid Station	05/09/96	4.47	0.41	1.19
Area 12, Building 12-23	07/11/96	3.69	0.38	1.12
Area 12, Ice House	10/01/96	3.54	0.42	1.27
Area 23, Mercury Cafeteria	01/09/96	9.31	0.48	1.22
Area 23, Mercury Cafeteria	05/14/96	10.20	0.49	1.24
Area 23, Mercury Cafeteria	07/11/96	10.20	0.46	1.13
Area 23, Mercury Cafeteria	10/01/96	12.00	0.53	1.31
Area 25, Building 4221	01/09/96	4.81	0.43	1.22
Area 25, Building 4221	05/14/96	5.19	0.42	1.17
Area 25, Building 4221	07/11/96	5.01	0.40	1.12
Area 25, Building 4221	10/01/96	3.81	0.41	1.22
RESERVOIRS				
Area 2, Mud Plant	07/22/96	5.25	0.44	1.24
Area 2, Well 2 Reservoir	07/22/96		Dry	
Area 3, Mud Plant	07/15/96		Dry	
Area 3, Well A Reservoir	07/22/96	18.80	0.55	1.15
Area 5, Well 5B Reservoir	07/15/96	15.10	0.55	1.24

Attachment 9.2 (Gross Beta in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL×10^{-9} Concentration	Standard Deviation	MDC
(RESERVOIRS, cont.)				
Area 5, UE-5C Reservoir	07/15/96	8.57	0.45	1.17
Area 6, Well 3 Reservoir	07/15/96	17.70	0.55	1.19
Area 6, Well C-1 Reservoir	07/15/96	17.40	0.54	1.15
Area 18, Well HTH #8 Reservoir	07/15/96		Dry	
Area 18, Camp 17 Reservoir	07/22/96	14.50	0.56	1.31
Area 19, UE-19c Reservoir	07/15/96		Dry	
Area 20, Well 20A Reservoir	07/15/96		Dry	
Area 23, Swimming Pool	07/15/96		Dry	
Area 25, Well J11 Reservoir	07/15/96	4.63	0.41	1.18
Area 25, Well J12 Reservoir	07/15/96	5.18	0.43	1.21
NATURAL SPRINGS				
Area 5, Cane Spring	07/15/96	12.10	0.55	1.33
Area 7, Reitman Seep	07/15/96	13.40	0.59	1.45
Area 12, White Rock Spring	07/22/96	9.00	0.46	1.16
Area 12, Capt Jack Spring	07/22/96	7.80	0.44	1.16
Area 12, Gold Meadows Spring	07/15/96		Dry	
Area 15, Tub Springs	07/22/96	8.06	0.50	1.34
Area 16, Tippipah Spring	07/15/96	6.26	0.43	1.16
Area 29, Topopah Spring	07/15/96	7.88	0.47	1.24
CONTAINMENT PONDS				
Area 12, E Tunnel Effluent	02/07/96	225.0	2.86	3.67
Area 12, E Tunnel Effluent	05/30/96	61.20	1.48	2.87
Area 12, E Tunnel Effluent	07/25/96	96.10	1.05	1.19
Area 12, E Tunnel Effluent	10/31/96	99.60	1.09	1.25
Area 12, E Tunnel Pond 2	10/31/96	92.60	1.06	1.29
Area 12, E Tunnel Pond 1	02/07/96	136.0	2.11	3.14
Area 12, E Tunnel Pond 1	07/25/96	134.0	1.23	1.20
LAGOONS				
Area 5, RWMS Sewage Pond	02/13/96	14.80	0.56	1.33
Area 5, RWMS Sewage Pond	05/07/96	34.80	0.80	1.49
Area 5, RWMS Sewage Pond	08/08/96	41.60	0.82	1.38
Area 5, RWMS Sewage Pond	11/06/96	28.00	0.63	1.18
Area 6, Yucca Sewage Pond	02/13/96	16.70	0.62	1.45
Area 6, Yucca Sewage Pond	05/07/96	24.30	0.65	1.32
Area 6, Yucca Sewage Pond	08/08/96	22.20	0.68	1.44

Attachment 9.2 (Gross Beta in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL×10^{-9} Concentration	Standard Deviation	MDC
(LAGOONS cont.)				
Area 6, Yucca Sewage Pond	11/06/96	4.56	0.40	1.16
Area 6, DAF Sewage Pond	02/13/96	32.20	0.70	1.27
Area 6, DAF Sewage Pond	05/07/96	22.70	0.65	1.35
Area 6, DAF Sewage Pond	08/08/96	18.90	0.65	1.46
Area 6, DAF Sewage Pond	11/06/96	19.60	0.58	1.22
Area 11, LANL Sewage Pond	02/13/96	28.40	0.71	1.42
Area 11, LANL Sewage Pond	05/07/96	30.20	0.76	1.49
Area 11, LANL Sewage Pond	08/08/96	39.30	0.83	1.47
Area 11, LANL Sewage Pond	11/06/96	22.60	0.59	1.18
Area 12, Sewage Pond	02/13/96	5.66	0.49	1.40
Area 12, Sewage Pond	05/07/96	11.50	0.54	1.35
Area 12, Sewage Pond	08/08/96	8.24	0.53	1.43
Area 12, Sewage Pond	11/06/96	5.43	0.43	1.22
Area 22, Sewage Pond	02/13/96	29.00	0.66	1.26
Area 22, Sewage Pond	05/07/96	45.40	0.79	1.28
Area 22, Sewage Pond	08/08/96	22.00	0.68	1.45
Area 22, Sewage Pond	11/06/96	36.90	0.70	1.19
Area 23, Sewage Pond	02/13/96	16.90	0.56	1.24
Area 23, Sewage Pond	05/07/96	44.70	0.84	1.40
Area 23, Sewage Pond	08/08/96	17.30	0.60	1.35
Area 23, Sewage Pond	11/06/96	22.60	0.61	1.24
Area 25, Reactor Control Pond	02/13/96	14.00	0.53	1.24
Area 25, Reactor Control Pond	11/06/96	15.50	1.01	2.74
Area 25, Central Supply Pond	02/13/96	12.70	0.51	1.24
Area 25, Central Supply Pond	05/07/96	25.90	0.66	1.32
Area 25, Central Supply Pond	08/08/96	16.40	0.53	1.15
Area 25, Central Supply Pond	11/06/96	12.70	0.50	1.18

10.0 Onsite ^{238}Pu AND $^{239+240}$Pu IN WATER

For data analysis purposes the sampling locations for plutonium-238 and plutonium-239+240 in water are divided into seven types. These types of water sampling locations are:

- Potable water or supply wells are the wells that supply water for human consumption. These wells may also be used to supply water for industrial and construction purposes. In 1996, ten supply wells were sampled quarterly.

- Industrial wells or non-potable water wells are wells that supply water only for industrial and construction purposes. One industrial well was sampled quarterly, and a second industrial well was sampled the first quarter and then was shut down.

- Potable water end points or water supply distribution points are locations where water is drawn for human consumption. These are typically faucets in buildings such as offices and cafeterias. There were seven end point locations that were sampled quarterly.

- Natural springs are places where ground water comes to the surface. They are used by the fauna of the NTS and sometimes are dry when visited for sampling. Seven natural springs were sampled annually in July.

- Sewage lagoons are the end points for the several sanitary sewage systems operated on the NTS. Water is lost from these lagoons primarily by evaporation. Nine lagoons were sampled quarterly.

- Open reservoirs are man-made water storage ponds. Most are adjacent to wells, but this type also includes the reservoirs that supply the concrete batch plants (Mud Plants) and the Area 23 recreational swimming pool, which is now empty. In 1996, there were nine open reservoirs with water that were sampled once a year, in July.

- Containment ponds are used to contain the effluents from the tunnels. The water in these typically has elevated levels of tritium. Loss of water is primarily by evaporation. These locations are sampled quarterly. Only the E Tunnel effluent and containment ponds contained water in 1996. The effluent is grouped with the ponds.

The names of the sampling locations in each of these type classifications is given in the attachments to this chapter. (Figures, tables, and attachments are located at the end of the chapters.) For a few of the potable water sampling locations, samples may be collected from adjacent locations when the primary location is unavailable. For example, when it was time to sample Building 101 in Area 1 for the third quarter sample the building was locked. The sampler took the sample from an adjacent building, the Area 1 Ice House. A similar situation occurred in Area 12 where Building 12-23, the Medical Aid Station, and the Area 12 Ice House are adjacent buildings. It is known that adjacent buildings are on the same water supply system and are connected to the system in close proximity.

Sampling locations, sample collection dates, measured concentrations, analytic standard deviations, and analytic minimum detectable concentrations (MDCs) for ^{238}Pu appear in Attachment 10.1, and for $^{239+240}$Pu these data appear in Attachment 10.2. Refer to Figure 9.1, in the previous chapter, for a map of the Nevada Test Site (NTS) water sampling locations. Descriptive statistics for sampling locations with quarterly sampling appear in Table 10.1 for ^{238}Pu and Table 10.2 for $^{239+240}$Pu. The annual averages for locations sampled once a year are identical to the single sample results in the attachments.

PLUTONIUM-238

^{238}Pu concentrations in water were measured quarterly at 29 locations and annually at an additional 16 locations. An examination of the data, displayed in Attachment 10.1, reveals that all concentrations are below the corresponding MDC except for the seven containment pond results and the first quarter data from the Area 23 Sewage Lagoon. The median MDC is 1.92×10^{-10} µCi/mL. Plutonium in the E Tunnel effluent is known to result from the several nuclear experiments that were preformed within that tunnel. Water that seeps into the tunnel picks up contamination within the tunnel then exits the tunnel as the effluent and is collected in the containment ponds. The concentrations measured from the containment ponds in 1996 are consistent with historical levels at those locations. The reason for the one high value in the Area 23 Sewage Lagoon has been investigated and will be discussed below.

Excluding the eight values that are above detection limits, 71 percent of the values are less than zero, and all but one value are within one standard deviation of zero. This situation indicates that the measurements represent only randomness in the analytical procedures, and no plutonium was actually found in the samples. Thus no further statistical analyses were performed.

PLUTONIUM-239+240

$^{239+240}Pu$ concentrations in water were measured using the same samples used for ^{238}Pu; thus, the same sampling pattern applies. The results were also similar. Results for the seven containment pond samples and the Area 23 sewage lagoon, for the first quarter, were above MDC. In addition, the annual sample from Reitman Seep was above MDC. The median MDC is 2.02×10^{-11} µCi/mL. $^{239+240}Pu$ levels in the containment ponds are known to be elevated for the same reason ^{238}Pu levels are elevated. The Area 23 sewage lagoon sample will be discussed in the next section. Reitman Seep has historically shown elevated levels. Water samples from this seep are typically turbid; thus, the analytical results represent concentrations in sediments. Sixty-eight percent of the reported values were less than zero, and, excluding the nine values above MDC, 80 percent of the results are within one standard deviation of zero. As for ^{238}Pu, no further statistical analyses of the $^{239+240}Pu$ results were performed.

AREA 23 SEWAGE LAGOON

The first quarter sample from the Area 23 sewage lagoon contained detectable levels of both ^{238}Pu and $^{239+240}Pu$. This sampling location did not contain detectable levels of these isotopes in water in the other three quarters of the year and historically plutonium concentrations have been below detection limits at this location. This incident was investigated and attributed to the accumulation of old fallout (from atmospheric test in the 1950s and 1960s) in sewer line sediments. These lines were flushed with water shortly before the first quarter sample was collected. Sediment samples collected after this finding was noted to also contained detectable levels of these isotopes. The radiochemistry laboratory that uses this sewer system was eliminated as a source, since the ratio of $^{239+240}Pu$ to ^{238}Pu in the sediments was 50, while the ratio in the laboratory standard is 3,000. The ratio in environmental air and soil samples ranges from 50 to 100, when quantitative levels are present.

HISTORICAL TRENDS

Annual averages for the plutonium isotopes in water have been reported since 1989. Detailed reporting of historical data from all water sampling locations would result in an unwieldy document. Instead, two representative locations were chosen from each of the following types of water sampling locations: supply wells, potable water, open reservoirs, natural springs, and

sewage lagoons. In addition, the E Tunnel effluent was added to the list in order to show the trend at a location with an inventory of plutonium. The chosen locations were further restricted to be locations with data available for all years, since plutonium concentrations were first included in annual reports and to be geographically disperse within the NTS. The chosen locations are identified in Tables 10.3 and 10.4, which contain the historical annual averages.

Most of the annual averages in these tables are below detection limits, but there are a few notable exceptions. Over the years the median detection limit for both plutonium isotopes has been approximately 20×10^{-12} µCi/mL. In the introduction to this volume, it was noted that prior to 1996 the sensitivity of water analyses were reported as detection limits, and in 1996, this was changed to reporting minimum detectable concentrations. Thus it is appropriate to use detection limits when discussing historical plutonium concentrations in water. The mathematical definition of these sensitivity measures is given in the Executive Summary.

The E Tunnel effluents have had high plutonium levels of both isotopes for all the tabled years. These levels are from known sources, as discussed above. Note that, for both isotopes, the concentrations show a declining trend over time and the 1989 concentrations are over seven *times the 1996 concentrations.*

^{238}Pu was slightly above detection limits at Cane Spring in 1989 and 1990, and Tippipah Spring was slightly above the detection limit in 1991. $^{239+240}$Pu was above detection limits at Tippipah Spring in 1991. The annual reports for these years do not comment on these observations. There were severe drought conditions at the NTS during these years, resulting in a lack of growth of annual plants and a loss of the integrity of the soil surface. This results in dusty conditions which increase the sediment collected by ponds. The natural springs also tend to dry up during drought years, making collection of sediment free samples difficult. Sediments in water samples on the NTS are a known reason for measurable levels of plutonium.

The Area 23 sewage lagoon contained above MDCs of both plutonium isotopes in 1996, and slightly above detection limit levels of $^{239+240}$Pu in 1989. The 1996 observations are discussed in the previous section. The 1989 annual report did not comment on the finding for that year.

CONCLUSIONS

With a few exceptions, all of the 1996 plutonium in water results were below MDCs. The exceptions are the E Tunnel effluents for all quarters of the year and the first quarter sample from the Area 23 Sewage Lagoon. The Tunnel effluents are from a known and well documented source and are in radiologically controlled locations. The sewage lagoon finding was investigated and found to, most likely, be due to sewer system maintenance, which flushed plutonium containing sediments into the lagoon shortly before the sample was collected.

Table 10.1 Descriptive Statistics for ^{238}Pu in Water by Sampling Location (μCi/mL × 10^{-12}) - 1996

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
WELLS						
Well 5B	4	-0.82	-0.87	1.36	-2.12	0.60
Well 5C	4	-2.81	-2.28	3.04	-6.98	0.32
Well No. 4A	4	-0.79	-0.75	1.33	-2.18	0.53
Well No. 4	4	-4.31	-3.10	3.21	-8.95	-2.09
Well C-1	4	1.50	3.00	5.54	-6.43	6.43
Well UE-16D	4	-2.57	-1.86	2.92	-6.69	0.16
Well HTH No. 8	4	-3.02	-2.35	1.65	-5.47	-1.90
Army Well No. 1	4	-2.71	-2.13	1.23	-4.54	-2.02
Well J-12	4	-3.52	-2.16	2.87	-7.82	-1.92
Well J-13	4	-2.85	-2.32	2.98	-6.95	0.20
Well UE-5C	4	-1.94	-1.01	4.84	-8.53	2.79
POTABLE WATER						
Building 101	4	-2.65	-0.80	4.78	-9.62	0.61
Area 2, Restroom	4	-1.43	-0.96	2.31	-4.30	0.51
Area 6, Cafeteria	4	-1.51	-2.34	3.12	-4.31	2.95
Building 6-900	4	-1.99	-2.11	2.05	-4.38	0.63
Building 12-23	3	-1.25	0.35	4.98	-6.83	2.74
Mercury Cafeteria	4	-3.80	-1.70	5.61	-12.10	0.29
Building 4221	4	-0.32	-0.72	2.21	-2.28	2.44
CONTAINMENT PONDS						
E Tunnel Effluent	4	355.75	344.50	112.61	233.00	501.00
E Tunnel Pond No. 1	2	326.00	326.00	175.36	202.00	450.00
SEWAGE LAGOONS						
RWMS Sewage Pond	4	-4.31	-2.25	4.19	-10.60	-2.16
Yucca Sewage Pond	4	-2.01	-2.05	1.80	-4.08	0.15
DAF Sewage Pond	4	-0.75	-0.61	1.40	-2.42	0.65
LANL Sewage Pond	4	-2.38	-2.46	4.32	-7.50	2.92
Area 12, Sewage Pond	4	-2.19	-1.95	2.23	-5.12	0.25
Area 22, Sewage Pond	4	-2.32	-0.69	4.17	-8.40	0.52
Area 23, Sewage Pond	4	13.94	-2.17	32.78	-3.02	63.10
Reactor Control Sewage	2	-2.37	-2.37	0.95	-3.04	-1.70
Central Supply Sewage	4	-2.75	-4.08	5.10	-7.03	4.18

Table 10.2 Descriptive Statistics for $^{239+240}Pu$ in Water by Sampling Location ($\mu Ci/mL \times 10^{-12}$) - 1996

Station Name	Number of Samples	Mean	Median	Standard Deviation	Minimum	Maximum
WELLS						
Well 5B	4	-1.77	-2.26	1.29	-2.70	0.14
Well 5C	4	-2.44	-1.61	3.13	-6.71	0.16
Well No. 4A	4	1.73	-0.05	3.75	-0.34	7.34
Well No. 4	4	-2.89	-2.70	1.99	-5.49	-0.66
Well C-1	4	-2.70	-2.50	0.94	-3.94	-1.67
Well UE-16d	4	-3.41	-2.60	2.02	-6.42	-2.02
Well HTH No. 8	4	-3.53	-2.96	3.29	-8.04	-0.16
Army Well No. 1	4	-2.55	-2.68	3.48	-6.67	1.83
Well J-12	4	-2.62	-1.56	3.52	-7.51	0.14
Well J-13	4	-1.13	-0.09	3.87	-6.67	2.32
Well UE-5c	4	-2.68	-2.52	4.38	-8.19	2.52
POTABLE WATER						
Building 101	4	-2.78	-2.22	4.78	-9.14	2.45
Area 2, Restroom	4	-3.53	-3.09	1.92	-6.22	-1.70
Area 6, Cafeteria	4	-2.39	-2.61	1.54	-3.98	-0.38
Building 6-900	4	-1.72	-1.48	1.99	-4.04	0.15
Building 12-23	3	-3.84	-3.07	2.36	-6.48	-1.96
Mercury Cafeteria	4	-4.08	-2.25	5.04	-11.50	-0.32
Building 4221	4	0.98	1.04	1.24	-0.30	2.16
CONTAINMENT PONDS						
E Tunnel Effluent	4	2840.00	2835.00	710.35	2060.00	3630.00
E Tunnel Pond No. 1	2	2530.00	2530.00	1301.08	1610.00	3450.00
SEWAGE LAGOONS						
RWMS Sewage Pond	4	-2.76	-1.51	3.91	-8.25	0.25
Yucca Sewage Pond	4	4.33	5.36	5.82	-3.51	10.10
DAF Sewage Pond	4	-2.21	-2.67	1.26	-3.12	-0.40
LANL Sewage Pond	4	-0.66	-1.18	5.90	-7.20	6.91
Area 12, Sewage Pond	4	-2.61	-1.59	3.52	-7.52	0.27
Area 22, Sewage Pond	4	-4.12	-2.98	2.65	-8.07	-2.43
Area 23, Sewage Pond	4	819.90	0.06	1640.06	-0.51	3280.00
Reactor Control Sewage	2	0.62	0.62	4.96	-2.88	4.13
Central Supply Sewage	4	-1.84	-3.63	5.02	-5.72	3.83

Table 10.3 Historical ^{238}Pu in Water Annual Averages at Selected Locations ($\mu Ci/mL \times 10^{-12}$) - 1996

Location	1989	1990	1991	1992	1993	1994	1995	1996
Area 18, Well HTH No. 8	7.3	31.0	2.2	-12.0	4.8	-2.1	-1.7	-3.0
Area 25, Well J-13	-26.0	12.0	0.7	-5.0	-6.9	-0.7	-0.4	-2.9
Area 2, Restroom	12.0	21.0	-5.5	-13.0	0.8	1.3	4.6	-1.4
Area 23, Mercury Cafeteria	-8.9	12.0	18.6	5.0	0.0	1.3	1.5	-3.8
Area 5, Well 5B Reservoir	5.4	11.3	6.3	7.0	2.2	2.4	-2.0	-2.4
Area 18, Camp 17 Reservoir	6.3	-36.4	9.0	5.7	0.7	-0.6	2.4	-2.0
Area 5, Cane Spring	32.7	25.5	10.7	10.6	2.3	2.3	-1.5	-2.6
Area 16, Tippipah Spring	11.9	7.0	23.9	-18.5	0.8	8.0	1.8	-2.5
Area 12, Sewage Lagoon	2.7	26.7	-4.8	-9.2	1.8	-1.7	-1.3	-2.2
Area 23, Sewage Lagoon	26.0	-14.5	1.3	-11.4	0.0	-1.3	1.3	13.9
Area 12, E Tunnel Eff.	2625.0	1616.7	732.5	660.0	450.0	687.3	323.0	355.8

Table 10.4 Historical $^{239+240}Pu$ in Water Annual Averages at Selected Locations ($\mu Ci/mL \times 10^{-12}$) - 1996

Location	1989	1990	1991	1992	1993	1994	1995	1996
Area 18, Well HTH No. 8	1.6	-3.0	0.6	7.2	-8.2	2.5	-1.1	-3.5
Area 25, Well J-13	-0.3	7.8	2.6	13.2	-6.9	2.1	-1.6	-1.1
Area 2, Restroom	-2.4	2.7	0.5	0.1	2.3	2.2	0.0	-3.5
Area 23, Mercury Cafeteria	3.2	0.5	2.9	0.1	2.1	0.6	-0.1	-4.1
Area 5, Well 5B Reservoir	1.8	-5.4	1.0	11.3	7.4	1.7	-2.0	0.0
Area 18, Camp 17 Reservoir	8.0	3.4	8.0	4.0	5.7	5.0	2.4	-0.3
Area 5, Cane Spring	-5.5	0.0	12.4	-3.1	8.9	3.2	0.7	0.0
Area 16, Tippipah Spring	0.3	7.8	66.0	-1.0	9.2	6.6	24.1	-2.7
Area 12, Sewage Lagoon	11.8	0.5	12.9	-2.0	4.3	2.2	-0.9	-2.6
Area 23, Sewage Lagoon	6.9	3.5	16.1	1.8	7.1	9.0	5.0	819.9
Area 12, E Tunnel Eff.	21250.0	9223.0	9500.0	6275.0	4333.0	5343.0	5208.0	2840.0

Attachment 10.1 ^{238}Pu in Water - 1996

Sampling Location	Collection Date	µCi/mL x 10^{-12} Mean	Standard Deviation	MDC
SUPPLY WELLS				
Area 5, Well 5B	01/17/96	0.60	3.35	17.80
Area 5, Well 5B	05/09/96	0.09	3.36	18.10
Area 5, Well 5B	07/15/96	-2.12	2.27	17.80
Area 5, Well 5B	10/07/96	-1.84	1.91	14.90
Area 5, Well 5C	01/17/96	-2.24	2.56	20.70
Area 5, Well 5C	05/09/96	-6.98	7.12	26.40
Area 5, Well 5C	07/15/96	0.32	3.47	18.60
Area 5, Well 5C	10/07/96	-2.32	2.41	18.70
Area 6, Well No. 4A	01/17/96	0.53	2.97	15.80
Area 6, Well No. 4A	06/04/96	-2.18	2.31	18.10
Area 6, Well No. 4A	07/15/96	-1.66	1.78	14.00
Area 6, Well No. 4A	10/07/96	0.15	2.97	16.00
Area 6, Well No. 4	01/17/96	-2.09	2.39	19.30
Area 6, Well No. 4	05/09/96	-8.95	9.13	33.80
Area 6, Well No. 4	07/15/96	-3.96	4.16	32.40
Area 6, Well No. 4	10/07/96	-2.25	2.34	18.10
Area 6, Well C-1	01/17/96	3.34	4.49	19.00
Area 6, Well C-1	05/09/96	-6.43	6.56	24.30
Area 6, Well C-1	07/15/96	2.66	4.00	17.40
Area 6, Well C-1	10/07/96	6.43	3.79	11.50
Area 16, Well UE-16d	01/17/96	-1.63	1.87	15.10
Area 16, Well UE-16d	05/09/96	-6.69	6.82	25.30
Area 16, Well UE-16d	07/15/96	-2.10	2.25	17.70
Area 16, Well UE-16d	10/07/96	0.16	3.03	16.30
Area 18, Well HTH No. 8	01/17/96	-2.23	2.55	20.60
Area 18, Well HTH No. 8	05/09/96	-5.47	9.03	31.60
Area 18, Well HTH No. 8	07/15/96	-2.47	2.64	20.70
Area 18, Well HTH No. 8	10/07/96	-1.90	2.03	16.00
Area 22, Army Well No. 1	01/17/96	-2.05	2.35	18.90
Area 22, Army Well No. 1	05/07/96	-4.54	7.49	26.20
Area 22, Army Well No. 1	07/15/96	-2.21	2.36	18.60
Area 22, Army Well No. 1	10/07/96	-2.02	2.10	16.30
Area 25, Well J-12	01/17/96	-1.92	2.20	17.80
Area 25, Well J-12	05/09/96	-7.82	7.98	29.50
Area 25, Well J-12	07/15/96	-2.05	2.19	17.20
Area 25, Well J-12	10/07/96	-2.28	2.37	18.40
Area 25, Well J-13	01/17/96	-2.19	2.51	20.30
Area 25, Well J-13	05/09/96	-6.95	7.09	26.20
Area 25, Well J-13	07/15/96	-2.45	2.62	20.60
Area 25, Well J-13	10/07/96	0.20	3.82	20.60

Attachment 10.1 (^{238}Pu in Water - 1996, cont.)

Sampling Location	Collection Date	µCi/mL × 10^{-12} Mean	Standard Deviation	MDC
INDUSTRIAL WELLS				
Area 5, Well UE-5c	01/31/96	2.79	4.28	18.70
Area 5, Well UE-5c	05/09/96	-8.53	8.70	32.20
Area 5, Well UE-5c	07/15/96	-2.16	2.31	18.20
Area 5, Well UE-5c	10/07/96	0.14	2.74	14.70
Area 20, Well U-20	01/29/96	8.44	11.86	50.70
POTABLE WATER				
Area 1, Building 101	01/09/96	0.61	2.91	15.40
Area 1, Building 101	05/09/96	-9.62	9.76	36.10
Area 1, Ice House	07/11/96	0.35	3.78	20.40
Area 1, Building 101	10/01/96	-1.94	2.02	15.60
Area 2, Rest Room	01/09/96	0.51	2.45	13.00
Area 2, Rest Room	05/09/96	-4.30	7.01	24.50
Area 2, Rest Room	07/11/96	0.37	4.05	21.80
Area 2, Rest Room	10/01/96	-2.30	2.39	18.50
Area 6, Cafeteria	01/09/96	2.95	3.82	16.10
Area 6, Cafeteria	05/14/96	-4.31	7.03	24.60
Area 6, Cafeteria	07/11/96	-2.43	2.60	20.40
Area 6, Cafeteria	10/01/96	-2.25	2.34	18.10
Area 6, Building 6-900	01/09/96	0.63	3.53	18.80
Area 6, Building 6-900	05/14/96	-4.38	7.14	25.00
Area 6, Building 6-900	07/11/96	-2.07	2.21	17.40
Area 6, Building 6-900	10/01/96	-2.15	2.24	17.40
Area 12, Building 12-23	01/09/96	2.74	3.55	14.90
Area 12, Medical Aid Station	05/09/96	-6.83	6.93	25.60
Area 12, Building 12-23	07/11/96	0.35	3.76	20.20
Area 12, Ice House	10/01/96	-1.94	2.02	15.60
Area 23, Mercury Cafeteria	01/09/96	-1.54	1.81	14.80
Area 23, Mercury Cafeteria	05/14/96	-12.10	12.28	45.30
Area 23, Mercury Cafeteria	07/11/96	0.29	3.15	16.90
Area 23, Mercury Cafeteria	10/01/96	-1.86	1.93	15.00
Area 25, Building 4221	01/09/96	0.49	2.34	12.40
Area 25, Building 4221	05/14/96	-1.93	1.97	15.20
Area 25, Building 4221	07/11/96	-2.28	2.44	19.10
Area 25, Building 4221	10/01/96	2.44	3.90	17.00
RESERVOIRS				
Area 2, Mud Plant	07/22/96	-2.02	2.14	16.70
Area 3, Well A Reservoir	07/22/96	-2.11	2.24	17.40

Attachment 10.1 (^{238}Pu in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL × 10^{-12} Mean	Standard Deviation	MDC
(RESERVOIRS, cont.)				
Area 5, Well 5B Reservoir	07/15/96	-2.43	2.58	20.10
Area 5, Well UE-5c Reservoir	07/15/96	-2.84	3.01	23.50
Area 6, Well 3 Reservoir	07/15/96	-2.19	2.32	18.10
Area 6, Well C-1 Reservoir	07/15/96	0.29	3.81	20.40
Area 18, Camp 17 Reservoir	07/22/96	-2.01	2.11	16.50
Area 25, Well J-11 Reservoir	07/15/96	-2.33	2.47	19.30
Area 25, Well J-12 Reservoir	07/15/96	-2.30	2.44	19.00
NATURAL SPRINGS				
Area 5, Cane Spring	07/15/96	-2.65	2.81	22.00
Area 7, Reitman Seep	07/15/96	-3.62	3.84	29.90
Area 12, White Rock Spring	07/22/96	-2.46	2.61	20.30
Area 12, Captain Jack Spring	07/22/96	0.24	3.21	17.20
Area 15, Tub Springs	07/22/96	0.28	3.64	19.50
Area 16, Tippipah Spring	07/15/96	-2.46	2.61	20.30
Area 29, Topopah Spring	07/15/96	-2.11	2.24	17.50
CONTAINMENT PONDS				
Area 12, E Tunnel Effluent	02/07/96	316.00	32.39	19.60
Area 12, E Tunnel Effluent	05/30/96	233.00	27.03	19.60
Area 12, E Tunnel Effluent	07/25/96	501.00	40.08	16.80
Area 12, E Tunnel Effluent	10/31/96	373.00	28.72	10.60
Area 12, E Tunnel Pond No. 1	02/07/96	202.00	31.71	31.00
Area 12, E Tunnel Pond No. 2	07/25/96	450.00	39.60	19.10
Area 12, E Tunnel Pond No. 2	10/31/96	271.00	24.25	11.10
SEWAGE LAGOONS				
Area 5, RWMS Sewage Pond	02/13/96	-2.16	2.41	19.20
Area 5, RWMS Sewage Pond	05/07/96	-10.60	10.81	39.90
Area 5, RWMS Sewage Pond	08/08/96	-2.21	11.03	36.90
Area 5, RWMS Sewage Pond	11/06/96	-2.28	2.88	24.30
Area 6, Yucca Sewage Pond	02/13/96	-2.66	2.97	23.70
Area 6, Yucca Sewage Pond	05/07/96	0.15	5.33	28.70
Area 6, Yucca Sewage Pond	08/08/96	-4.08	4.28	33.40
Area 6, Yucca Sewage Pond	11/06/96	-1.43	1.92	16.50
Area 6, DAF Sewage Pond	02/13/96	0.65	4.50	24.00

Attachment 10.1 (^{238}Pu in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL × 10^{-12} Mean	Standard Deviation	MDC
(SEWAGE LAGOONS, cont.)				
Area 6, DAF Sewage Pond	05/07/96	0.13	4.75	25.50
Area 6, DAF Sewage Pond	08/08/96	-2.42	2.54	19.80
Area 6, DAF Sewage Pond	11/06/96	-1.36	1.72	14.50
Area 11, LANL Sewage Pond	02/13/96	2.92	4.09	17.50
Area 11, LANL Sewage Pond	05/07/96	-7.50	7.65	28.30
Area 11, LANL Sewage Pond	08/08/96	-3.40	3.57	27.80
Area 11, LANL Sewage Pond	11/06/96	-1.53	1.94	16.30
Area 12, Sewage Pond	02/13/96	-2.28	2.54	20.30
Area 12, Sewage Pond	05/07/96	-5.12	8.45	29.60
Area 12, Sewage Pond	08/08/96	0.25	3.86	20.80
Area 12, Sewage Pond	11/06/96	-1.62	2.05	17.40
Area 22, Sewage Pond	02/13/96	0.52	3.62	19.20
Area 22, Sewage Pond	05/07/96	-8.40	8.57	31.70
Area 22, Sewage Pond	08/08/96	0.25	3.84	20.70
Area 22, Sewage Pond	11/06/96	-1.64	2.07	17.50
Area 23, Sewage Pond	02/13/96	63.10	12.34	15.90
Area 23, Sewage Pond	05/07/96	-2.99	3.05	23.50
Area 23, Sewage Pond	08/08/96	-3.02	3.17	24.70
Area 23, Sewage Pond	11/06/96	-1.34	1.70	14.30
Area 25, Reactor Control Sewg.	02/13/96	-3.04	3.39	27.00
Area 25, Reactor Control Sewg.	11/06/96	-1.70	2.15	18.20
Area 25, Central Supply Sewg.	02/13/96	4.18	5.85	25.10
Area 25, Central Supply Sewg.	05/07/96	-6.09	10.05	35.20
Area 25, Central Supply Sewg.	08/08/96	-7.03	7.52	28.20
Area 25, Central Supply Sewg.	11/06/96	-2.07	2.62	22.20

Attachment 10.2 $^{239+240}$Pu in Water - 1996

Sampling Location	Collection Date	µCi/mL x 10^{-12} Mean	Standard Deviation	MDC
SUPPLY WELLS				
Area 5, Well 5B	01/17/96	0.1	3.5	19.0
Area 5, Well 5B	05/09/96	-2.2	2.3	17.9
Area 5, Well 5B	07/15/96	-2.7	2.6	19.1
Area 5, Well 5B	10/07/96	-2.3	2.1	15.9
Area 5, Well 5C	01/17/96	0.2	4.1	22.1
Area 5, Well 5C	05/09/96	-6.7	7.0	26.0
Area 5, Well 5C	07/15/96	-2.8	2.7	20.1
Area 5, Well 5C	10/07/96	-0.4	3.7	20.0
Area 6, Well No. 4A	01/17/96	0.1	3.1	16.9
Area 6, Well No. 4A	06/04/96	7.3	5.5	18.7
Area 6, Well No. 4A	07/15/96	-0.2	2.8	15.0
Area 6, Well No. 4A	10/07/96	-0.3	3.1	17.1
Area 6, Well No. 4	01/17/96	-2.6	2.7	20.6
Area 6, Well No. 4	05/09/96	-5.5	9.5	33.3
Area 6, Well No. 4	07/15/96	-0.7	6.4	34.8
Area 6, Well No. 4	10/07/96	-2.8	2.6	19.4
Area 6, Well C-1	01/17/96	-2.6	2.6	20.3
Area 6, Well C-1	05/09/96	-3.9	6.8	23.9
Area 6, Well C-1	07/15/96	-2.6	2.5	18.7
Area 6, Well C-1	10/07/96	-1.7	1.6	12.2
Area 16, Well UE-16d	01/17/96	-2.0	2.1	16.1
Area 16, Well UE-16d	05/09/96	-6.4	6.7	24.9
Area 16, Well UE-16d	07/15/96	-2.7	2.5	19.0
Area 16, Well UE-16d	10/07/96	-2.5	2.4	17.5
Area 18, Well HTH No. 8	01/17/96	-2.8	2.8	22.0
Area 18, Well HTH No. 8	05/09/96	-8.0	8.4	31.2
Area 18, Well HTH No. 8	07/15/96	-3.2	3.0	22.3
Area 18, Well HTH No. 8	10/07/96	-0.2	3.1	17.0
Area 22, Army Well No. 1	01/17/96	-2.5	2.6	20.2
Area 22, Army Well No. 1	05/07/96	-6.7	6.9	25.8
Area 22, Army Well No. 1	07/15/96	-2.8	2.7	20.0
Area 22, Army Well No. 1	10/07/96	1.8	3.9	17.4
Area 25, Well J-12	01/17/96	0.1	3.5	19.0
Area 25, Well J-12	05/09/96	-7.5	7.8	29.1
Area 25, Well J-12	07/15/96	-0.3	3.4	18.5
Area 25, Well J-12	10/07/96	-2.9	2.7	19.7
Area 25, Well J-13	01/17/96	0.2	4.0	21.6
Area 25, Well J-13	05/09/96	-6.7	6.9	25.8
Area 25, Well J-13	07/15/96	-0.3	4.1	22.2
Area 25, Well J-13	10/07/96	2.3	4.9	22.1

Attachment 10.2 ($^{239+240}$Pu in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL x 10^{-12} Mean	Standard Deviation	MDC
INDUSTRIAL WELLS				
Area 5, Well UE-5c	01/31/96	2.5	4.4	19.3
Area 5, Well UE-5c	05/09/96	-8.2	8.5	31.7
Area 5, Well UE-5c	07/15/96	-2.8	2.6	19.6
Area 5, Well UE-5c	10/07/96	-2.3	2.1	15.7
Area 20, Well U-20	01/29/96	-6.4	6.8	52.5
POTABLE WATER				
Area 1, Building101	01/09/96	-2.0	2.1	16.5
Area 1, Building101	05/09/96	-9.1	9.5	35.4
Area 1, Ice House	07/11/96	2.4	4.9	21.9
Area 1, Building101	10/01/96	-2.4	2.3	16.7
Area 2, Restroom	01/09/96	-1.7	1.8	13.9
Area 2, Restroom	05/09/96	-6.2	6.5	24.1
Area 2, Restroom	07/11/96	-3.3	3.1	23.5
Area 2, Restroom	10/01/96	-2.9	2.7	19.8
Area 6, Cafeteria	01/09/96	-2.1	2.2	17.2
Area 6, Cafeteria	05/14/96	-4.0	6.9	24.1
Area 6, Cafeteria	07/11/96	-3.1	2.9	22.0
Area 6, Cafeteria	10/01/96	-0.4	3.6	19.4
Area 6, Building 6-900	01/09/96	0.1	3.7	20.0
Area 6, Building 6-900	05/14/96	-4.0	7.0	24.5
Area 6, Building 6-900	07/11/96	-0.3	3.4	18.7
Area 6, Building 6-900	10/01/96	-2.7	2.5	18.6
Area 12, Building 12-23	01/09/96	-2.0	2.0	16.0
Area 12, Medical Aid Station	05/09/96	-6.5	6.7	25.1
Area 12, Building 12-23	07/11/96	-3.1	2.9	21.8
Area 12, Ice House	10/01/96	-2.4	2.3	16.7
Area 23, Mercury Cafeteria	01/09/96	-1.9	2.0	15.8
Area 23, Mercury Cafeteria	05/14/96	-11.5	12.0	44.4
Area 23, Mercury Cafeteria	07/11/96	-2.6	2.4	18.2
Area 23, Mercury Cafeteria	10/01/96	-0.3	3.0	16.1
Area 25, Building 4221	01/09/96	0.2	2.5	13.3
Area 25, Building 4221	05/14/96	2.2	3.4	15.0
Area 25, Building 4221	07/11/96	-0.3	3.8	20.6
Area 25, Building 4221	10/01/96	1.9	4.1	18.2
RESERVOIRS				
Area 2, Mud Plant	07/22/96	2.3	3.9	17.2
Area 3, Well A Reservoir	07/22/96	-2.3	2.3	18.0
Area 3, Well 3 Reservoir	07/15/96	-2.4	2.4	18.7

Attachment 10.2 ($^{239+240}$Pu in Water - 1996, cont.)

Sampling Location	Collection Date	µCi/mL x 10^{-12} Mean	Standard Deviation	MDC
(RESERVOIRS, cont.)				
Area 5, Well 5B Reservoir	07/15/96	0.0	3.8	20.7
Area 5, Well UE-5c Reservoir	07/15/96	0.0	4.5	24.3
Area 6, Well C-1 Reservoir	07/15/96	-2.8	2.8	21.1
Area 18, Camp 17 Reservoir	07/22/96	-0.3	3.2	17.7
Area 25, Well J-11 Reservoir	07/15/96	0.0	3.7	19.9
Area 25, Well J-12 Reservoir	07/15/96	0.0	3.6	19.7
NATURAL SPRINGS				
Area 5, Cane Spring	07/15/96	0.0	4.2	22.7
Area 7, Reitman Seep	07/15/96	109.0	22.6	30.9
Area 12, White Rock Spring	07/22/96	-2.8	2.8	21.0
Area 12, Capt. Jack Spring	07/22/96	0.0	3.3	17.8
Area 15, Tub Springs	07/22/96	0.0	3.7	20.2
Area 16, Tippipah Spring	07/15/96	-2.7	2.7	21.0
Area 29, Topopah Spring	07/15/96	-2.4	2.4	18.0
CONTAINMENT PONDS				
Area 12, E Tunnel Effluent	02/07/96	2460.0	136.5	20.3
Area 12, E Tunnel Effluent	05/30/96	2060.0	116.4	20.2
Area 12, E Tunnel Effluent	07/25/96	3630.0	178.8	17.4
Area 12, E Tunnel Effluent	10/31/96	3210.0	144.4	13.0
Area 12, E Tunnel Pond No. 1	02/07/96	1610.0	122.4	32.1
Area 12, E Tunnel Pond No. 2	07/25/96	3450.0	177.7	19.8
Area 12, E Tunnel Pond No. 2	10/31/96	2650.0	125.6	13.7
SEWAGE LAGOONS				
Area 5, RWMS Sewage Pond	02/13/96	0.3	3.7	19.9
Area 5, RWMS Sewage Pond	05/07/96	-2.8	11.7	39.3
Area 5, RWMS Sewage Pond	08/08/96	-8.3	11.7	40.3
Area 5, RWMS Sewage Pond	11/06/96	-0.2	5.2	28.4
Area 6, Yucca Sewage Pond	02/13/96	6.9	6.5	24.5
Area 6, Yucca Sewage Pond	05/07/96	-3.5	3.7	28.4
Area 6, Yucca Sewage Pond	08/08/96	3.8	8.0	35.8
Area 6, Yucca Sewage Pond	11/06/96	10.1	6.3	19.8
Area 6, DAF Sewage Pond	02/13/96	-3.0	3.2	24.8
Area 6, DAF Sewage Pond	05/07/96	-3.1	3.2	25.2
Area 6, DAF Sewage Pond	08/08/96	-0.4	3.9	21.3
Area 6, DAF Sewage Pond	11/06/96	-2.3	2.2	16.9

Attachment 10.2 ($^{239+240}$Pu in Water - 1996, cont.)

Sampling Location	Collection Date	µCi/mL x 10^{-12} Mean	Standard Deviation	MDC
(SEWAGE LAGOONS, cont.)				
Area 11, LANL Sewage Pond	02/13/96	0.2	3.4	18.2
Area 11, LANL Sewage Pond	05/07/96	-7.2	7.5	27.9
Area 11, LANL Sewage Pond	08/08/96	6.9	7.6	29.9
Area 11, LANL Sewage Pond	11/06/96	-2.6	2.5	19.0
Area 12, Sewage Pond	02/13/96	0.3	3.9	21.0
Area 12, Sewage Pond	05/07/96	-7.5	7.8	29.1
Area 12, Sewage Pond	08/08/96	-0.4	4.1	22.3
Area 12, Sewage Pond	11/06/96	-2.8	2.7	20.2
Area 22, Sewage Pond	02/13/96	-2.4	2.6	19.9
Area 22, Sewage Pond	05/07/96	-8.1	8.4	31.3
Area 22, Sewage Pond	08/08/96	-3.2	3.0	22.2
Area 22, Sewage Pond	11/06/96	-2.8	2.7	20.4
Area 23, Sewage Pond	02/13/96	3280.0	163.0	16.9
Area 23, Sewage Pond	05/07/96	0.2	4.3	23.2
Area 23, Sewage Pond	08/08/96	-0.5	4.9	26.6
Area 23, Sewage Pond	11/06/96	-0.1	3.1	16.6
Area 25, Reactor Control Pond	02/13/96	4.1	6.4	28.0
Area 25, Reactor Control Pond	11/06/96	-2.9	2.8	21.2
Area 25, Central Supply Pond	02/13/96	3.8	6.0	26.0
Area 25, Central Supply Pond	05/07/96	-5.7	9.9	34.7
Area 25, Central Supply Pond	08/08/96	-3.6	9.3	30.8

11.0 ONSITE TRITIUM IN WATER

For data analysis purposes the sampling locations for tritium in water are divided into seven types. These types of water sampling locations are listed below:

- Potable water or supply wells are the wells that supply water for human consumption. These wells may also be used to supply water for industrial and construction purposes. These locations are sampled quarterly for tritium.

- Industrial wells or non-potable water wells are wells that supply water only for industrial and construction purposes. One industrial well was sampled quarterly, and a second well was sampled for the first quarter then it was taken out of service.

- Potable water end points or water supply distribution points are locations where water is drawn for human consumption. These are typically faucets in buildings such as offices and cafeterias. These locations are sampled quarterly.

- Natural springs are places where ground water comes to the surface. They are used by the fauna of the NTS and sometimes are dry when visited for sampling. These locations are sampled once a year, in July.

- Sewage lagoons are the end points for the several sanitary sewage systems operated on the NTS. Water is lost from these lagoons primarily by evaporation. These locations are sampled quarterly.

- Open reservoirs are man-made water storage ponds. Most are adjacent to wells, but this type also includes the reservoirs that supply the concrete batch plants (Mud Plants) and the Area 23 recreational swimming pool. These locations are sampled once a year, in July.

- Containment ponds are used to contain the effluents from the tunnels. The water in these typically has elevated levels of tritium. Loss of water is primarily by evaporation. These locations are sampled quarterly. The only containment ponds that contain water are at the E Tunnel, the tunnel effluent is grouped with the ponds for convenience.

The names of the sampling locations in each of these type classifications are given in the attachments to this chapter. (Figures, tables, and attachments are located at the end of the chapters.) For a few of the potable water sampling locations samples may be collected from adjacent locations when the primary location is unavailable. For example, when it was time to sample Building 101 in Area 1 for the third quarter sample, the building was locked. The sampler took the sample from an adjacent building, the Area 1 Ice House. A similar situation occurred in Area 12 where Building 12-23, the Medical Aid Station, and the Area 12 Ice House are adjacent buildings. It is known that adjacent buildings are on the same water supply system and are connected to the system in close proximity.

Sampling locations, sample collection dates, measured concentrations, analytic standard deviations, and analytic minimum detectable concentrations (MDCs) for tritium in water appear in Attachment 11.1. Refer to Figure 9.1, in chapter 9, for a map of the Nevada Test Site (NTS) water sampling locations. The numerical format of Attachment 11.1 differs from that of previous chapters. In this attachment, exponential notation is used, while in previous chapters all numbers were scaled by an exponent noted in the headings. For tritium in water, scaling is not reasonable because the data range from 10^{-3} to 10^{-11}.

Tritium samples were collected in 1996 from ten supply wells, two industrial wells, seven potable water sources, nine open reservoirs, seven natural springs, two containment ponds, and nine sewage lagoons. The E Tunnel effluent and Ponds 1 and 2 are considered a single location.

Two analytical procedures are used for tritium analyses. Well waters, both supply and industrial wells, are analyzed using an enriched tritium procedure. The remaining types of waters are analyzed using a conventional tritium procedure. The enriched procedure is capable of measuring substantially lower levels of tritium, and it is more accurate (smaller errors) than the conventional procedure. However, the enriched procedure is also 2¼ times more expensive than the conventional procedure, and the enriched procedure takes about three weeks to perform the analyses, while the conventional procedure typically takes one week. The mean of the MDCs in Attachment 11.1 for the well waters (enriched method) was 1.35×10^{-8} µCi/mL, while the mean MDC for the remaining waters (conventional method) is 7.31×10^{-7} µCi/mL. The mean of the standard deviations for the well waters is 4.06×10^{-9} while the mean standard deviation for the remaining waters is 4.13×10^{-7} µCi/mL. The enriched tritium procedure is used for supply well waters because these supply the potable water for human consumption at the NTS.

An examination of the data in Attachment 11.1 will reveal that almost all the concentration values are less than the corresponding MDC. The exceptions are all the samples from the E Tunnel and the October 7, 1996 sample from Well 5B. The Well 5B sample was only 7 percent above its MDC and may be a false positive result. The concentrations from E Tunnel samples are three orders of magnitude above MDCs and thus show a substantial tritium inventory. Hence the tritium in water results can be divided into two groups of sampling locations based on tritium concentrations: the E Tunnel sampling locations and all other sampling locations.

The data from the other sampling locations will not be statistically analyzed. Concentrations below MDC represent randomness in the analytical procedure rather than providing information about tritium inventories. Forty-six percent of these concentrations are negative; thus, this data is almost centered on zero.

EFFLUENT AND CONTAINMENT PONDS

Tritium in the E Tunnel effluent is known to result from the several nuclear experiments that were preformed within that tunnel. Water that seeps into the tunnel picks up contamination within the tunnel, then exits the tunnel as the effluent and is collected in the containment ponds. The concentrations measured from the containment ponds in 1996 are consistent with historical levels at those locations. A two-way analysis of variance (ANOVA) was used to test for differences between sampling locations and sampling dates. The results are given in Table 11.1. This analysis found no differences; thus, the effluent and containment pond tritium concentrations can be characterized by the descriptive statistics given in Table 11.2, which combine all sampling dates and all locations. The residuals from this ANOVA are normally distributed.

HISTORICAL TRENDS

Detailed reporting of historical trends at all sampling locations would result in an unwieldy document. Instead, two representative locations from each of the types of water sources have been chosen, except that no industrial well was chosen and only one containment pond location was chosen. Tritium in water annual averages are available starting in 1989 and are presented in Table 11.3. When reviewing the data in this table, consider the averages with respect to detection limits. In the units of this table, µCi/mL $\times 10^{-9}$, the detection limit for supply wells is

approximately 14, and for the other types of locations, the detection limit is about 730. Prior to 1996, the sensitivity of the analytical procedure was reported as a detection limit rather than as a MDC; thus, for discussing historical data, it is appropriate to use the detection limit. Also, it is important to note that prior to 1991 the enriched tritium method was not used to analyze water from supply wells, rather the conventional method was used. The industrial wells were analyzed using the conventional method through 1994, then beginning in 1995, the enriched method was used.

Table 11.3 clearly shows the effect a source of tritium has on the E Tunnel effluent. The remaining sampling locations are below detection limits for all years except for the supply wells in 1991 through 1993.

CONCLUSIONS

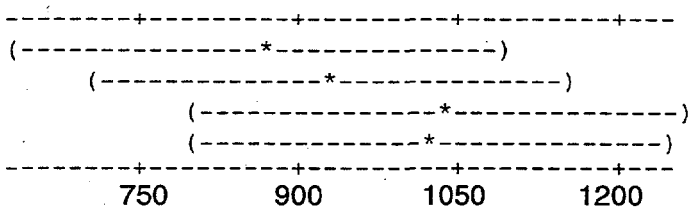
Except for the containment ponds, the 1996 tritium in water concentrations are below the individual minimum detectable concentrations. Measurable levels of tritium are expected in containment ponds, since these contain effluent from nuclear events within the tunnels.

Table 11.1 Two-Way ANOVA on Tritium in Effluent and Containment Ponds Response Variable is 1996 Tritium Concentration ($\mu Ci/mL \times 10^{-6}$)

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value	P-Level
Sample Date	3	40711	13570	1.31	0.414
Location	1	8712	8712	0.84	0.426
Error	3	31015	10338		
Total	7	80438			

Sample Date	Mean
02/07/96	862
05/30/96	913
07/25/96	1030
10/31/96	1022

Individual 95% Confidence Intervals



Location	Mean
Effluent	924
Ponds	990

Individual 95% Confidence Intervals

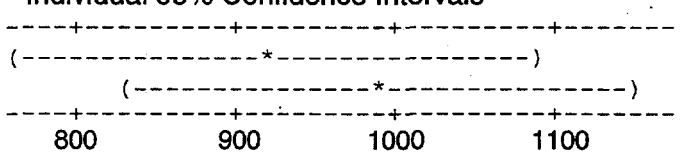


Table 11.2 Descriptive Statistics for 1996 Tritium in Effluent and Containment Ponds

Number of Samples = 8
Mean = 9.57×10^{-4}
Standard Deviation = 1.07×10^{-4}
Median = 1.01×10^{-3}
Minimum = 7.76×10^{-4}
Maximum = 1.05×10^{-3}
Median MDC = 7.40×10^{-7}

Table 11.3 Historical Annual Averages for Tritium in Water at Representative Sampling Locations

Table Data is in Units of $\mu Ci/mL \times 10^{-9}$

Location	1989	1990	1991	1992	1993	1994	1995	1996
Well UE-5C	20	-45	64	3	67	2	-4	-4
Well J-13	120	70	21	48	18	0	-1	-1
Area 6, Cafeteria	52	89	-28	18	60	-11	154	-52
Mercury Cafeteria	75	210	-38	31	29	49	23	63
Area 2, Mud Plant	200	151	121	76	22	102	74	74
Well J-11 Reservoir	75	21	19	60	59	-133	91	183
Cane Spring	110	-10	394	-27	17	-180	430	114
Reitman Seep	167	29	158	102	-81	50	0	97
Area 12, Sewage Pond	100	423	352	151	121	-11	56	4
Area 23, Sewage Pond	267	185	-47	105	-80	67	13	-20
E Tunnel Effluent	993480	1475000	2175000	2000000	1800000	-	827000	923750

Attachment 11.1 Tritium in Water - 1996

Sampling Location	Collection Date	µCi/mL Concentration	µCi/mL Standard Deviation	µCi/mL MDC
SUPPLY WELLS				
Area 5, Well 5B	01/17/96	-2.6×10^{-9}	4.5×10^{-9}	1.6×10^{-8}
Area 5, Well 5B	05/09/96	4.1×10^{-9}	3.4×10^{-9}	1.1×10^{-8}
Area 5, Well 5B	07/15/96	-2.2×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 5, Well 5B	10/07/96	1.3×10^{-8}	3.6×10^{-9}	1.2×10^{-8}
Area 5, Well 5C	01/17/96	2.5×10^{-9}	4.5×10^{-9}	1.5×10^{-8}
Area 5, Well 5C	05/09/96	2.5×10^{-9}	3.6×10^{-9}	1.2×10^{-8}
Area 5, Well 5C	07/15/96	4.3×10^{-10}	4.2×10^{-9}	1.4×10^{-8}
Area 5, Well 5C	10/07/96	7.4×10^{-11}	3.6×10^{-9}	1.2×10^{-8}
Area 6, Well No. 4A	01/17/96	4.3×10^{-9}	4.7×10^{-9}	1.6×10^{-8}
Area 6, Well No. 4A	06/04/96	3.7×10^{-9}	4.3×10^{-9}	1.4×10^{-8}
Area 6, Well No. 4A	07/15/96	-1.9×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 6, Well No. 4A	10/07/96	-5.4×10^{-10}	4.4×10^{-9}	1.5×10^{-8}
Area 6, Well No. 4	01/17/96	2.5×10^{-9}	4.5×10^{-9}	1.5×10^{-8}
Area 6, Well No. 4	05/09/96	-7.7×10^{-10}	3.4×10^{-9}	1.1×10^{-8}
Area 6, Well No. 4	07/15/96	6.3×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 6, Well No. 4	10/07/96	3.5×10^{-9}	4.1×10^{-9}	1.3×10^{-8}
Area 6, Well C-1	01/17/96	4.9×10^{-9}	4.6×10^{-9}	1.5×10^{-8}
Area 6, Well C-1	05/09/96	-2.0×10^{-9}	3.3×10^{-9}	1.1×10^{-8}
Area 6, Well C-1	07/15/96	7.3×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 6, Well C-1	10/07/96	6.8×10^{-9}	3.6×10^{-9}	1.2×10^{-8}
Area 16, Well UE-16d	01/17/96	1.8×10^{-9}	4.4×10^{-9}	1.5×10^{-8}
Area 16, Well UE-16d	05/09/96	3.9×10^{-9}	3.2×10^{-9}	1.1×10^{-8}
Area 16, Well UE-16d	07/15/96	2.5×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 16, Well UE-16d	10/07/96	3.9×10^{-10}	4.2×10^{-9}	1.4×10^{-8}
Area 18, Well HTH No. 8	01/17/96	8.9×10^{-10}	4.8×10^{-9}	1.6×10^{-8}
Area 18, Well HTH No. 8	05/09/96	4.8×10^{-9}	4.1×10^{-9}	1.3×10^{-8}
Area 18, Well HTH No. 8	07/15/96	-7.7×10^{-10}	4.2×10^{-9}	1.4×10^{-8}
Area 18, Well HTH No. 8	10/07/96	-3.8×10^{-9}	3.6×10^{-9}	1.2×10^{-8}
Area 22, Army Well No. 1	01/17/96	3.2×10^{-9}	4.5×10^{-9}	1.5×10^{-8}
Area 22, Army Well No. 1	05/07/96	2.4×10^{-9}	3.5×10^{-9}	1.1×10^{-8}
Area 22, Army Well No. 1	07/15/96	5.5×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 22, Army Well No. 1	10/07/96	1.0×10^{-8}	3.5×10^{-9}	1.1×10^{-8}
Area 25, Well J-12	01/17/96	-1.6×10^{-9}	4.7×10^{-9}	1.6×10^{-8}
Area 25, Well J-12	05/09/96	1.1×10^{-9}	3.9×10^{-9}	1.3×10^{-8}
Area 25, Well J-12	07/15/96	1.7×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 25, Well J-12	10/07/96	-2.5×10^{-9}	3.9×10^{-9}	1.3×10^{-8}
Area 25, Well J-13	01/17/96	1.7×10^{-10}	4.4×10^{-9}	1.5×10^{-8}
Area 25, Well J-13	05/09/96	-2.1×10^{-10}	3.4×10^{-9}	1.1×10^{-8}
Area 25, Well J-13	07/15/96	-6.9×10^{-10}	4.2×10^{-9}	1.4×10^{-8}
Area 25, Well J-13	10/07/96	-3.2×10^{-9}	3.5×10^{-9}	1.2×10^{-8}

Attachment 11.1 (Tritium in Water - 1996, cont.)

Sampling Location	Collection Date	μCi/mL Concentration	Standard Deviation	MDC
INDUSTRIAL WELLS				
Area 5, Well UE-5c	01/31/96	-1.2×10^{-8}	4.8×10^{-9}	1.7×10^{-8}
Area 5, Well UE-5c	05/09/96	4.0×10^{-10}	3.6×10^{-9}	1.2×10^{-8}
Area 5, Well UE-5c	07/15/96	-4.2×10^{-9}	4.2×10^{-9}	1.4×10^{-8}
Area 5, Well UE-5c	10/07/96	-3.0×10^{-10}	3.7×10^{-9}	1.2×10^{-8}
Area 20, Well U-20	01/29/96	-1.5×10^{-8}	4.8×10^{-9}	1.7×10^{-8}
POTABLE WATER				
Area 1, Building 101	01/09/96	-2.2×10^{-7}	2.2×10^{-7}	7.4×10^{-7}
Area 1, Building 101	05/09/96	5.6×10^{-9}	2.1×10^{-7}	7.2×10^{-7}
Area 1, Building 101	07/11/96	-3.0×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 1, Building 101	10/01/96	4.6×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 2, Restroom	01/09/96	-2.3×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 2, Restroom	05/09/96	1.2×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 2, Restroom	07/11/96	-1.2×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 2, Restroom	10/01/96	1.2×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 6, Cafeteria	01/09/96	9.1×10^{-8}	2.2×10^{-7}	7.3×10^{-7}
Area 6, Cafeteria	05/14/96	-1.4×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 6, Cafeteria	07/11/96	-2.0×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 6, Cafeteria	10/01/96	4.0×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 6, Building 6-900	01/09/96	5.1×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 6, Building 6-900	05/14/96	1.0×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 6, Building 6-900	07/11/96	-6.1×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 6, Building 6-900	10/01/96	-4.0×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 12, Building 12-23	01/09/96	2.6×10^{-7}	2.2×10^{-7}	7.4×10^{-7}
Area 12, Medical Aid Station	05/09/96	1.3×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 12, Ice House	07/11/96	-2.6×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 12, Ice House	10/01/96	2.0×10^{-7}	2.2×10^{-7}	7.4×10^{-7}
Area 23, Mercury Cafeteria	01/09/96	1.3×10^{-7}	2.2×10^{-7}	7.4×10^{-7}
Area 23, Mercury Cafeteria	05/14/96	3.4×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 23, Mercury Cafeteria	07/11/96	-4.3×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 23, Mercury Cafeteria	10/01/96	2.1×10^{-7}	2.2×10^{-7}	7.4×10^{-7}
Area 25, Building 4221	01/09/96	5.1×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
Area 25, Building 4221	05/14/96	-2.2×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 25, Building 4221	07/11/96	-6.1×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 25, Building 4221	10/01/96	-4.6×10^{-8}	2.2×10^{-7}	7.4×10^{-7}
RESERVIORS				
Area 2, Mud Plant	07/22/96	7.4×10^{-8}	2.2×10^{-7}	7.2×10^{-7}
Area 3, Well A Reservoir	07/22/96	3.4×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 5, Well 5B Reservoir	07/15/96	4.6×10^{-8}	2.2×10^{-7}	7.3×10^{-7}

Attachment 11.1 (Tritium in Water - 1996, cont.)

Sampling Location	Collection Date	µCi/mL Concentration	µCi/mL Standard Deviation	µCi/mL MDC
(RESERVIORS, cont.)				
Area 5, Well UE-5c Reservoir	07/15/96	-1.5×10^{-7}	2.1×10^{-7}	7.3×10^{-7}
Area 6, Well 3 Reservoir	07/15/96	1.4×10^{-7}	2.2×10^{-7}	7.3×10^{-7}
Area 6, Well C-1 Reservoir	07/15/96	-1.3×10^{-7}	2.1×10^{-7}	7.3×10^{-7}
Area 18, Camp 17 Reservoir	07/22/96	-1.6×10^{-8}	2.2×10^{-7}	7.3×10^{-7}
Area 25, Well J-11 Reservoir	07/15/96	1.8×10^{-7}	2.2×10^{-7}	7.3×10^{-7}
Area 25, Well J-12 Reservoir	07/15/96	1.8×10^{-7}	2.2×10^{-7}	7.3×10^{-7}
NATURAL SPRINGS				
Area 5, Cane Spring	07/15/96	1.1×10^{-7}	2.2×10^{-7}	7.3×10^{-7}
Area 7, Reitman Seep	07/15/96	9.7×10^{-8}	2.2×10^{-7}	7.3×10^{-7}
Area 12, White Rock	07/22/96	-6.8×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 12, Capt Jack	07/22/96	-1.0×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 15, Tub Springs	07/22/96	2.2×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 16, Tippipah Spring	07/15/96	2.9×10^{-8}	2.2×10^{-7}	7.3×10^{-7}
Area 29, Topopah Spring	07/15/96	1.4×10^{-7}	2.2×10^{-7}	7.3×10^{-7}
CONTAINMENT PONDS				
Area 12, E Tunnel Effluent	02/07/96	8.5×10^{-4}	2.2×10^{-6}	7.4×10^{-7}
Area 12, E Tunnel Effluent	05/30/96	7.8×10^{-4}	2.0×10^{-6}	7.4×10^{-7}
Area 12, E Tunnel Effluent	07/25/96	1.0×10^{-3}	2.4×10^{-6}	7.2×10^{-7}
Area 12, E Tunnel Effluent	10/31/96	1.1×10^{-3}	2.5×10^{-6}	7.6×10^{-7}
Area 12, E Tunnel Pond No. 1	02/07/96	8.8×10^{-4}	2.3×10^{-6}	7.4×10^{-7}
Area 12, E Tunnel Pond No. 1	05/30/96	1.1×10^{-3}	2.4×10^{-6}	7.1×10^{-7}
Area 12, E Tunnel Pond No. 2	07/25/96	1.0×10^{-3}	2.4×10^{-6}	7.2×10^{-7}
Area 12, E Tunnel Pond No. 2	10/31/96	9.9×10^{-4}	2.4×10^{-6}	7.6×10^{-7}
SEWAGE LAGOONS				
Area 5, RWMS Sewage Pond	02/13/96	-1.4×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 5, RWMS Sewage Pond	05/07/96	2.5×10^{-7}	2.1×10^{-7}	6.9×10^{-7}
Area 5, RWMS Sewage Pond	08/08/96	-6.7×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 5, RWMS Sewage Pond	11/06/96	-3.7×10^{-7}	2.2×10^{-7}	7.7×10^{-7}
Area 6, Yucca Sewage Pond	02/13/96	-1.3×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 6, Yucca Sewage Pond	05/07/96	2.4×10^{-7}	2.1×10^{-7}	6.9×10^{-7}
Area 6, Yucca Sewage Pond	08/08/96	5.6×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 6, Yucca Sewage Pond	11/06/96	-1.5×10^{-7}	2.3×10^{-7}	7.7×10^{-7}
Area 6, DAF Sewage Pond	02/13/96	-1.7×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 6, DAF Sewage Pond	05/07/96	2.3×10^{-7}	2.1×10^{-7}	6.9×10^{-7}
Area 6, DAF Sewage Pond	08/08/96	1.0×10^{-7}	2.1×10^{-7}	7.2×10^{-7}

Attachment 11.1 (Tritium in Water - 1996, cont.)

Sampling Location	Collection Date	µCi/mL Concentration	µCi/mL Standard Deviation	µCi/mL MDC
(SEWAGE LAGOONS, cont.)				
Area 6, DAF Sewage Pond	11/06/96	-2.8×10^{-7}	2.3×10^{-7}	7.7×10^{-7}
Area 6, LANL Sewage Pond	02/13/96	-2.0×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 6, LANL Sewage Pond	05/07/96	3.4×10^{-7}	2.1×10^{-7}	6.9×10^{-7}
Area 6, LANL Sewage Pond	08/08/96	3.0×10^{-7}	2.2×10^{-7}	7.2×10^{-7}
Area 6, LANL Sewage Pond	11/06/96	-7.3×10^{-8}	2.3×10^{-7}	7.7×10^{-7}
Area 12, Sewage Pond	02/13/96	1.5×10^{-7}	2.3×10^{-7}	7.5×10^{-7}
Area 12, Sewage Pond	05/07/96	8.2×10^{-8}	2.1×10^{-7}	6.9×10^{-7}
Area 12, Sewage Pond	08/08/96	-7.2×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 12, Sewage Pond	11/06/96	-1.5×10^{-7}	2.3×10^{-7}	7.7×10^{-7}
Area 22, Sewage Pond	02/13/96	-3.2×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 22, Sewage Pond	05/07/96	2.2×10^{-8}	2.1×10^{-7}	6.9×10^{-7}
Area 22, Sewage Pond	08/08/96	-3.0×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 22, Sewage Pond	11/06/96	-2.6×10^{-7}	2.3×10^{-7}	7.7×10^{-7}
Area 23, Sewage Pond	02/13/96	-1.9×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 23, Sewage Pond	05/07/96	3.4×10^{-7}	2.1×10^{-7}	6.9×10^{-7}
Area 23, Sewage Pond	08/08/96	-2.3×10^{-7}	2.1×10^{-7}	7.2×10^{-7}
Area 23, Sewage Pond	11/06/96	3.9×10^{-10}	2.3×10^{-7}	7.7×10^{-7}
Area 25, Reactor Control Pond	02/13/96	-2.6×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 25, Reactor Control Pond	11/06/96	-1.6×10^{-7}	2.3×10^{-7}	7.7×10^{-7}
Area 25, Central Supply Pond	02/13/96	-1.9×10^{-7}	2.2×10^{-7}	7.5×10^{-7}
Area 25, Central Supply Pond	05/07/96	2.8×10^{-7}	2.1×10^{-7}	6.9×10^{-7}
Area 25, Central Supply Pond	08/08/96	-2.8×10^{-8}	2.1×10^{-7}	7.2×10^{-7}
Area 25, Central Supply Pond	11/06/96	-2.9×10^{-7}	2.3×10^{-7}	7.7×10^{-7}

12.0 SUMMARY OF 1996 RESULTS OF OFFSITE TLD AND GROUNDWATER MONITORING

Because of the change in Nevada Test Site operations and a reduced budget, some of the monitoring networks operated by the U.S. Environmental Protection Agency's Radiation and Indoor Environments National Laboratory were eliminated or sharply curtailed. As a result, only tables of personnel and area monitoring with thermoluminescent dosimeters (Tables 12.1-12.2) and results from the offsite Long-Term Hydrological Monitoring Program (LTHMP) are included in this chapter (see Tables 12.3-12.10). In the LTHMP tables, if the MDC is 220 or so, then conventional tritium analysis was used. If the MDC is <10, tritium enrichment was used. These results are discussed in the "U.S. Department of Energy, Nevada Operations Office, Annual Site Environmental Report - 1996, DOE/NV/11718-137."

Table 12.1 Personnel Thermoluminescent Dosimetry Results - 1996

Personnel & Associated ID Station Name		Number of Days	Daily Deep Dose Exposure (mrem) Minimum	Maximum	Mean	Total Annual Exposure	Percent Complete
022	Alamo, NV	356	0.14	0.30	0.23	85	98
028	Beatty, NV	357	0.32	0.37	0.35	120	98
040	Goldfield, NV	357	0.22	0.33	0.28	100	98
042	Tonopah, NV	357	0.30	0.34	0.32	120	98
045	St.George, UT	169	0.19	0.22	0.20	74	46
293	Pioche, NV	274	0.26	0.34	0.31	110	75
307	Mina, NV	216	0.26	0.31	0.29	100	59
336	Caliente, NV	341	0.21	0.29	0.25	91	93
344	Delta, UT	356	0.20	0.27	0.23	85	98
345	Delta, UT	356	0.24	0.28	0.26	95	98
346	Milford, UT	356	0.21	0.36	0.29	110	98
347	Milford, UT	265	0.26	0.36	0.30	110	73
348	Overton, NV	357	0.15	0.21	0.19	71	98
380	Amargosa Valley, NV	183	0.21	0.24	0.23	82	50
427	Alamo, NV	357	0.22	0.32	0.26	93	98
592	Alamo, NV	357	0.22	0.29	0.26	95	98
593	Cedar City, UT	286	0.25	0.32	0.28	100	78
594	St. George, UT	273	0.11	0.19	0.15	49	75
595	Las Vegas, NV	361	0.16	0.40	0.27	90	99
596	Las Vegas, NV	361	0.14	0.30	0.22	76	99
607	Tonopah, NV	357	0.30	0.36	0.34	120	98
608	Logandale, NV	357	0.19	0.21	0.20	75	98
610	Caliente,NV	356	0.27	0.38	0.32	120	98
621	Indian Springs, NV	267	0.15	0.30	0.21	76	73
651	Amargosa Valley, NV	84	0.24	0.24	0.24	87	23

Mean of total exposure is 96 mrem. Total data completeness is 86 percent.

Note: Total annual exposure is calculated by multiplying the mean daily exposure rate by 365.25.

Table 12.2 Environmental Thermoluminescent Dosimetry Results - 1996

Station Name	Number of Days	Daily Exposure (mR) Minimum	Maximum	Mean	Total (mR) Exposure	Percent Complete
Alamo, NV	357	0.22	0.26	0.24	86	98
Amargosa Center, NV	356	0.18	0.32	0.22	81	98
Austin, NV	273	0.34	0.36	0.34	130	75
Baker, CA	334	0.23	0.26	0.24	87	92
Barstow, CA	356	0.26	0.31	0.27	99	98
Beatty, NV	357	0.14	0.32	0.26	95	98
Bishop, CA	356	0.26	0.32	0.27	100	98
Blue Jay, NV	358	0.15	0.37	0.28	100	98
Caliente, NV	356	0.22	0.29	0.25	110	98
Cedar City, UT	357	0.18	0.21	0.19	71	98
Coaldale, NV	355	0.25	0.32	0.28	100	97
Complex I, NV	357	0.28	0.30	0.29	110	98
Coyote Summit, NV	357	0.28	0.38	0.33	120	98
Delta, UT	356	0.21	0.23	0.22	80	98
Ely, NV	357	0.17	0.24	0.19	88	98
Eureka, NV	356	0.22	0.27	0.24	87	98
Gabbs, NV	355	0.20	0.24	0.21	76	97
Garrison, UT	356	0.19	0.22	0.21	75	98
Goldfield, NV	357	0.12	0.28	0.22	81	98
Groom Lake, NV	349	0.23	0.28	0.26	93	96
Hiko, NV	356	0.18	0.21	0.19	70	98
Indian Springs, NV	83	0.28	0.28	0.28	100	23
Las Vegas UNLV, NV	350	0.16	0.24	0.19	67	96
Lone Pine, CA	334	0.23	0.29	0.26	120	92
Lund, NV	310	0.24	0.30	0.26	92	85
Lund, UT	357	0.28	0.32	0.29	110	98
Manhattan, NV	335	0.34	0.40	0.36	130	92
Medlins Ranch, NV	357	0.30	0.32	0.31	110	98
Mesquite, NV	357	0.18	0.21	0.20	71	98
Milford, UT	356	0.31	0.32	0.32	120	98
Mina, NV	355	0.23	0.29	0.26	95	97
Moapa, NV	357	0.22	0.25	0.23	85	98
Nyala, NV	356	0.12	0.26	0.19	74	98
Overton, NV	357	0.17	0.21	0.19	68	98
Pahrump, NV	356	0.14	0.22	0.16	60	98
Pioche, NV	356	0.22	0.25	0.23	100	98
Queen City Summit, NV	358	0.31	0.35	0.34	130	98
Rachel, NV	357	0.29	0.32	0.31	110	98
Round Mountain, NV	356	0.30	0.34	0.32	120	98
St. George, UT	357	0.15	0.19	0.16	59	98
Stone Cabin, NV	358	0.15	0.33	0.26	98	98
Sunnyside, NV	357	0.16	0.19	0.17	61	98

Note: Total annual exposure is calculated by multiplying the mean daily exposure rate by 365.25.

Table 12.2 (Environmental Thermoluminescent Dosimetry Results - 1996, cont.)

Station Name	Number of Days	Daily Exposure (mR) Minimum	Maximum	Mean	Total (mR) Exposure	Percent Complete
Tonopah Test Range, NV	357	0.16	0.34	0.29	100	98
Tonopah, NV	357	0.15	0.33	0.27	100	98
Twin Springs, NV	358	0.15	0.33	0.26	95	98
Uhaldes Ranch, NV	357	0.26	0.33	0.30	110	98
Warm Springs No. 1, NV	189	0.13	0.27	0.20	75	52

Minimum total exposure is 59 at St. George, Utah, maximum is 130 at Manhattan, Nevada.
Mean of total exposure is 93 mR.
Total data completeness is 94 percent.

Note: Total annual exposure is calculated by multiplying the mean daily exposure rate by 365.25.

Table 12.3 LTHMP Summary of Tritium Results for Project FAULTLESS - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1 Standard Deviation	% of DCG	Mean MDC
Hot Creek Ranch	1	-73	65	N/A	220
Blue Jay Maintenance	1	-110	65	N/A	220
Bias Well	No Pump				
James Ranch	1	1100	75	1.3	220
Rivers Ranch	1	880	74	0.98	220
Base Camp Well	1	180	67	N/A	220
Well HTH-1	1	-0.08	1.6	N/A	6.3
Well HTH-2	1	-0.45	1.8	N/A	5.9
Well Six Mile	Pump Inoperable				

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.
N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.4 LTHMP Summary of Tritium Results for Project SHOAL - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1 Standard Deviation	% of DCG	Mean MDC
Hunts' Station	1	0.0	66	N/A	220
Smith/James Spring	1	-37	65	N/A	220
Spring Windmill	Pump Out				
Well Flowing	1	37	66	N/A	220
Well H-2	No Access, Gate Locked				
Well H-3	1	37	66	N/A	220
Well HS-1	1	1.1	1.6	N/A	5.1

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.
N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.4 LTHMP Summary of Tritium Results for Project SHOAL - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1Sigma	% of DCG	Mean MDC
Battlement Creek	1	240	70	0.27	220
City Springs	1	-27	67	N/A	220
Gardner Ranch	1	240	70	0.27	220
Spring 300 Yards N		Spring Dry			
Well CER Test	1	75	2.8	0.08	5.9
Hayward Ranch	1	110	3.4	0.12	8.6
Potter Ranch	1	120	69	N/A	220
Jacobs Ranch	1	240	70	0.27	220
Rothgery Ranch	1	88	68	N/A	220

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.
N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.6 LTHMP Summary of Tritium Results for Project RIO BLANCO - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1Sigma	% of DCG	Mean MDC
B-1 Equity Camp	1	47	2.6	0.05	7.2
Brennan Windmill	Windmill Not Working				
CER 1 Black Sulph	1	78	70	N/A	230
CER 4 Black Sulph	1	46	2.4	0.05	6.4
Fawn Creek 1	1	-27	68	N/A	220
Fawn Creek 500' Up	1	88	68	N/A	220
Fawn Creek 500' Dn	1	12	68	N/A	220
Fawn Creek 6800' Up	1	12	68	N/A	220
Fawn Creek 8400' Dn	1	32	2.4	0.04	7.0
Fawn Creek 3	1	50	68	N/A	220
Johnson Artesian	1	88	68	N/A	220
Well RB-D-01	1	0.74	2.0	N/A	6.5
Well RB-D-03	1	-27	68	N/A	220
Well RB-S-03	1	88	68	N/A	220

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.
N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.7 LTHMP Summary of Tritium Results for Project GNOME - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1Sigma	% of DCG	Mean MDC
Carlsbad City Well 7[a]	1	-27	68	NA	220
Loving City Well 2	1	12	68	NA	220
Well DD-1[b]	1	6.8×10^7	3.0×10^5	7.6×10^4	220
Well LRL-7[c]	1	5.3×10^3	110	5.9	220
Well PHS 6	1	33	2.4	0.04	6.9
Well PHS 8	1	7.8	1.4	0.01	4.5
Well PHS 9	1	12	68	NA	220
Well PHS 10	1	12	68	NA	220
Well USGS 1	1	-0.3	1.6	NA	5.4
Well USGS 4[d]	1	9.0×10^4	350	100	220
Well USGS 8[e]	1	7.6×10^4	320	84	220
J. Mobley Ranch	1	4.1	1.5	NA	4.8

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.
N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.7 (LTHMP Summary of Tritium Results for Project GNOME- 1996, cont.)

Additional Results Greater than the MDC:

	Nuclide	Result	1 Standard Deviation	MDC	Units
(a)	^{90}Sr	-0.19	0.26	1.2	pCi/L
	^{238}Pu	0.013	0.012	0.017	pCi/L
	$^{239+240}Pu$	-0.025	0.018	0.12	pCi/L
(b)	^{90}Sr	1.0×10^4	7.0×10^2	1.3×10^3	pCi/L
	^{137}Cs	7.3×10^5	3.5×10^4	3.2×10^3	pCi/L
	^{238}Pu	0.021	0.021	0.058	pCi/L
	$^{239+240}Pu$	0.064	0.047	0.16	pCi/L
(c)	^{90}Sr	2.1	2.5	6.0	pCi/L
	^{137}Cs	100	7.5	2.5	pCi/L
	^{238}Pu	0.012	0.012	0.033	pCi/L
	$^{239+240}Pu$	0.012	0.012	0.033	pCi/L
(d)	^{90}Sr	3500	12	1.2	pCi/L
	^{238}Pu	-0.003	0.003	0.022	pCi/L
	$^{239+240}Pu$	0.003	0.003	0.008	pCi/L
(e)	^{90}Sr	4000	12	1.2	pCi/L
	^{137}C	6.8	0.6	2.5	pCi/L
	^{238}Pu	-0.007	0.007	0.051	pCi/L
	$^{239+240}Pu$	0.007	0.007	0.019	pCi/L

Table 12.8 LTHMP Summary of Tritium Results for Project GASBUGGY - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1Sigma	% of DCG	Mean MDC
La Jara Creek	1	160	70	NA	220
Lower Burro Canyon	1	12	68	NA	220
Pond N 30.3.32.3	1	Pond Dry			
Arnold Ranch	1	-65	67	NA	220

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.

N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.8 LTHMP Summary of Tritium Results for Project GASBUGGY - 1996

Location	Number of Samples	Tritium Concentration (pCi/L) Result	1Sigma	% of DCG	Mean MDC
Bixler Ranch	Ranch Abandoned				
Bubbling Springs	1	26	2.2	0.03	6.2
Cave Springs	1	54	3.1	0.06	8.5
Cedar Springs	1	43	2.0	0.05	5.6
Well Jicarilla	1 (from stock tank)	50	68	NA	220
Well 28.3.33.233	1	50	68	NA	220
Well 30.3.32.343	Pump out				
Windmill 2	1	50	68	NA	220
Well EPNG 10-36	1	120	2.6	0.13	6.1

DCG Derived Concentration Guide. Established by DOE Order as 90,000 pCi/L.

N/A Not applicable. Percent of concentration guide is not applicable because the tritium result is less than the MDC or because the water is known to be nonpotable.

Table 12.9 LTHMP Summary of Tritium Results for Project SALMON - April 1996

Sample Location		Collection Date	Enriched Tritium pCi/L ± sd	MDC	Tritium pCi/L ± 1sd	MDC
Baxterville, MS						
Anderson, Billy Ray		4/22/96			<MDC	220
Anderson Pond		4/22/96			<MDC	220
Anderson, Regina		4/24/96			<MDC	220
Anderson, Robert Harvey		4/22/96			<MDC	220
Anderson, Robert Lowell, Jr.		4/24/96			<MDC	220
Anderson, Robert Lee		4/24/96			<MDC	220
Anderson, Tony		4/23/96			<MDC	220
Bilbo, Timothy L.		4/23/96			<MDC	220
Burge, Joe		4/24/96			<MDC	220
Daniels, Webster, Jr.		4/23/96			<MDC	220
Daniels - Well No. 2 Fish Pond		4/23/96			<MDC	220
Hilbey, Billy		4/22/96			<MDC	220
Half Moon Creek	Pre Dup[a]	4/22/96	20 ± 2.4	7.4		
	Post Dup	4/22/96	16 ± 1.9	6.0		
	Pre	4/22/96	17 ± 2.0	6.1		
	Post	4/22/96	15 ± 1.2	4.9		

(a) Pre indicates sampling prior to pumping the well, Dup indicates a duplicate sample, Post indicates sampling after pumping the well, and Post Dup is a duplicate sample after pumping the well.

Table 12.9 (LTHMP Summary of Tritium Results for Project SALMON - April 1996, cont.)

Sample Location		Collection Date	Enriched Tritium pCi/L ± sd		MDC	Tritium pCi/L ± 1sd	MDC
(Baxterville, MS, cont.)							
Half Moon Creek	Pre Dup[a]	4/22/96	180	± 3.3	6.6		
Overflow	Post Dup	4/22/96	210	± 3.0	5.8		
	Pre	4/22/96	180	± 2.7	5.5		
	Post	4/22/96	200	± 3.0	5.7		
Lee, P. T.		4/22/96				<MDC	230
Little Creek No. 1		4/22/96				<MDC	230
Lower Little Creek No. 2		4/22/96				<MDC	230
McGinnis, Gloria		4/22/96	14	± 1.7	5.2		
Mills, A. C.			No sample, on city water				
Mills, Roy		4/22/96				<MDC	230
Noble's Pond		4/21/96	16	± 1.9	5.9		
Noble, W. H., Jr.		4/25/96	31	± 1.8	5.2		
Pond West of GZ	Pre	4/21/96	8.5	± 1.4	4.3		
	Post	4/22/96	13	± 2.0	6.3		
REECo Pit Drainage-A		4/21/96	13	± 2.2	6.6		
REECo Pit Drainage-B		4/21/96	240	± 3.4	6.6		
REECo Pit Drainage-C		4/21/96	260	± 6.9			
Salt Dome Hunting Club		4/22/96	14	± 1.5	4.5		
Salt Dome Timber Co.		4/23/96				<MDC	230
Saucier, Dennis		4/23/96				<MDC	230
Saucier, Wilma & Yancy			No sample, on city water				
Well Ascot 2		4/24/96	28	± 2.1	7.0		
Baxterville Well City		4/23/96	20	± 2.2	6.8		
Well E-7		4/23/96				<MDC	230
Well HM-1	Pre pump	4/22/96				<MDC	230
	½ hr pump	4/22/96				<MDC	230
	1 hr pump	4/22/96				<MDC	230
	1½ hr pump	4/22/96				<MDC	230
	Post	4/22/96				<MDC	230
Well HM-2A	Pre pump	4/22/96				<MDC	230
	½ hr pump	4/22/96				<MDC	230
	1 hr pump	4/22/96				<MDC	230
	1½ hr pump	4/22/96				<MDC	230
	Post pump	4/22/96				<MDC	230
Well HM-2B	Pre pump	4/22/96				<MDC	230
	1½ hr pump	4/22/96				<MDC	230
	Post pump	4/22/96				<MDC	230
Well HM-3	Pre pump	4/22/96				<MDC	230

(a) Pre indicates sampling prior to pumping the well, Dup indicates a duplicate sample, Post indicates sampling after pumping the well, and Post Dup is a duplicate sample after pumping the well.

Table 12.9 (LTHMP Summary of Tritium Results for Project SALMON - April 1996, cont.)

Sample Location		Collection Date	Enriched Tritium pCi/L ± sd	MDC	Tritium pCi/L ± 1sd	MDC
(Baxterville, MS, cont.)						
	½ hr pump	4/22/96			<MDC	230
	1 hr pump	4/22/96			<MDC	230
	1½ hr pump	4/22/96			<MDC	230
	Post pump	4/22/96			<MDC	230
Well HM-L	Pre pump	4/22/96			<MDC	230
	½ hr pump	4/22/96			<MDC	230
	1 hr pump	4/22/96			<MDC	230
	1½ hr pump	4/22/96			<MDC	230
	Post pump	4/22/96			<MDC	230
Well HM-L2	Pre[(a)]	4/24/96			<MDC	230
	Post	4/24/96			<MDC	230
Well HM-S	Pre	4/21/96			4000 ± 99	230
	Post	4/22/96			4000 ± 99	230
Well HMH-1	Pre	4/21/96			2000 ± 85	230
	Post	4/21/96			2100 ± 86	230
Well HMH-2	Pre	4/21/96			230 ± 71	230
	Post	4/22/96			<MDC	230
Well HMH-3	Pre	4/21/96	12 ± 2.0	6.0		
	Post	4/22/96	16 ± 1.7	5.3		
Well HMH-4	Pre	4/21/96			<MDC	230
	Post	4/22/96			<MDC	230
Well HMH-5	Pre	4/21/96			620 ± 75	230
	Post	4/22/96			1200 ± 79	230
Well HMH-6	Pre	4/21/96			<MDC	230
	Post	4/22/96			<MDC	230
Well HMH-7	Pre	4/21/96				
	Post	4/22/96		No sample, well under water		
Well HMH-8	Pre	4/21/96				
	Post	4/22/96		No sample, well under water		
Well HMH-9	Pre	4/21/96			<MDC	230
	Post	4/22/96			<MDC	230
Well HMH-10	Pre	4/21/96			<MDC	230
	Post	4/22/96			<MDC	230
Well HMH-11	Pre	4/21/96			<MDC	230
	Post	4/22/96			<MDC	230
Well HMH-12	Pre	4/21/96			<MDC	230

(a) Pre indicates sampling prior to pumping the well, Dup indicates a duplicate sample, Post indicates sampling after pumping the well, and Post Dup is a duplicate sample after pumping the well.

Table 12.9 (LTHMP Summary of Tritium Results for Project SALMON - April 1996, cont.)

Sample Location		Collection Date	Enriched Tritium pCi/L ± sd	MDC	Tritium pCi/L ± 1sd	MDC
(Baxtervill, MS, cont.)						
	Post[a]	4/22/96			<MDC	220
Well HMH-13	Pre	4/21/96			<MDC	220
	Post	4/22/96			<MDC	220
Well HMH-14	Pre	4/21/96			<MDC	220
	Post	4/22/96			<MDC	220
Well HMH-15	Pre	4/21/96			<MDC	220
	Post	4/22/96			<MDC	220
Well HMH-16	Pre	4/21/96	18 ± 1.6	4.9		
	Post	4/22/96	26 ± 2.0	6.0		
Well HT-2C		4/23/96		No access		
Well HT-4		4/23/96			<MDC	220
Well HT-5		4/23/96			<MDC	220
Columbia, MS						
Dennis, Buddy		4/23/96	Sample from hub water system		<MDC	220
Dennis, Marvin		4/23/96			<MDC	220
Well 64B City		4/23/96			<MDC	220
Lumberton, MS						
Anderson, Arleene		4/23/96			<MDC	220
Anderson, Lee L		4/23/96			<MDC	220
Rogers, Robert		4/22/96			<MDC	220
Boren Crawfish Pond		4/22/96			<MDC	220
Gipson, Herman		4/22/96	City water			
Gipson, Michael D.		4/23/96	City water			
Gipson, Philip		4/22/96	City water			
Graham, Sylvester		4/22/96	City water			
Hartfield, Ray		4/23/96			<MDC	220
Powell, Shannon		4/23/96	15 ± 2.0	4.9		
Saul, Lee L.		4/22/96	City water			
Saul, Rushing, Debra		4/23/96			<MDC	220
Saul, Ola		4/23/96			<MDC	220
Smith, E. J.		4/23/96	City water			

(a) Pre indicates sampling prior to pumping the well, Dup indicates a duplicate sample, Post indicates sampling after pumping the well, and Post Dup is a duplicate sample after pumping the well.

Table 12.9 (LTHMP Summary of Tritium Results for Project SALMON - April 1996, cont.)

Sample Location	Collection Date	Enriched Tritium pCi/L ± sd	Enriched Tritium MDC	Tritium pCi/L ± 1sd	Tritium MDC
(Lumberton, MS, cont.)					
Smith, Howard	4/22/96	City water			
Smith, Howard - Pond	4/22/96			<MDC	230
Thompson, Reswell	4/22/96	14 ± 1.9	6.1		
Well 2 City	4/23/96			<MDC	230
Purvis, MS					
Burge, Willie Ray & Grace	4/24/96			<MDC	230
Boren, Ron	4/22/96			<MDC	230
City Supply	4/23/96			<MDC	230
Rain Sample					
IT Compound (Baxterville)	4/23/96			<MDC	230

(a) Pre indicates sampling prior to pumping the well, Dup indicates a duplicate sample, Post indicates sampling after pumping the well, and Post Dup is a duplicate sample after pumping the well.

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N. George McNeill, Environment, Safety, & Health Division, Nevada Operations Office, U.S. Department of Energy, Post Office Box 98518, Las Vegas, NV 89193-8518, M/S 505

Technical Information Resource Center, Nevada Operations Office, U.S. Department of Energy, Post Office Box 98518, Las Vegas, NV 89193-8518, M/S 505

BN

Manager, Environmental Management Division, Bechtel Nevada, Post Office Box 98521, Las Vegas, NV 89193-8521, M/S NLV022

Manager, Waste Operations, Bechtel Nevada, Post Office Box 98521, Las Vegas, NV 89193-8521, M/S NLV080

O. L. Haworth, Analytical Services Project, Bechtel Nevada, Post Office Box 98521, Las Vegas,NV 89193-8521, M/S NTS110

Daniel A. Gonzalez, Health Protection, Bechtel Nevada, Post Office Box 98521, Las Vegas, NV 89193-8521, M/S NTS270

Martha E. DeMarre, Coordination and Information Center, Post Office Box 98521, Las Vegas, NV 89193-8521, M/S NLV040

EPA

Anita A. Mullen, Radiation Sciences Laboratory, U.S. Environmental Protection Agency, P. O. Box 98517, Las Vegas, NV 89193-8517, M/S 513

Angela Haag, Librarian, Radiation Sciences Laboratory, U.S. Environmental Protection Agency, Post Office Box 98517, Las Vegas, NV 89193-8517, M/S 513

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