Quarterly Report of Analytical Results for the CEMP Air Sampling Network

The CEMP air sampling network is designed to monitor and collect radioactive airborne particles from NTS and non-NTS activities, as well as background environmental sources. This report is provided to the station managers as a summary of the results from the analysis of the air samples they have collected as part of the environmental monitoring program.

In general, the CEMP air sampling network is comprised of 24 continuously operating sampling stations. A total of 22 stations are equipped with a low volume air sampler/totalizer configuration to collect particulate radionuclides on glass fiber filter papers. Ideally, the samples are collected on a weekly basis with a target collection time of 168 hours. The samplers are calibrated on a monthly basis by DRI to maintain a collection rate of 2.0 cfm (@ STP). All relevant information such as collection times, variations in flow rate, actual flow volumes, power outages, and other information documenting the integrity of the sample are recorded by the station managers. This allows for the proper interpretation of the analytical results. The air filters are analyzed at a commercial laboratory for gross alpha/beta activity as well as by high-resolution gamma spectrometry. The filters are composited on a quarterly basis for the gamma analysis only after the gross alpha/beta analyses have been completed. As a result of the lag time, the gamma results are for the third quarter of CY2002, while the rest of the results are for the fourth quarter.

The principle reporting units used in the U.S. for the measurement of radioactivity in the atmospheric environment is pCi/m^3 (picocuries per cubic meter). DRI receives its data from the lab as microcuries per filter which is then recalculated to microcuries per milliliter based on the information provided by the station managers as well as monthly calibration results. This is the notation used for DRI internal data bases and annual reports to DOE. For the ease in constructing the tables contained in this report, as well as hopefully the ease of comparison among stations and previous results, the units of pCi/m^3 are used.

A summary of the fourth quarter CY2002 analytical results for gross alpha and beta are found in Tables 1 and 2. These tables show the minimum, maximum, and average values for each of the stations of the air-sampling network. The last column shows an average annual value from previous years (in this case CY2000) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2002 appear to reflect similar values to the previous quarter. These data remain consistent with the average CY2000 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2002 beta results are also consistent with the previous quarter.

The third quarter gamma results for CY2002 are shown in Table 3. All of the samples are again gamma spectrum negligible (i.e. gamma emitting radionuclides were not detected) with the exception of Beryllium(Be)-7 and occasionally Lead(Pb)-210,both naturally occurring radiological elements of our atmospheric and geologic environment. Overall, these data are consistent with previous analytical results.

The TLD results for the fourth quarter of CY2002 are shown in Table 4. On initial inspection the fourth quarter results appear higher than previous values this year. This is due to the fact that a sudden increase in 'control' TLD values, starting in the fourth quarter of CY2001, suggested that whole batches were possibly being exposed somewhere in the mailing process. It was thought that this could be a result of additional exposure due to radiological sources being used to 'sanitize' the mail within the postal service. In an attempt to correct for this the TLD results were adjusted for this possibility. After further review of historical data it was determined that the control TLD were not abnormal and the correction was not necessary at this point. It is for reasons such as this that the data presented in this report should always be considered preliminary. The 2001 PIC exposure rate is also shown for comparison.

Finally, as station managers, your input regarding the contents of these reports are welcome and encouraged. We are interested in anything you feel would be helpful for you to interpret the data or to enable you to explain the information to someone in your community not familiar with the program.

Table 1. Gross Alpha Analytical Results for the Fourth Quarter of Calendar Year 2002
(Average analytical error, +/– 0.0007)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2000 Average (pCi/m^3)
Las Vegas	0.0011	0.0046	0.0024	0.0028
Henderson	0.0009	0.0032	0.0021	0.0027
Boulder City	0.0009	0.0061	0.0035	0.0036
Overton	0.0014	0.0079	0.0033	0.0029
St. George	0.0007	0.0037	0.0022	0.0026
Cedar City	0.0009	0.0069	0.0031	0.0038
Milford	0.0014	0.0053	0.0021	0.0023
Delta	0.0006	0.0043	0.0020	0.0022
Pioche	0.0008	0.0026	0.0016	0.0022
Caliente	0.0008	0.0047	0.0029	0.0025
Alamo	0.0004	0.0058	0.0026	0.0032
Rachel	0.0010	0.0040	0.0018	0.0029
Tonopah	0.0006	0.0032	0.0017	0.0023
Goldfield	0.0007	0.0028	0.0017	0.0026
Beatty	0.0007	0.0035	0.0021	0.0028
Indian Springs	0.0009	0.0026	0.0015	0.0021
Amargosa	0.0013	0.0072	0.0031	0.0031
Pahrump	0.0004	0.0052	0.0020	0.0022

Garden Valley	0.0008	0.0024	0.0016	---
Nyala	0.0006	0.0017	0.0011	---
Twin Springs	0.0011	0.0023	0.0015	---
Stone Cabin	0.0017	0.0069	0.0032	---

Table 2. Gross Beta Analytical Results for the Fourth Quarter of Calendar Year 2002.
(Average analytical error, +/− 0.003)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2000 Average (pCi/m^3)
Las Vegas	0.016	0.046	0.031	0.025
Henderson	0.016	0.050	0.032	0.024
Boulder City	0.018	0.054	0.036	0.027
Overton	0.022	0.072	0.037	0.026
St. George	0.017	0.063	0.037	0.025
Cedar City	0.012	0.048	0.029	0.024
Milford	0.016	0.072	0.033	0.024
Delta	0.017	0.072	0.035	0.025
Pioche	0.011	0.043	0.026	0.022
Caliente	0.018	0.050	0.032	0.025
Alamo	0.014	0.045	0.030	0.025
Rachel	0.012	0.050	0.030	0.025
Tonopah	0.013	0.045	0.025	0.024
Goldfield	0.011	0.041	0.027	0.024
Beatty	0.012	0.045	0.029	0.024
Indian Springs	0.015	0.045	0.028	0.022
Amargosa	0.014	0.054	0.032	0.025
Pahrump	0.012	0.053	0.030	0.023

Garden Valley	0.014	0.044	0.027	---
Nyala	0.011	0.047	0.023	---
Twin Springs	0.017	0.051	0.030	---
Stone Cabin	0.014	0.051	0.026	---

Table 3. Gamma Spectroscopy Results for the Third Quarter of Calendar Year 2002.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m^3)	Pb-210 (pCi/m^3)
Las Vegas	-2.6	14.0	0.088	0.026
Henderson	-8.3	16.0	N.D.	N.D.
Boulder City	1.1	13.0	0.097	N.D.
Overton	2.1	11.0	0.087	N.D.
St. George	-0.9	12.0	0.068	N.D.
Cedar City	-0.4	14.0	0.097	N.D.
Milford	0.3	13.0	0.079	0.028
Delta	-8.1	17.0	0.085	N.D.
Pioche	5.2	16.0	N.D.	N.D.
Caliente	-5.5	11.0	0.077	N.D.
Alamo	0.8	12.0	0.097	N.D.
Rachel	1.7	16.0	0.081	0.032
Tonopah	0.2	9.8	0.095	0.037
Goldfield	0.4	13.0	0.098	0.040
Beatty	2.7	16.0	0.076	0.034
Indian Springs	1.6	11.0	0.092	N.D.
Amargosa	-18.3	16.0	N.D.	0.035
Pahrump	-0.8	11.0	0.097	N.D.

Garden Valley	-5.1	12.0	0.104	N.D.
Nyala	2.6	14.0	0.061	N.D.
Twin Springs	-3.2	9.2	0.061	N.D.
Stone Cabin	-3.3	19.0	0.066	0.030

MDC Be-7 = 0.022 pCi/m^3 Pb-210 = 0.006 pCi/m^3 N.D. = not detected

Table 4. TLD Analytical Results for the Fourth Quarter of Calendar Year 2002.

Station	Second Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2001 TLD Exposure (mR/yr)	2001 PIC Exposure (mR/yr)
Las Vegas	24	97	77	97
Henderson	32	130	107	131
Boulder City	27	110	94	121
Overton	--	--	81	88
St. George	23	93	76	75
Cedar City	26	106	84	86
Milford	33	130	126	153
Delta	28	110	93	103
Pioche	29	114	95	104
Caliente	33	130	115	145
Alamo	29	116	103	109
Rachel	35	140	120	133
Tonopah	37	149	128	147
Goldfield	33	132	113	129
Beatty	38	153	138	153
Indian Springs	29	113	86	90
Amargosa	29	113	94	108
Pahrump	21	82	71	71

Medlins	33	145	125	135
Sarcobatus	40	161	133	148
Garden Valley	30	135	145	139
Nyala	29	128	91	113
Twin Springs	40	178	134	168
Stone Cabin	35	154	118	150