

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 related 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 26 continuously operating environmental sampling stations. A total of 24 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 by 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 gamma spectroscopy analysis only after the gross alpha/beta analyses have been completed.

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 databases and annual reports to DOE/NNSA. For the ease in constructing the tables contained in this report, as well as to hopefully the ease of comparison among stations and previous results, the units of pCi/m^3 are used.

A summary of the fourth quarter CY2004 analytical results for gross alpha and beta analyses 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 2003) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2004 reflect similar values to the previous quarters. These data remain consistent with the average CY2003 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2004 beta results are also consistent with previous results.

The third and fourth quarter gamma results for CY2004 are shown in Tables 3 and 4, respectively. 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 elements of our atmospheric and geologic environment. Overall, these data are consistent with previous analytical results.

The TLD results for the fourth quarter of CY2004 are shown in Table 5. Overall, the results display similar values to the previous quarters of this calendar year. The 2003 PIC exposure rate and TLD data are also shown for comparison. As with historical data, TLD

values are commonly lower than the PIC results. The overall estimated annual exposure based on the fourth quarter shows consistent agreement with CY2003.

Finally, as station managers, your input concerning the contents of these reports is 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 2004
(Average analytical error, +/- 0.0007)

Station	Minimum (pCi/m ³)	Maximum (pCi/m ³)	Average (pCi/m ³)	2003 Average (pCi/m ³)
Las Vegas	0.0013	0.0056	0.0030	0.0022
Henderson	0.0008	0.0032	0.0019	0.0016
Boulder City	0.0014	0.0050	0.0035	0.0032
Overton	0.0009	0.0051	0.0022	0.0021
St. George	0.0006	0.0028	0.0019	0.0015
Cedar City	0.0010	0.0060	0.0029	0.0022
Milford	0.0006	0.0038	0.0022	0.0018
Delta	0.0007	0.0029	0.0018	0.0014
Pioche	0.0007	0.0021	0.0014	0.0014
Caliente	0.0009	0.0070	0.0028	0.0023
Alamo	0.0009	0.0055	0.0027	0.0021
Rachel	0.0008	0.0036	0.0019	0.0016
Tonopah	0.0012	0.0026	0.0017	0.0015
Goldfield	0.0011	0.0031	0.0017	0.0014
Beatty	0.0008	0.0044	0.0022	0.0021
Indian Springs	0.0006	0.0030	0.0015	0.0014
Amargosa	0.0015	0.0066	0.0027	0.0021
Pahrump	0.0003	0.0026	0.0018	0.0015

Garden Valley	0.0007	0.0026	0.0017	0.0013
Nyala	0.0006	0.0020	0.0013	0.0011
Twin Springs	0.0005	0.0026	0.0017	0.0013
Stone Cabin	0.0009	0.0025	0.0015	0.0026
Ely	0.0005	0.0023	0.0013	0.0014
Sarcobatus	0.0007	0.0038	0.0023	N/A

Table 2. Gross Beta Analytical Results for the Fourth Quarter of Calendar Year 2004.
(Average analytical error, +/- 0.003)

Station	Minimum (pCi/m ³)	Maximum (pCi/m ³)	Average (pCi/m ³)	2003 Average (pCi/m ³)
Las Vegas	0.013	0.034	0.024	0.025
Henderson	0.014	0.034	0.025	0.027
Boulder City	0.014	0.036	0.026	0.027
Overton	0.014	0.036	0.027	0.026
St. George	0.014	0.034	0.026	0.025
Cedar City	0.014	0.036	0.024	0.023
Milford	0.011	0.038	0.026	0.026
Delta	0.012	0.037	0.026	0.024
Pioche	0.011	0.032	0.019	0.022
Caliente	0.014	0.041	0.024	0.024
Alamo	0.013	0.036	0.024	0.023
Rachel	0.013	0.032	0.023	0.024
Tonopah	0.016	0.031	0.023	0.021
Goldfield	0.014	0.035	0.024	0.021
Beatty	0.014	0.033	0.024	0.024
Indian Springs	0.015	0.030	0.023	0.023
Amargosa	0.015	0.038	0.025	0.025
Pahrump	0.015	0.032	0.024	0.024

Garden Valley	0.013	0.032	0.021	0.022
Nyala	0.012	0.027	0.019	0.020
Twin Springs	0.017	0.031	0.024	0.024
Stone Cabin	0.013	0.028	0.020	0.022
Ely	0.011	0.032	0.019	0.021
Sarcobatus	0.013	0.037	0.025	N/A

Table 3. Gamma Spectroscopy Results for the Third Quarter of Calendar Year 2004.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m ³)	Pb-210 (pCi/m ³)
Las Vegas	3.6	16.0	0.080	N.D.
Henderson	-0.1	13.0	0.101	0.011
Boulder City	-2.9	15.0	0.089	0.015
Overton	0.7	16.0	0.080	N.D.
St. George	-1.8	15.0	0.086	N.D.
Cedar City	1.8	19.0	0.105	N.D.
Milford	5.1	15.0	0.082	N.D.
Delta	2.8	19.0	0.107	N.D.
Pioche	-3.3	11.0	0.076	0.013
Caliente	-3.6	13.0	N.D.	0.013
Alamo	5.0	21.0	0.042	N.D.
Rachel	1.1	13.0	0.116	N.D.
Tonopah	6.0	21.0	0.102	0.022
Goldfield	-4.4	13.0	0.072	0.015
Beatty	7.0	17.0	0.080	N.D.
Indian Springs	3.3	13.0	0.096	0.015
Amargosa	2.6	20.0	0.102	0.013
Pahrump	5.4	17.0	0.087	0.013

Garden Valley	5.8	16.0	0.095	0.016
Nyala	-0.3	14.0	0.076	0.012
Twin Springs	-1.1	17.0	0.068	0.009
Stone Cabin	-1.4	14.0	0.097	N.D.
Ely	-0.8	14.0	0.132	N.D.

MDC Be-7 = 0.022 pCi/m³ Pb-210 = 0.006 pCi/m³ N.D. = not detected

Table 4. Gamma Spectroscopy Results for the Fourth Quarter of Calendar Year 2004.

Station	Cs-137 (pCi/sam)	Cs-137 (MDC)	Be-7 (pCi/m ³)	Pb-210 (pCi/m ³)
Las Vegas	0.1	19.0	0.054	N.D.
Henderson	-4.0	19.0	0.074	N.D.
Boulder City	1.6	19.0	0.064	N.D.
Overton	2.5	19.0	0.054	N.D.
St. George	-3.0	14.0	0.073	N.D.
Cedar City	3.6	19.0	0.084	N.D.
Milford	-0.6	18.0	0.043	N.D.
Delta	0.1	18.0	0.062	N.D.
Pioche	-5.0	13.0	0.073	N.D.
Caliente	-2.0	13.0	0.050	N.D.
Alamo	4.1	13.0	0.054	N.D.
Rachel	-5.2	14.0	0.059	N.D.
Tonopah	-0.7	11.0	0.056	N.D.
Goldfield	0.7	13.0	0.063	N.D.
Beatty	4.3	18.0	0.057	N.D.
Indian Springs	0.9	15.0	0.063	N.D.
Amargosa	3.9	14.0	0.071	N.D.
Pahrump	-2.0	17.0	0.041	N.D.

Stone Cabin	1.4	14.0	0.061	N.D.
Twin Springs	6.8	21.0	0.064	N.D.
Nyala	-3.9	13.0	0.042	N.D.
Garden Valley	-1.7	14.0	0.066	N.D.
Ely	-1.6	18.0	0.063	N.D.
Sarcobatus	-3.4	17.0	0.082	N.D.

MDC Be-7 = 0.022 pCi/m³ Pb-210 = 0.006 pCi/m³ N.D. = not detected

Table 5. TLD Analytical Results for the Fourth Quarter of Calendar Year 2004

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2003 TLD Exposure (mR/yr)	2003 PIC Exposure (mR/yr)
Las Vegas	26	99	94	83
Henderson	29	111	116	134
Boulder City	26	100	110	129
Overton	23	88	95	86
St. George	22	82	90	83
Cedar City	25	93	105	95
Milford	38	142	146	181
Delta	26	97	108	102
Pioche	29	108	117	143
Caliente	33	123	129	133
Alamo	28	112	103	111
Rachel	35	140	140	131
Tonopah	34	135	137	142
Goldfield	34	138	124	134
Beatty	35	140	157	156
Indian Springs	25	98	103	101
Amargosa	29	114	104	110
Pahrump	20	79	87	69
Medlins	33	132	142	145
Sarcobatus	39	157	145	156

Garden Valley	34	125	138	142
Nyala	28	111	114	113
Twin Springs	38	153	163	169
Stone Cabin	36	144	144	151
Ely	26	103	99	107

