

# 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 25 continuously operating environmental sampling stations. A total of 23 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. As a result of the lag time, the gamma results are for the third quarter of CY2003, while the rest of the results are for the fourth quarter of CY2003.

The principle reporting units used in the U.S. for the measurement of radioactivity in the atmospheric environment is pCi/m<sup>3</sup> (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. For the ease in constructing the tables contained in this report, as well as to hopefully ease the comparison among stations and previous results, the units of pCi/m<sup>3</sup> are used.

A summary of the fourth quarter CY2003 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 CY2002) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2003 reflect similar values to the previous quarters. These data remain consistent with the average CY2002 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2003 beta results are also consistent with the previous quarter.

The third quarter gamma results for CY2003 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 CY2003 are shown in Table 4. Overall, the results display similar values to the previous quarters of this calendar year. The 2002 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 CY2002. Finally, as station managers, your input concerning 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 2003  
(Average analytical error, +/- 0.0007)

Station	Minimum (pCi/m <sup>3</sup> )	Maximum (pCi/m <sup>3</sup> )	Average (pCi/m <sup>3</sup> )	2002 Average (pCi/m <sup>3</sup> )
Las Vegas	0.0007	0.0030	0.0018	0.0023
Henderson	0.0008	0.0046	0.0017	0.0023
Boulder City	0.0013	0.0073	0.0034	0.0029
Overton	0.0011	0.0038	0.0023	0.0024
St. George	0.0007	0.0043	0.0017	0.0016
Cedar City	0.0008	0.0061	0.0024	0.0025
Milford	0.0006	0.0041	0.0020	0.0017
Delta	0.0009	0.0032	0.0017	0.0015
Pioche	0.0006	0.0031	0.0017	0.0014
Caliente	0.0011	0.0058	0.0024	0.0021
Alamo	0.0012	0.0048	0.0022	0.0024
Rachel	0.0007	0.0029	0.0016	0.0017
Tonopah	0.0006	0.0052	0.0016	0.0015
Goldfield	0.0005	0.0031	0.0016	0.0016
Beatty	0.0005	0.0036	0.0020	0.0020
Indian Springs	0.0005	0.0034	0.0014	0.0015
Amargosa	0.0008	0.0051	0.0025	0.0029
Pahrump	0.0007	0.0045	0.0017	0.0018

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Garden Valley	0.0004	0.0019	0.0011	0.0015
Nyala	0.0007	0.0019	0.0009	0.0012
Twin Springs	0.0007	0.0020	0.0012	0.0015
Stone Cabin	0.0007	0.0035	0.0024	0.0031
Ely	0.0006	0.0028	0.0013	N.A.

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Table 2. Gross Beta Analytical Results for the Fourth Quarter of Calendar Year 2003.  
(Average analytical error, +/- 0.003)

Station	Minimum (pCi/m <sup>3</sup> )	Maximum (pCi/m <sup>3</sup> )	Average (pCi/m <sup>3</sup> )	2002 Average (pCi/m <sup>3</sup> )
Las Vegas	0.017	0.043	0.026	0.025
Henderson	0.019	0.045	0.028	0.026
Boulder City	0.019	0.059	0.030	0.028
Overton	0.012	0.055	0.029	0.028
St. George	0.021	0.065	0.032	0.027
Cedar City	0.016	0.035	0.024	0.023
Milford	0.018	0.053	0.029	0.026
Delta	0.017	0.060	0.028	0.026
Pioche	0.014	0.039	0.023	0.022
Caliente	0.017	0.049	0.027	0.026
Alamo	0.019	0.044	0.026	0.025
Rachel	0.014	0.045	0.026	0.025
Tonopah	0.014	0.046	0.024	0.023
Goldfield	0.013	0.031	0.023	0.023
Beatty	0.015	0.034	0.025	0.025
Indian Springs	0.017	0.045	0.025	0.024
Amargosa	0.016	0.040	0.027	0.027
Pahrump	0.017	0.036	0.025	0.024

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Garden Valley	0.017	0.034	0.025	0.022
Nyala	0.012	0.029	0.021	0.020
Twin Springs	0.018	0.036	0.026	0.025
Stone Cabin	0.009	0.032	0.021	0.024
Ely	0.012	0.031	0.021	N/A

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Table 3. Gamma Spectroscopy Results for the Third Quarter of Calendar Year 2003.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m <sup>3</sup> )	Pb-210 (pCi/m <sup>3</sup> )
Las Vegas	-2.6	17.0	0.098	N.D.
Henderson	-2.3	14.0	0.066	N.D.
Boulder City	-2.6	10.0	0.063	N.D.
Overton	-1.8	13.0	0.119	N.D.
St. George	1.3	11.0	0.067	N.D.
Cedar City	-3.0	9.7	0.114	N.D.
Milford	-2.8	16.0	0.082	N.D.
Delta	1.7	15.0	0.080	N.D.
Pioche	-5.6	10.0	0.090	N.D.
Caliente	0.7	16.0	0.082	N.D.
Alamo	1.6	13.0	N.D.	N.D.
Rachel	-2.8	15.0	0.120	N.D.
Tonopah	-6.2	12.0	0.070	N.D.
Goldfield	0.7	12.0	0.082	N.D.
Beatty	2.9	12.0	0.082	N.D.
Indian Springs	2.8	17.0	0.118	N.D.
Amargosa	-2.7	13.0	0.082	N.D.
Pahrump	2.6	12.0	0.077	N.D.

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Garden Valley	2.0	14.0	0.088	N.D.
Nyala	-4.8	15.0	0.087	N.D.
Twin Springs	2.3	18.0	0.069	N.D.
Stone Cabin	2.8	15.0	0.097	N.D.
Ely	-2.7	11.0	0.094	N.D.

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



Table 4. TLD Analytical Results for the Fourth Quarter of Calendar Year 2003.

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2002 TLD Exposure (mR/yr)	2002 PIC Exposure (mR/yr)
Las Vegas	23	79	95	89
Henderson	29	104	119	132
Boulder City	27	97	108	125
Overton	24	87	95	84
St. George	22	88	94	80
Cedar City	25	100	111	92
Milford	34	136	147	154
Delta	24	96	115	142
Pioche	29	116	120	122
Caliente	30	120	136	131
Alamo	28	111	116	110
Rachel	34	135	150	132
Tonopah	34	135	149	148
Goldfield	30	122	139	132
Beatty	38	154	160	160
Indian Springs	25	96	107	96
Amargosa	23	88	112	108
Pahrump	21	81	87	71
Medlins	35	140	147	141
Sarcobatus	37	150	162	152

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Garden Valley	36	145	136	104
Nyala	29	115	118	114
Twin Springs	39	156	162	169
Stone Cabin	36	146	151	155
Ely	25	100	N/A	N/A

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