

# 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. 22 stations are equipped with a low volume air sampler 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 actual collection times, variations in flow rate, power outages, or other information which documents the integrity of the sample is 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 second quarter of CY2001, while the rest of the results are for the third quarter.

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 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<sup>3</sup> are used.

A summary of the fourth quarter CY2001 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 2000) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2001 appear indistinguishable from the previous quarter. These data remain consistent with the average CY2000 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2001 beta results again appear slightly higher than the previous quarter, and overall show a slight increasing trend since the first quarter of CY2001.

The third and fourth quarter gamma results for CY2001 are shown in Tables 3 and 4. 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 CY2001 are shown in Table 5. Overall, the past results have revealed a steady decrease each quarter since CY2000. This quarter shows the lowest exposure rate since the first quarter of CY2000 shown for comparison. The 2001 PIC exposure rate is also shown for comparison. As with historical data, the TLD's are lower than the PIC results. As previously noted, this is due to the differences in the two techniques of gamma detection.

Finally, as station managers, your input on 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 2001  
(Average analytical error, +/- 0.0007)

Station	Minimum (pCi/m <sup>3</sup> )	Maximum (pCi/m <sup>3</sup> )	Average (pCi/m <sup>3</sup> )	2000 Average (pCi/m <sup>3</sup> )
Las Vegas	0.0014	0.0066	0.0029	0.0028
Henderson	0.0012	0.0056	0.0021	0.0027
Boulder City	0.0014	0.0060	0.0032	0.0036
Overton	0.0010	0.0048	0.0028	0.0029
St. George	0.0008	0.0042	0.0023	0.0026
Cedar City	0.0011	0.0072	0.0032	0.0038
Milford	0.0017	0.0034	0.0024	0.0023
Delta	0.0010	0.0036	0.0020	0.0022
Pioche	0.0012	0.0027	0.0020	0.0022
Caliente	0.0019	0.0035	0.0024	0.0025
Alamo	0.0014	0.0068	0.0035	0.0032
Rachel	0.0008	0.0067	0.0025	0.0029
Tonopah	0.0008	0.0040	0.0021	0.0023
Goldfield	0.0013	0.0036	0.0020	0.0026
Beatty	0.0008	0.0036	0.0022	0.0028
Indian Springs	0.0010	0.0033	0.0019	0.0021
Amargosa	0.0013	0.0066	0.0035	0.0031
Pahrump	0.0008	0.0037	0.0019	0.0022

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Garden Valley	0.0010	0.0032	0.0019	---
Nyala	0.0008	0.0031	0.0016	---
Twin Springs	0.0011	0.0036	0.0020	---
Stone Cabin	0.0022	0.0058	0.0036	---

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Table 2. Gross Beta Analytical Results for the Third Quarter of Calendar Year 2001.  
(Average analytical error, +/- 0.003)

Station	Minimum (pCi/m <sup>3</sup> )	Maximum (pCi/m <sup>3</sup> )	Average (pCi/m <sup>3</sup> )	2000 Average (pCi/m <sup>3</sup> )
Las Vegas	0.020	0.051	0.034	0.025
Henderson	0.016	0.046	0.033	0.024
Boulder City	0.022	0.050	0.035	0.027
Overton	0.022	0.048	0.036	0.026
St. George	0.026	0.045	0.038	0.025
Cedar City	0.016	0.042	0.031	0.024
Milford	0.019	0.060	0.036	0.024
Delta	0.021	0.045	0.031	0.025
Pioche	0.019	0.044	0.031	0.022
Caliente	0.026	0.051	0.037	0.025
Alamo	0.021	0.048	0.034	0.025
Rachel	0.020	0.048	0.032	0.025
Tonopah	0.015	0.047	0.029	0.024
Goldfield	0.017	0.055	0.030	0.024
Beatty	0.015	0.049	0.030	0.024
Indian Springs	0.023	0.043	0.032	0.022
Amargosa	0.017	0.053	0.033	0.025
Pahrump	0.017	0.038	0.029	0.023

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Garden Valley	0.016	0.043	0.033	---
Nyala	0.019	0.039	0.028	---
Twin Springs	0.023	0.055	0.036	---
Stone Cabin	0.017	0.052	0.030	---

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Table 3. Gamma Spectroscopy Results for the Third Quarter of Calendar Year 2001

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m <sup>3</sup> )	Pb-210 (pCi/m <sup>3</sup> )
Las Vegas	-3.3	9.8	0.108	0.021
Henderson	2.7	14.0	0.097	N.D.
Boulder City	1.8	14.0	0.107	N.D.
Overton	2.5	14.0	0.115	N.D.
St. George	6.2	14.0	0.120	N.D.
Cedar City	0.4	15.0	N.D.	N.D.
Milford	6.3	15.0	0.100	N.D.
Delta	-3.3	11.0	0.154	N.D.
Pioche	2.7	13.0	0.083	N.D.
Caliente	-1.7	11.0	N.D.	N.D.
Alamo	4.0	13.0	0.088	N.D.
Rachel	2.5	12.0	N.D.	N.D.
Tonopah	-1.1	12.0	N.D.	N.D.
Goldfield	0.1	14.0	0.118	N.D.
Beatty	5.9	16.0	N.D.	0.029
Indian Springs	-3.3	11.0	0.175	N.D.
Amargosa	0.3	12.0	0.177	N.D.
Pahrump	2.6	14.0	N.D.	N.D.

Garden Valley	-9.0	11.0	N.D.	N.D.
Nyala	-1.2	12.0	N.D.	N.D.
Twin Springs	-3.8	10.0	N.D.	N.D.
Stone Cabin	0.4	13.0	0.026	N.D.

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. Gamma Spectroscopy Results for the Fourth Quarter of Calendar Year 2001

Station	Cs-137 (pCi/sam)	Cs-137 (MDC)	Be-7 (pCi/m <sup>3</sup> )	Pb-210 (pCi/m <sup>3</sup> )
Las Vegas	-0.6	9.1	0.066	0.036
Henderson	-4.1	11.0	0.068	0.049
Boulder City	1.6	13.0	0.087	N.D.
Overton	-4.7	12.0	0.074	N.D.
St. George	2.0	12.0	N.D.	N.D.
Cedar City	-4.5	13.0	0.075	0.047
Milford	-5.8	13.0	0.045	0.030
Delta	-5.3	12.0	N.D.	N.D.
Pioche	-0.2	15.0	0.094	N.D.
Caliente	-1.6	15.0	0.071	0.031
Alamo	1.8	17.0	0.071	0.033
Rachel	2.1	13.0	N.D.	N.D.
Tonopah	1.5	14.0	N.D.	N.D.
Goldfield	-3.1	13.0	0.089	N.D.
Beatty	0.2	12.0	0.094	0.029
Indian Springs	-2.5	14.0	0.042	N.D.
Amargosa	-3.2	14.0	0.067	N.D.
Pahrump	2.9	13.0	0.066	N.D.

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Stone Cabin	-1.9	13.0	0.075	N.D.
Twin Springs	-5.8	11.0	0.081	0.052
Nyala	-3.3	13.0	0.086	N.D.
Garden Valley	5.7	13.0	0.048	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 5. TLD Analytical Results for the Fourth Quarter of Calendar Year 2001

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2000 TLD Exposure (mR/yr)	2001 PIC Exposure (mR/yr)
Las Vegas	2	8	55	97
Henderson	13	51	82	131
Boulder City	7	27	73	121
Overton	3	12	60	88
St. George	3	11	51	75
Cedar City	5	19	63	86
Milford	18	67	112	153
Delta	7	26	75	103
Pioche	6	22	72	104
Caliente	14	52	82	145
Alamo	10	37	71	109
Rachel	14	52	98	133
Tonopah	18	67	102	147
Goldfield	13	49	83	129
Beatty	17	63	111	153
Indian Springs	9	34	66	90
Amargosa	12	45	71	108
Pahrump	4	15	45	71
Medlins	19	71	103	135
Sarcobatus	20	75	106	148

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Garden Valley	17	63	---
Nyala	13	48	---
Twin Springs	24	90	---
Stone Cabin	20	74	---

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