

Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Fourth Quarter CY2013

The CEMP air-sampling network is designed to monitor and collect radioactive airborne particles from NNSS and non-NNSS related activities, as well as background environmental sources. This report is compiled by the Desert Research Institute (DRI) and summarizes the results from the analysis of the air samples collected by CEMP station managers as part of the community environmental monitoring program.

In general, the CEMP air-sampling network is comprised of 24 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 paper. Prior to October 1, 2013 all air samples were collected on a bi-weekly basis with a target collection time of 336 hours (two weeks). After October 1, 2013 approximately half of the stations were converted to 'stand by' status in which only one two week sample is collected every quarter year. The samplers are calibrated on a monthly basis by DRI to maintain a collection rate of 1.75 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 after the gross alpha/beta analyses have been completed.

In the U.S., the principle reporting unit for the measurement of radioactivity in the atmospheric environment is pCi/m³ (picocuries per cubic meter). DRI receives its data from the lab as microcuries per filter. DRI converts the laboratory data unit of measurement to pCi/m³ for the ease in comparison of data.

A summary of the fourth quarter CY2013 analytical results for gross alpha and beta analyses are found in Tables 1 and 2. These tables document the minimum, maximum, and average values for each of the 23 air-sampling network stations. The last column shows the average annual value from the previous year (CY2012) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2013 reflect similar values to previous quarters. These data remain consistent with the average CY2012 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2013 beta results are also consistent with previous results.

The fourth quarter gamma results for CY2013 are shown in Table 3. All of the samples were gamma spectrum negligible (i.e. gamma emitting radionuclides were not detected) with the exception of beryllium (Be)-7, a naturally occurring element of the atmospheric environment. Overall, these data are consistent with previous analytical results.

The TLD results for the fourth quarter of CY2013 are shown in Table 4. Data for the environmental thermoluminescent dosimeter (TLD) is reported in milliroentgens (mR). Overall, the results display similar values to the previous quarters of the last calendar

year. The 2012 pressurized ion chamber, or PIC exposure rate and TLD data are also provided 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 CY2012.

DRI welcomes and encourages input from the station managers regarding the content of the CEMP quarterly reports. If there is anything you feel we could provide to help you interpret the data or enable you to explain the information to someone in your community not familiar with the program, please let us know.

Table 1. Gross Alpha Analytical Results for the Fourth Quarter of Calendar Year 2013
(Average analytical error, +/- 0.0007)

Station	Minimum (pCi/m ³)	Maximum (pCi/m ³)	Average (pCi/m ³)	2012 Average (pCi/m ³)
Alamo	0.0011	0.0034	0.0022	0.0018
Amargosa*	N.A.	N.A.	0.0012	0.0011
Beatty	0.0009	0.0024	0.0013	0.0011
Boulder City*	N.A.	N.A.	0.0010	0.0013
Caliente	0.0012	0.0037	0.0021	0.0016
Cedar City	0.0003	0.0010	0.0007	0.0006
Delta*	N.A.	N.A.	0.0010	0.0008
Duckwater*	N.A.	N.A.	0.0012	0.0010
Ely*	N.A.	N.A.	0.0012	0.0009
Goldfield	0.0012	0.0016	0.0014	0.0011
Henderson*	N.A.	N.A.	0.0017	0.0011
Indian Springs*	N.A.	N.A.	0.0012	0.0008
Las Vegas	0.0005	0.0020	0.0010	0.0010
Mesquite	0.0016	0.0029	0.0021	0.0013
Milford*	N.A.	N.A.	0.0010	0.0009
Overton*	N.A.	N.A.	0.0014	0.0014
Pahrump*	N.A.	N.A.	0.0011	0.0011
Pioche	0.0007	0.0025	0.0017	0.0009
Rachel	0.0011	0.0015	0.0012	0.0008
Sarcobatus	0.0006	0.0033	0.0018	0.0016

St. George	0.0014	0.0025	0.0017	0.0009
Tecopa*	N.A.	N.A.	0.0015	0.0010
Tonopah	0.0011	0.0015	0.0013	0.0008

*quarterly air sampling station (represents only one sample)

Table 2. Gross Beta Analytical Results for the Fourth Quarter of Calendar Year 2013.
(Average analytical error, +/- 0.005)

Station	Minimum (pCi/m ³)	Maximum (pCi/m ³)	Average (pCi/m ³)	2012 Average (pCi/m ³)
Alamo	0.016	0.025	0.022	0.023
Amargosa*	N.A.	N.A.	0.026	0.021
Beatty	0.020	0.029	0.023	0.019
Boulder City*	N.A.	N.A.	0.028	0.022
Caliente	0.023	0.028	0.026	0.021
Cedar City	0.016	0.021	0.018	0.015
Delta*	N.A.	N.A.	0.027	0.020
Duckwater*	N.A.	N.A.	0.030	0.019
Ely*	N.A.	N.A.	0.020	0.018
Goldfield	0.025	0.030	0.027	0.019
Henderson*	N.A.	N.A.	0.034	0.021
Indian Springs*	N.A.	N.A.	0.028	0.020
Las Vegas	0.017	0.026	0.021	0.021
Mesquite	0.030	0.034	0.032	0.023
Milford*	N.A.	N.A.	0.028	0.021
Overton*	N.A.	N.A.	0.034	0.024
Pahrump*	N.A.	N.A.	0.028	0.020
Pioche	0.022	0.035	0.029	0.018
Rachel	0.025	0.026	0.026	0.019
Sarcobatus	0.019	0.028	0.025	0.021

St. George	0.030	0.032	0.031	0.022
Tecopa*	N.A.	N.A.	0.032	0.021
Tonopah	0.020	0.026	0.022	0.018

*quarterly air sampling station (represents only sample)

Table 3. Gamma Spectroscopy Results for the Fourth Quarter of Calendar Year 2013.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m ³)	Pb-210 (pCi/m ³)
Alamo	0.4	10.4	N.D.	N.D.
Amargosa*	0.3	11.1	N.D.	N.D.
Beatty	-3.8	9.6	0.039	N.D.
Boulder City*	0.1	8.8	N.D.	N.D.
Caliente	1.6	8.9	0.037	N.D.
Cedar City	1.2	8.4	0.041	N.D.
Delta*	-3.1	16.7	N.D.	N.D.
Duckwater*	2.2	7.6	N.D.	N.D.
Ely*	0.0	14.9	N.D.	N.D.
Goldfield	1.3	8.3	0.047	N.D.
Henderson*	-3.8	11.0	N.D.	N.D.
Indian Springs*	2.8	7.8	N.D.	N.D.
Las Vegas	0.0	10.1	0.029	N.D.
Mesquite	0.9	10.6	0.037	N.D.
Milford*	0.1	8.7	N.D.	N.D.
Overton*	3.3	10.6	N.D.	N.D.
Pahrump*	-2.5	15.9	N.D.	N.D.
Pioche	-2.2	12.2	0.042	N.D.
Rachel	-0.3	10.4	N.D.	N.D.
Sarcobatus	-5.5	16.7	N.D.	N.D.

St. George	-1.7	11.1	0.031	N.D.
Tecopa*	2.8	10.2	N.D.	N.D.
Tonopah	2.1	11.0	0.044	N.D.

MDC (minimum detectable concentration)

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

*quarterly air sample station (represents only one sample)

Table 4. TLD Analytical Results for the Fourth Quarter of Calendar Year 2013

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2012 TLD Exposure (mR/yr)	2012 PIC Exposure (mR/yr)
Alamo	32	119	114	118
Amargosa	20	104	103	100
Beatty	38	142	139	148
Boulder City	22	106	105	133
Caliente	22	115	112	139
Cedar City	18	88	94	97
Delta	19	90	96	93
Duckwater	22	115	117	107
Ely	20	104	107	107
Goldfield	33	123	121	132
Henderson	23	111	110	123
Indian Springs	20	98	97	98
Las Vegas	20	95	100	99
Mesquite	20	103	108	102
Milford	28	132	140	154
Overton	19	89	100	106
Pahrump	15	82	78	72
Pioche	23	120	116	131
Rachel	35	130	127	134
Sarcobatus	40	149	147	145

St. George	17	83	86	88
Tecopa	20	109	108	132
Tonopah	36	136	132	141
