

Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Fourth Quarter CY2014

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 CY2014 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 (CY2013) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2014 reflect similar values to previous quarters. These data remain consistent with the average CY2013 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2014 beta results are also consistent with previous results.

The fourth quarter gamma results for CY2014 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 CY2014 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 2013 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 CY2013.

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 2014
(Average analytical error, +/- 0.0007)

Station	Minimum (pCi/m ³)	Maximum (pCi/m ³)	Average (pCi/m ³)	2013 Average (pCi/m ³)
Alamo	0.0007	0.0032	0.0020	0.0016
Amargosa*	N.A.	N.A.	0.0010	0.0012
Beatty	0.0008	0.0013	0.0010	0.0010
Boulder City*	N.A.	N.A.	0.0011	0.0014
Caliente	0.0008	0.0028	0.0017	0.0017
Cedar City	0.0003	0.0011	0.0007	0.0007
Delta*	N.A.	N.A.	0.0005	0.0011
Duckwater*	N.A.	N.A.	0.0012	0.0012
Ely*	N.A.	N.A.	0.0009	0.0011
Goldfield	0.0007	0.0010	0.0009	0.0011
Henderson*	N.A.	N.A.	0.0011	0.0012
Indian Springs*	N.A.	N.A.	0.0009	0.0012
Las Vegas	0.0007	0.0015	0.0010	0.0012
Mesquite	0.0006	0.0049	0.0018	0.0017
Milford*	N.A.	N.A.	0.0008	0.0011
Overton*	N.A.	N.A.	0.0013	0.0012
Pahrump*	N.A.	N.A.	0.0015	0.0011
Pioche	0.0008	0.0017	0.0011	0.0012
Rachel	0.0008	0.0017	0.0011	0.0010
Sarcobatus	0.0007	0.0035	0.0023	0.0017

St. George	0.0007	0.0013	0.0010	0.0010
Tecopa*	N.A.	N.A.	0.0008	0.0011
Tonopah	0.0006	0.0019	0.0010	0.0011

*quarterly air sampling station (represents only one sample)

Table 2. Gross Beta Analytical Results for the Fourth Quarter of Calendar Year 2014.
(Average analytical error, +/- 0.005)

Station	Minimum (pCi/m ³)	Maximum (pCi/m ³)	Average (pCi/m ³)	2013 Average (pCi/m ³)
Alamo	0.020	0.028	0.025	0.018
Amargosa*	N.A.	N.A.	0.021	0.020
Beatty	0.017	0.029	0.022	0.018
Boulder City*	N.A.	N.A.	0.023	0.019
Caliente	0.018	0.033	0.027	0.020
Cedar City	0.011	0.023	0.016	0.015
Delta*	N.A.	N.A.	0.016	0.021
Duckwater*	N.A.	N.A.	0.024	0.019
Ely*	N.A.	N.A.	0.019	0.017
Goldfield	0.015	0.027	0.021	0.019
Henderson*	N.A.	N.A.	0.024	0.020
Indian Springs*	N.A.	N.A.	0.020	0.020
Las Vegas	0.016	0.025	0.022	0.020
Mesquite	0.021	0.035	0.028	0.024
Milford*	N.A.	N.A.	0.019	0.021
Overton*	N.A.	N.A.	0.027	0.023
Pahrump*	N.A.	N.A.	0.019	0.017
Pioche	0.017	0.029	0.024	0.020
Rachel	0.017	0.026	0.023	0.019
Sarcobatus	0.019	0.037	0.025	0.020

St. George	0.021	0.028	0.026	0.020
Tecopa*	N.A.	N.A.	0.020	0.019
Tonopah	0.017	0.024	0.020	0.017

*quarterly air sampling station (represents only sample)

Table 3. Gamma Spectroscopy Results for the Fourth Quarter of Calendar Year 2014.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m ³)	Pb-210 (pCi/m ³)
Alamo	-1.3	10.1	0.039	N.D.
Amargosa*	0.3	8.6	N.D.	N.D.
Beatty	1.0	9.2	0.035	N.D.
Boulder City*	0.1	10.4	N.D.	N.D.
Caliente	-1.0	9.7	0.038	N.D.
Cedar City	-2.3	15.6	0.043	N.D.
Delta*	1.5	15.2	N.D.	N.D.
Duckwater*	2.3	9.5	N.D.	N.D.
Ely*	-0.6	10.2	N.D.	N.D.
Goldfield	-2.8	14.0	0.042	N.D.
Henderson*	0.0	7.5	N.D.	N.D.
Indian Springs*	-5.0	13.2	N.D.	N.D.
Las Vegas	-0.4	9.0	0.044	N.D.
Mesquite	-0.1	7.5	0.044	N.D.
Milford*	2.0	8.6	N.D.	N.D.
Overton*	-2.9	13.8	N.D.	N.D.
Pahrump*	3.4	10.0	N.D.	N.D.
Pioche	-0.7	9.1	0.053	N.D.
Rachel	-0.2	11.6	0.042	N.D.
Sarcobatus	-4.5	15.0	0.028	N.D.

St. George	-0.1	11.9	0.037	N.D.
Tecopa*	0.4	8.0	N.D.	N.D.
Tonopah	2.1	9.4	0.037	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 2014

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2013 TLD Exposure (mR/yr)	2013 PIC Exposure (mR/yr)
Alamo	28	111	115	121
Amargosa	28	114	105	102
Beatty	35	142	139	151
Boulder City	29	125	107	146
Caliente	29	119	113	140
Cedar City	24	95	93	97
Delta	25	100	93	110
Duckwater	30	126	115	129
Ely	26	108	103	108
Goldfield	31	124	122	134
Henderson	27	116	113	128
Indian Springs	24	97	97	100
Las Vegas	24	101	98	102
Mesquite	27	108	104	105
Milford	36	145	137	153
Overton	24	103	94	108
Pahrump	21	85	77	72
Pioche	29	119	117	130
Rachel	31	123	126	138
Sarcobatus	33	134	144	148

St. George	22	88	84	89
Tecopa	27	110	107	116
Tonopah	34	137	133	141
