Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Third Quarter CY2015

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/m^3 (picocuries per cubic meter). DRI receives its data from the lab as picocuries per filter. DRI converts the laboratory data unit of measurement to pCi/m^3 for the ease in comparison of data.

A summary of the third quarter CY2015 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 (CY2014) for comparison purposes. Overall the gross alpha results for the third quarter of CY2015 reflect similar values to previous quarters. These data remain consistent with the average CY2014 analyses used for comparison, especially when analytical error is considered. The third quarter CY2015 beta results are also consistent with previous results.

The third quarter gamma results for CY2015 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 third quarter of CY2015 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 2014 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 third quarter shows consistent agreement with CY2014.

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 Third Quarter of Calendar Year 2015
(Average analytical error, +/– 0.0007)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2014 Average (pCi/m^3)
Alamo	0.0008	0.0040	0.0018	0.0014
Amargosa*	N.A.	N.A.	0.0012	0.0013
Beatty	0.0007	0.0013	0.0010	0.0009
Boulder City*	N.A.	N.A.	0.0012	0.0012
Caliente	0.0009	0.0032	0.0015	0.0016
Cedar City	0.0006	0.0014	0.0009	0.0006
Delta*	N.A.	N.A.	0.0009	0.0007
Duckwater*	N.A.	N.A.	0.0010	0.0010
Ely*	N.A.	N.A.	0.0008	0.0010
Goldfield	0.0008	0.0011	0.0009	0.0010
Henderson*	N.A.	N.A.	0.0014	0.0011
Indian Springs*	N.A.	N.A.	0.0012	0.0010
Las Vegas	0.0007	0.0031	0.0013	0.0010
Mesquite	0.0006	0.0015	0.0011	0.0012
Milford*	N.A.	N.A.	0.0008	0.0014
Overton*	N.A.	N.A.	0.0008	0.0013
Pahrump*	N.A.	N.A.	0.0012	0.0017
Pioche	0.0006	0.0020	0.0012	0.0012
Rachel	0.0009	0.0021	0.0012	0.0010
Sarcobatus	0.0010	0.0027	0.0017	0.0017

St. George	0.0006	0.0013	0.0010	0.0009
Tecopa*	N.A.	N.A.	0.0011	0.0010
Tonopah	0.0008	0.0013	0.0011	0.0009

*quarterly air sampling station (represents only one sample)

Table 2. Gross Beta Analytical Results for the Third Quarter of Calendar Year 2015.
(Average analytical error, +/– 0.005)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2014 Average (pCi/m^3)
Alamo	0.017	0.032	0.021	0.020
Amargosa*	N.A.	N.A.	0.018	0.021
Beatty	0.016	0.022	0.019	0.019
Boulder City*	N.A.	N.A.	0.018	0.019
Caliente	0.019	0.025	0.021	0.022
Cedar City	0.014	0.023	0.017	0.015
Delta*	N.A.	N.A.	0.017	0.016
Duckwater*	N.A.	N.A.	0.015	0.023
Ely*	N.A.	N.A.	0.018	0.016
Goldfield	0.014	0.023	0.017	0.020
Henderson*	N.A.	N.A.	0.018	0.021
Indian Springs*	N.A.	N.A.	0.019	0.018
Las Vegas	0.017	0.025	0.020	0.018
Mesquite	0.016	0.026	0.020	0.022
Milford*	N.A.	N.A.	0.017	0.017
Overton*	N.A.	N.A.	0.018	0.022
Pahrump*	N.A.	N.A.	0.018	0.018
Pioche	0.014	0.024	0.018	0.021
Rachel	0.015	0.024	0.019	0.020
Sarcobatus	0.016	0.026	0.021	0.021

St. George	0.016	0.030	0.022	0.020
Tecopa*	N.A.	N.A.	0.016	0.021
Tonopah	0.014	0.020	0.017	0.018

*quarterly air sampling station (represents only sample)

Table 3. Gamma Spectroscopy Results for the Third Quarter of Calendar Year 2015.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	-9.2	16.7	0.035	0.024
Amargosa*	0.2	13.6	N.D.	N.D.
Beatty	1.7	16.2	0.021	0.018
Boulder City*	0.0	12.3	N.D.	N.D.
Caliente	0.0	12.2	0.031	0.025
Cedar City	-0.2	8.4	0.029	0.017
Delta*	-1.8	8.2	N.D.	N.D.
Duckwater*	0.1	14.6	N.D.	N.D.
Ely*	-2.5	13.4	N.D.	N.D.
Goldfield	-6.6	16.3	0.030	0.018
Henderson*	-3.3	13.1	N.D.	N.D.
Indian Springs*	-3.3	13.1	N.D.	N.D.
Las Vegas	-1.2	15.9	0.033	0.014
Mesquite	-2.4	16.0	0.035	N.D.
Milford*	-0.8	12.2	N.D.	N.D.
Overton*	3.6	9.4	N.D.	N.D.
Pahrump*	0.2	8.1	N.D.	N.D.
Pioche	1.0	12.8	0.022	N.D.
Rachel	-0.6	9.1	0.026	N.D.
Sarcobatus	-0.6	9.5	0.033	0.016

St.George	2.5	13.7	0.032	0.031
Tecopa*	0.3	11.5	N.D.	N.D.
Tonopah	1.5	10.5	0.031	0.021

MDC (minimum detectable concentration)
MDC Be-7 = 0.022 pCi/m^3 Pb-210 = 0.006 pCi/m^3 N.D. = not detected
*quarterly air sample station (represents only one sample)

Table 4. TLD Analytical Results for the Third Quarter of Calendar Year 2015

Station	Third Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2014 TLD Exposure (mR/yr)	2014 PIC Exposure (mR/yr)
Alamo	30	120	119	118
Amargosa	28	104	112	99
Beatty	37	149	147	145
Boulder City	30	120	115	142
Caliente	31	118	117	139
Cedar City	25	100	107	96
Delta	26	104	106	109
Duckwater	32	122	120	133
Ely	27	104	105	107
Goldfield	32	128	127	131
Henderson	31	124	123	124
Indian Springs	26	97	97	96
Las Vegas	27	102	109	96
Mesquite	27	108	110	102
Milford	38	152	144	152
Overton	25	100	103	105
Pahrump	18	87	89	71
Pioche	32	122	123	133
Rachel	32	128	134	133
Sarcobatus	37	149	144	146

St. George	23	92	87	89
Tecopa	30	112	112	116
Tonopah	36	145	137	139