Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network–Fourth Quarter CY2011

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 29 continuously operating environmental sampling stations. A total of 27 stations are equipped with a low volume air sampler/totalizer configuration to collect particulate radionuclides on glass fiber filter paper. Ideally, the samples are collected on a bi-weekly basis with a target collection time of 336 hours (two weeks). 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 microcuries 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 fourth quarter CY2011 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 27 air-sampling network stations. The last column shows the average annual value from the previous year (CY2010) for comparison purposes. Overall the gross alpha results for the fourth quarter of CY2011 reflect similar values to previous quarters. These data remain consistent with the average CY2010 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2011 beta results are also consistent with previous results.

The fourth quarter gamma results for CY2011 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 CY2011 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 2010 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 CY2010.

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 2011
(Average analytical error, +/− 0.0007)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2010 Average (pCi/m^3)
Alamo	0.0009	0.0037	0.0020	0.0016
Amargosa	0.0005	0.0021	0.0012	0.0012
Beatty	0.0008	0.0025	0.0017	0.0012
Boulder City	0.0007	0.0025	0.0017	0.0015
Caliente	0.0012	0.0031	0.0020	0.0018
Cedar City	0.0007	0.0015	0.0011	0.0008
Delta	0.0006	0.0026	0.0013	0.0011
Duckwater	0.0008	0.0019	0.0012	0.0011
Ely	0.0005	0.0033	0.0012	0.0009
Garden Valley	0.0007	0.0019	0.0012	0.0011
Goldfield	0.0008	0.0019	0.0013	0.0011
Henderson	0.0007	0.0017	0.0014	0.0013
Indian Springs	0.0007	0.0014	0.0011	0.0012
Las Vegas	0.0010	0.0027	0.0015	0.0011
Mesquite	0.0008	0.0042	0.0019	0.0015
Milford	0.0008	0.0023	0.0013	0.0012
Nyala	0.0007	0.0019	0.0013	0.0012
Overton	0.0014	0.0044	0.0025	0.0011
Pahrump	0.0006	0.0015	0.0010	0.0013

Pioche	0.0008	0.0020	0.0012	0.0010
Rachel	0.0007	0.0018	0.0012	0.0012
Sarcobatus	0.0007	0.0046	0.0021	0.0019
St. George	0.0010	0.0024	0.0013	0.0011
Stone Cabin	0.0007	0.0020	0.0011	0.0010
Tecopa	0.0009	0.0023	0.0015	0.0013
Tonopah	0.0006	0.0021	0.0014	0.0010
Twin Springs	0.0009	0.0018	0.0012	0.0013

Table 2. Gross Beta Analytical Results for the Fourth Quarter of Calendar Year 2011.
(Average analytical error, +/– 0.005)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2010 Average (pCi/m^3)
Alamo	0.019	0.044	0.030	0.017
Amargosa	0.018	0.039	0.027	0.018
Beatty	0.017	0.042	0.024	0.017
Boulder City	0.018	0.039	0.030	0.022
Caliente	0.021	0.039	0.028	0.019
Cedar City	0.017	0.030	0.020	0.015
Delta	0.019	0.059	0.028	0.018
Duckwater	0.018	0.039	0.024	0.017
Ely	0.017	0.034	0.021	0.015
Garden Valley	0.019	0.039	0.024	0.017
Goldfield	0.015	0.049	0.024	0.016
Henderson	0.020	0.041	0.029	0.019
Indian Springs	0.017	0.038	0.026	0.018
Las Vegas	0.019	0.041	0.028	0.018
Mesquite	0.020	0.045	0.031	0.020
Milford	0.021	0.052	0.028	0.020
Nyala	0.018	0.044	0.028	0.018
Overton	0.024	0.042	0.035	0.019
Pahrump	0.019	0.035	0.026	0.017

Pioche	0.015	0.034	0.022	0.014
Rachel	0.019	0.037	0.025	0.018
Sarcobatus	0.019	0.050	0.028	0.019
St. George	0.020	0.047	0.031	0.019
Stone Cabin	0.015	0.029	0.020	0.015
Tecopa	0.019	0.041	0.029	0.019
Tonopah	0.016	0.043	0.024	0.015
Twin Springs	0.019	0.042	0.026	0.019

Table 3. Gamma Spectroscopy Results for the Fourth Quarter of Calendar Year 2011.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	0.0	9.8	0.063	N.D.
Amargosa	1.1	8.0	0.052	N.D.
Beatty	0.1	7.4	0.049	N.D.
Boulder City	1.0	11.0	0.053	N.D.
Caliente	0.1	12.0	0.055	N.D.
Cedar City	-0.1	11.0	0.048	N.D.
Delta	1.9	11.0	0.038	N.D.
Duckwater	0.1	8.5	0.051	N.D.
Ely	0.3	6.3	0.051	N.D.
Garden Valley	2.1	6.4	0.056	N.D.
Goldfield	-2.1	12.0	0.059	N.D.
Henderson	-1.4	7.8	0.055	N.D.
Indian Springs	0.0	8.5	0.050	N.D.
Las Vegas	1.0	12.0	0.056	N.D.
Mesquite	-1.5	12.0	0.058	N.D.
Milford	0.0	7.8	0.039	N.D.
Nyala	0.2	12.0	0.050	N.D.
Overton	1.3	11.0	0.043	N.D.
Pahrump	0.2	9.6	0.055	N.D.

Pioche	1.1	10.0	0.050	N.D.
Rachel	1.1	11.0	0.053	N.D.
Sarcobatus	1.0	11.0	0.059	N.D.
St. George	-2.0	9.7	0.049	N.D.
Stone Cabin	0.8	11.0	0.053	N.D.
Tecopa	2.0	8.0	0.047	N.D.
Tonopah	-0.1	9.7	0.058	N.D.
Twin Springs	1.1	10.0	0.041	N.D.

MDC (minimum detectable concentration)
MDC Be-7 = 0.022 pCi/m^3 Pb-210 = 0.006 pCi/m^3 N.D. = not detected

Table 4. TLD Analytical Results for the Fourth Quarter of Calendar Year 2011

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2010 TLD Exposure (mR/yr)	2010 PIC Exposure (mR/yr)
Alamo	27	101	106	120
Amargosa	26	112	94	106
Beatty	35	130	129	149
Boulder City	25	93	94	134
Caliente	27	101	104	139
Cedar City	22	82	81	100
Delta	24	89	86	106
Duckwater	24	124	103	129
Ely	22	113	91	107
Garden Valley	30	154	139	153
Goldfield	29	108	110	132
Henderson	27	101	102	121
Indian Springs	23	99	90	99
Las Vegas	24	89	87	97
Medlins Ranch	26	134	132	148
Mesquite	24	91	95	106
Milford	35	130	130	153
Nyala	24	124	100	120
Overton	24	91	87	98
Pahrump	19	82	73	73

Pioche	26	97	102	124
Rachel	31	116	118	132
Sarcobatus	34	127	140	148
St. George	22	82	70	92
Stone Cabin	31	159	131	148
Tecopa	26	112	97	129
Tonopah	32	119	122	141
Twin Springs	31	159	146	170