Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling Network–First Quarter CY2009

The CEMP air-sampling network is designed to monitor and collect radioactive airborne particles from NTS and non-NTS 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). This two week sampling interval was adopted during the first quarter of CY2009. 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 (13 weeks) for gamma spectroscopy analysis only 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. The data for the environmental thermoluminescent dosimeter (TLD) is reported in milliroentgens (mR).

A summary of the first quarter CY2009 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 (CY2008) for comparison purposes. Overall the gross alpha results for the first quarter of CY2009 reflect similar values to previous quarters. These data remain consistent with the average CY2008 analyses used for comparison, especially when analytical error is considered. The first quarter CY2009 beta results are also consistent with previous results.

The first quarter gamma results for CY2009 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 and occasionally Lead (Pb)-210, both naturally occurring elements of the atmospheric and geologic environment, respectively. Overall, these data are consistent with previous analytical results.

The TLD results for the first quarter of CY2009 are shown in Table 4. Overall, the results display similar values to the previous quarters of the last calendar year. The 2008

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 first quarter shows consistent agreement with CY2008.

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 First Quarter of Calendar Year 2009
(Average analytical error, +/− 0.0007)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2008 Average (pCi/m^3)
Alamo	0.0008	0.0031	0.0014	0.0019
Amargosa	0.0006	0.0009	0.0007	0.0013
Beatty	0.0006	0.0019	0.0012	0.0019
Boulder City	0.0003	0.0015	0.0009	0.0021
Caliente	0.0011	0.0026	0.0017	0.0023
Cedar City	0.0008	0.0012	0.0009	0.0013
Delta	0.0005	0.0019	0.0012	0.0014
Duckwater	0.0008	0.0024	0.0013	0.0013
Ely	0.0004	0.0014	0.0008	0.0012
Garden Valley	0.0006	0.0014	0.0009	0.0012
Goldfield	0.0006	0.0013	0.0009	0.0014
Henderson	0.0008	0.0028	0.0014	0.0015
Indian Springs	0.0006	0.0010	0.0008	0.0013
Las Vegas	0.0008	0.0026	0.0018	0.0029
Mesquite	0.0006	0.0017	0.0011	0.0017
Milford	0.0006	0.0019	0.0015	0.0016
Nyala	0.0003	0.0010	0.0006	0.0010
Overton	0.0008	0.0036	0.0016	0.0020
Pahrump	0.0005	0.0013	0.0007	0.0016

Pioche	0.0005	0.0012	0.0008	0.0013
Rachel	0.0006	0.0015	0.0009	0.0017
Sarcobatus	0.0010	0.0022	0.0016	0.0024
St. George	0.0008	0.0016	0.0012	0.0014
Stone Cabin	0.0006	0.0012	0.0009	0.0014
Tecopa	0.0006	0.0013	0.0011	0.0015
Tonopah	0.0007	0.0012	0.0009	0.0014
Twin Springs	0.0005	0.0018	0.0010	0.0013

Table 2. Gross Beta Analytical Results for the First Quarter of Calendar Year 2009.
(Average analytical error, +/– 0.003)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2008 Average (pCi/m^3)
Alamo	0.010	0.028	0.018	0.021
Amargosa	0.014	0.022	0.018	0.021
Beatty	0.010	0.021	0.016	0.021
Boulder City	0.013	0.031	0.021	0.022
Caliente	0.012	0.029	0.021	0.022
Cedar City	0.012	0.022	0.017	0.019`
Delta	0.014	0.034	0.022	0.021
Duckwater	0.014	0.025	0.018	0.020
Ely	0.011	0.020	0.016	0.019
Garden Valley	0.012	0.024	0.018	0.020
Goldfield	0.013	0.023	0.017	0.019
Henderson	0.011	0.028	0.020	0.022
Indian Springs	0.011	0.024	0.017	0.019
Las Vegas	0.013	0.027	0.021	0.024
Mesquite	0.013	0.031	0.021	0.023
Milford	0.016	0.037	0.023	0.022
Nyala	0.010	0.023	0.016	0.017
Overton	0.013	0.032	0.021	0.022
Pahrump	0.012	0.023	0.017	0.021

Pioche	0.012	0.026	0.017	0.019
Rachel	0.013	0.025	0.018	0.022
Sarcobatus	0.013	0.025	0.019	0.023
St. George	0.016	0.035	0.024	0.023
Stone Cabin	0.010	0.020	0.016	0.020
Tecopa	0.013	0.028	0.021	0.022
Tonopah	0.011	0.021	0.016	0.019
Twin Springs	0.012	0.035	0.021	0.021

Table 3. Gamma Spectroscopy Results for the First Quarter of Calendar Year 2009.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	0.6	6.6	0.107	N.D.
Amargosa	-1.9	11.0	0.134	N.D.
Beatty	0.5	6.7	0.097	N.D.
Boulder City	2.5	11.0	0.145	N.D.
Caliente	0.1	14.0	0.110	N.D.
Cedar City	1.8	8.1	0.119	N.D.
Delta	-1.5	13.0	0.098	0.021
Duckwater	-0.1	7.0	0.117	N.D.
Ely	-0.6	7.0	N.D.	N.D.
Garden Valley	0.3	9.3	0.118	N.D.
Goldfield	0.0	11.0	0.116	N.D.
Henderson	-0.7	7.7	0.141	N.D.
Indian Springs	2.2	9.2	0.133	N.D.
Las Vegas	-1.0	11.0	0.140	N.D.
Mesquite	-1.7	13.0	0.153	N.D.
Milford	0.1	7.6	0.109	N.D.
Nyala	-1.1	6.8	0.112	N.D.
Overton	0.1	11.0	0.144	N.D.
Pahrump	2.9	8.1	0.139	N.D.

Pioche	-0.6	11.0	0.136	0.024
Rachel	0.2	7.3	0.126	N.D.
Sarcobatus	-3.0	17.0	0.151	N.D.
St. George	-1.1	7.9	0.125	N.D.
Stone Cabin	0.0	9.2	0.093	N.D.
Tecopa	3.6	8.7	0.138	N.D.
Tonopah	1.0	9.8	0.126	N.D.
Twin Springs	4.2	6.7	0.107	0.024

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 First Quarter of Calendar Year 2009

Station	First Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2008 TLD Exposure (mR/yr)	2008 PIC Exposure (mR/yr)
Alamo	27	116	107	120
Amargosa	28	114	99	110
Beatty	36	145	142	148
Boulder City	27	103	100	135
Caliente	32	128	113	142
Cedar City	25	100	89	97
Delta	25	100	97	108
Duckwater	28	122	108	124
Ely	26	114	96	107
Garden Valley	38	142	141	156
Goldfield	32	128	122	132
Henderson	30	114	115	130
Indian Springs	25	102	92	99
Las Vegas	25	93	94	93
Medlins Ranch	38	142	132	148
Mesquite	24	100	98	104
Milford	38	155	146	153
Nyala	27	102	110	122
Overton	22	89	86	89

Pahrump	19	77	71	73
Pioche	29	116	108	121
Rachel	36	144	132	137
Sarcobatus	37	149	132	153
St. George	21	84	84	83
Stone Cabin	32	119	133	148
Tecopa	27	110	103	134
Tonopah	30	120	131	141
Twin Springs	45	168	148	170