DATA SUMMARY POSTING

Station: Midwest Generation Will County Generating Station

Regulated Unit(s): Pond 2 S (IEPA ID No. W1978100011-03)
Pond 3 S (IEPA ID No. W1978100011-04)

In accordance with the new Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (State CCR Rule) groundwater monitoring was completed during the 3rd quarter 2023 which includes the entire list of parameters specified under Section 845.600(a)(1) and (b). Table 1 is a summary table of all available CCR monitoring data to date including any data generated previously as part of the Federal CCR Rule monitoring. In addition, Table 2 provides a summary of turbidity data which was collected as part of State CCR Rule requirements which is a data parameter that was not required under the Federal CCR Rule.

No background statistics or proposed Groundwater Protection Standards are included on these tables. The background statistics and Proposed Groundwater Protection Standards were submitted to Illinois Environmental Protection Agency (EPA) as part of the Application for Initial Operating Permit submitted October 31, 2021. Upon Illinois EPA approval of the Operating Permit and Proposed Groundwater Protection Standards, the approved comparison values will be included on the tables for subsequent data comparisons/evaluations.

Table 1. Groundwater Analytical Data, Pond 2S and Pond 3S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228 Combined	Selenium	Thallium
MW-05 up-gradient	11/11/2015	6.1	220	110	0.31	7.24	770	1,900	< 0.003	0.0014	0.071	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.0750	-0.168	0.031	< 0.002
	2/18/2016	4.4	230	120	0.31	6.99	730	1,600	< 0.003	0.0021	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.079	0.468	0.019	< 0.002
	5/26/2016	3.7	170	110	0.33	6.73	670	1,500	< 0.003	0.0023	0.055	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.077	< 0.402	0.019	< 0.002
	8/10/2016	3.6	67	120	0.72	8.62	480	970	< 0.003	0.0044	0.043	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	F1 < 0.0002	0.14	< 0.394	0.0049	< 0.002
	10/26/2016	3.6	44	120	0.70	9.08	410	920	< 0.003	0.0047	0.033	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.12	0.592	< 0.0025	< 0.002
	2/1/2017	4.6	250	48	0.35	6.81	530	1,600	< 0.003	0.0015	0.058	* < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	^ < 0.0002	0.048	< 0.424	0.029	< 0.002
	5/11/2017	4.0	140	85	0.31	7.86	610	1,200	< 0.003	0.0035	0.053	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.093	< 0.388	< 0.0025	< 0.002
	6/27/2017	3.8	83	99	0.53	7.95	500	1,000	< 0.003	0.0037	0.045	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.11	0.412	< 0.0025	< 0.002
	9/8/2017	4.8	89	78	0.52	9.40	490	1,000	< 0.003	0.0038	V 0.069	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.095	0.486	0.0047	< 0.002
	11/16/2017	4.8	180	52	0.45	6.70	650	1,500	< 0.003	0.0028	0.065	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.064	< 0.379	0.012	< 0.002
	5/2/2018	3.6	200	32	0.39	7.23	510	1,300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	4.9	150	55	0.48	7.07	430	1,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	4.1	61	91	0.59	9.10	380	870	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	4.9	170	31	0.41	6.95	440	1,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/22/2020	4.5	52	70	0.59	7.39	300	870	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/4/2020	5.0	130	29	0.38	7.06	410	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/24/2021	4.7	120	28	0.53	7.07	430	1,000	< 0.003	0.0011	0.046	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.063	< 0.492	0.042	< 0.002
	8/24/2021	4.6	33	45	0.74	9.42	410	580	< 0.003	0.0054	0.028	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.091	1.230	< 0.0025	< 0.002
	11/23/2021	5.5	140	22	0.44	6.80	370	1,100	< 0.003	0.0035	0.066	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.066	0.784	0.012	< 0.002
	2/24/2022	4.9	210	25	0.39	6.73	660	1,400	< 0.003	0.0092	0.077	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.059	< 0.415	0.048	< 0.002
	6/16/2022	5.1	120	41	0.34	7.05	510	1,100	< 0.003	0.0037	0.055	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.064	< 0.471	0.008	< 0.002
	8/25/2022	6.6	130	20	0.4	6.69	300	940	< 0.003	0.0043	0.072	< 0.001	^1+ < 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.061	< 0.570	0.0056	< 0.002
	11/15/2022	8.9	150	9.8	0.72	6.78	310	930	< 0.003	0.032	0.099	^+ < 0.001	0.004	0.0083	< 0.001	< 0.0005	0.02	< 0.0002	0.1	< 0.569	0.089	< 0.002
	2/23/2023	6.3	120	26	0.43	6.83	430	1,100	< 0.003	0.0018	0.058	^1+ ^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	0.00027	0.067	< 0.655	0.021	< 0.002
	4/26/2023	4.9	210	33	0.47	6.73	670	1600	< 0.0030	0.0022	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.013	< 0.0002	0.055	< 0.479	0.039	< 0.0020
	7/26/2023	4.8	180	18	0.50	6.91	440	1200	< 0.0030	0.0014	0.061	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.021	< 0.00020	0.053	0.823	0.070	< 0.0020
MW-06 up-gradient	11/10/2015	3.0	52	100	0.55	8.63	300	660	< 0.003	0.0016	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.0670	-0.383	0.0039	< 0.002
	2/18/2016	2.5	74	150	0.47	8.58	280	650	< 0.003	0.0014	0.068	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.0630	0.412	< 0.0025	< 0.002
	5/26/2016	2.7	86	92	0.44	7.79	350	800	< 0.003	0.002	0.068	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.042	< 0.422	< 0.0025	< 0.002
	8/11/2016	3.6	110	58	0.35	7.74	330	840	< 0.003	0.0029	0.086	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.038	< 0.339	< 0.0025	< 0.002
	10/26/2016	3.8	86	74	0.40	8.16	220	800	< 0.003	0.003	0.074	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.043	< 0.531	< 0.0025	< 0.002
	2/1/2017	3.4	70	83	0.41	7.88	260	700	< 0.003	0.0043	0.068	* < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	^ < 0.0002	0.05	< 0.511	0.0035	< 0.002
	5/11/2017	3.0	75	84	0.28	8.68	330	570	< 0.003	0.002	0.054	< 0.001	< 0.0005	< 0.005	< 0.001	0.00054	0.011	< 0.0002	0.054	< 0.388	< 0.0025	< 0.002
	6/27/2017	3.1	65	74	0.38	8.15	330	710	< 0.003	0.0014	0.069	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.046	0.408	< 0.0025	< 0.002
	9/7/2017	3.5	75	67	0.40	8.20	300	740	< 0.003	0.0025	0.077	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.044	0.397	< 0.0025	< 0.002
	11/16/2017	3.9	88	54	0.39	7.59	280	810	< 0.003	0.0028	0.077	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.038	0.491	0.012	< 0.002
	5/3/2018	3.0	91	52	0.26	6.91	530	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2018 R	NA	NA	NA	NA	7.47	280	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	3.5	93	44	0.31	7.83	240	720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	4.3	120	38	0.21	7.51	350	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/3/2019 R	3.2	NA	NA	NA	8.28	NA	740	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	4.2	98	31	0.33	7.91	210	740	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/22/2020	3.4	98	56	0.31	7.47	180	710	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	3.3	100	43	0.36	7.29	170	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/24/2021	2.6	99	46	0.33	7.65	160	610	< 0.003	0.0025	0.08	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.017	0.576	< 0.0025	< 0.002
	8/24/2021	2.9	100	100	0.35	7.09	170	370	< 0.003	0.0029	0.093	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.018	< 0.468	< 0.0025	< 0.002
	11/23/2021	2.6	85	43	0.37	7.48	150	720	< 0.003	0.002	0.07	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.017	1.02	< 0.0025	< 0.002
	2/22/2022	2.8	130	35	0.33	7.29	260	940	< 0.003	0.0019	0.09	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.033	0.551	0.05	< 0.002
	6/14/2022	2.5	110	22	0.35	7.06	210	610	< 0.003	0.0018	0.082	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.018	1.22	< 0.0025	< 0.002
	8/25/2022	2.7	110	20	0.42	7.31	170	750	< 0.003	0.0023	0.088	< 0.001	^1+ < 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.021	< 0.519	< 0.0025	< 0.002
	11/15/2022	3.2	110	19	0.47	7.41	160	600	< 0.003	0.0017	0.083	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.021	1.08	< 0.0025	< 0.002
	2/23/2023	3	110	17	0.35	7.54	190	680	< 0.003	0.0023	0.086	^1+ ^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.023	0.948	0.022	< 0.002
	4/26/2023	2.0	100	15	0.36	7.42	150	610	< 0.0030	0.0023	0.070	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.014	< 0.0002	0.019	< 0.422	< 0.0025	< 0.0020
	7/26/2023	2.5	110	16	0.42	7.60	170	610	< 0.0030	0.0022	0.083	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.018	< 0.00020	0.022	< 0.653	< 0.0025	< 0.0020
MW-09 down-gradient	11/11/2015	1.9	56	190	0.55	9.12	460	750	< 0.003	0.0047	0.027	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.14	-0.2208	< 0.0025	< 0.002
	2/17/2016	1.8	47	160	0.55	9.10	250	600	< 0.003	0.0051	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00065	< 0.01	< 0.0002	0.089	< 0.373	< 0.0025	< 0.002
	5/24/2016	1.6	48	180	0.51	8.79	240	640	< 0.003	0.0043	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00071	< 0.01	< 0.0002	0.079	0.508	< 0.0025	< 0.002
	8/9/2016	2.2	53	140	0.48	8.35	280	750	< 0.003	0.0052	0.031	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.14	0.639	< 0.0025	< 0.002
	10/26/2016	2.2	33	130	0.81	9.16	230	660	< 0.003	0.0069	0.019	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.11	0.608	< 0.0025	< 0.002
	1/31/2017	2.0	61	250	0.57	8.59	180	710	< 0.003	0.0063	0.038	* < 0.001	< 0.0005	< 0.005	< 0.0010	0.0014	< 0.01	^ < 0.0002	0.09	< 0.45	< 0.0025	< 0.002
	5/9/2017	1.8	66	340	0.38	8.58	250	900	< 0.003	0.0052	0.038	< 0.001	< 0.0005	< 0.005	< 0.0010	0.00054	< 0.01	< 0.0002	0.093	< 0.361	< 0.0025	< 0.002
	6/27/2017	1.9	64	330	0.51	7.76	240	940	< 0.003	0.0046	0.039	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.091	0.638	< 0.0025	< 0.002
	9/6/2017	1.8	59	310	0.51	8.98	240	890	< 0.003	0.0047	0.038	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.1	0.454	< 0.0025	< 0.002
	11/14/2017	2.6	160	270	0.51	8.1	290	910	< 0.003	0.0017	0.11	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	0.018	< 0.0002	0.026	< 0.372	0.0061	< 0.002
	5/1/2018	1.7	49	200	0.52	7.81	430	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2018 R	NA	NA	NA	NA	NA	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/2018	2.1	49	170	0.55	8.09	270	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	1.5	48	280	0.29	8.90	150	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	2.0	38	140	0.46	8.65	160	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2020	1.3	55	320	0.32	8.66	140	720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	2.0	43	240	0.55	8.64	180	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2021	1.6	67	360	0.39	8.74	180	900	< 0.003	0.0044	0.054	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.054	0.741	< 0.0025	< 0.002
	8/25/2021	1.9	60	360	0.43	9.06	210	800	< 0.003	0.0065	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.067	< 0.444	< 0.0025	< 0.002
	11/23/2021	1.1	30	290	0.47	8.73	210	900	< 0.003	0.0046	0.024	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.037	0.789	< 0.0025	< 0.002
	2/22/2022	1.5	49	250	0.4	8.65	160	900	< 0.003	0.007	0.037	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.0065	< 0.0002	0.051	< 0.409	< 0.0025	< 0.002
	6/15/2022	1.9	43	230	0.48	8.35	180	730	< 0.003	0.0071	0.036	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.057	< 0.39	< 0.0025	< 0.002
	8/25/2022	2.1	38	210	0.58	8.68	190	770	< 0.003	0.0089	0.034	< 0.001	^1+ < 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.065	1.22	< 0.0025	< 0.002
	11/16/2022	2.3	37	210	0.79	8.82	160	690	< 0.003	0.0094	0.036	^+ < 0.001	< 0.0005	< 0.005	< 0.001	0.00066	< 0.01	< 0.0002	0.067	< 0.51	< 0.0025	< 0.002
	2/23/2023	2	38	190	0.53	9.04	210	680	< 0.003	0.0086	0.029	^1+ ^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.065	< 0.614	< 0.0025	< 0.002
	4/26/2023	1.8	38	190	0.48	8.82	220	750	< 0.003	0.008	0.029	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.062	< 0.562	< 0.0025	< 0.002
	7/26/2023	2.0	44	190	0.49	8.83	250	720	< 0.0030	0.0087	0.036	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.074	< 0.733	< 0.0025	< 0.0020

Notes: All units are in mg/l except pH is in standard units and radium is in pCi/L
Italics Date - First round of Detection Monitoring and resample after statistical background establishment.
F1 - MS and/or MSD Recovery outside of limits.
NA - Not analyzed. No confirmation resample required.
R - Resample
V - Serial Dilution exceeds the control limits

^ - Instrument related QC is outside acceptance limits.
* - LCS or LCSD is outside acceptance limits.
^1+ or ^+ - Initial or Continuing Calibration Verification limits is outside acceptable limits, high biased.

Table 1. Groundwater Analytical Data, Pond 2S and Pond 3S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228 Combined	Selenium	Thallium
MW-10 down-gradient	11/10/2015	3.9	140	140	0.77	7.34	310	980	< 0.003	0.015	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.068	1.341	< 0.0025	< 0.002
	2/16/2016	3.6	150	240	0.79	7.29	290	950	< 0.003	0.014	0.098	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.075	0.952	< 0.0025	< 0.002
	5/25/2016	3.6	120	140	0.83	7.26	260	1,000	< 0.003	0.034	0.096	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00055	0.016	< 0.0002	0.065	0.51	< 0.0025	< 0.002
	8/10/2016	4.3	150	120	0.78	7.22	230	970	< 0.003	0.017	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.082	0.864	< 0.0025	< 0.002
	10/26/2016	3.0	160	74	0.52	7.30	220	1,000	< 0.003	0.022	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.030	0.458	< 0.0025	< 0.002
	2/2/2017	3.7	180	81	0.54	7.16	160	930	< 0.003	0.05	0.14	* < 0.001	< 0.0005	< 0.005	< 0.001	0.0013	0.02	^ < 0.0002	0.031	< 0.464	< 0.0025	< 0.002
	5/10/2017	3.0	150	100	0.44	7.83	340	860	< 0.003	0.02	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.066	0.882	< 0.0025	< 0.002
	6/27/2017	2.8	130	110	0.67	7.49	250	930	< 0.003	0.0072	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.080	0.953	< 0.0025	< 0.002
	9/7/2017	2.8	120	120	0.77	7.37	290	920	< 0.003	0.0076	0.086	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	0.00058	0.096	0.921	< 0.0025	< 0.002
	11/15/2017	4.1	140	120	0.77	7.10	270	1,000	< 0.003	0.015	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.071	0.893	< 0.0025	< 0.002
	5/1/2018	3.2	150	130	0.65	7.31	280	990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	2.5	110	140	0.89	7.60	200	860	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	2.8	100	140	0.82	7.53	260	860	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2019	3.7	120	110	0.93	7.21	190	940	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/27/2020	2.3	100	170	0.90	7.29	280	850	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	3.7	130	140	0.87	7.02	180	920	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/25/2021	3.0	160	130	0.62	7.16	160	910	< 0.003	0.018	0.18	^1+ < 0.001	< 0.0005	< 0.005	0.0013	0.0054	0.02	< 0.0002	0.036	< 1.14	< 0.0025	< 0.002
	8/26/2021	2.5	110	140	0.82	7.70	250	740	< 0.003	0.009	0.085	< 0.001	< 0.0005	< 0.005	< 0.001	0.00073	0.017	< 0.0002	0.12	1.48	< 0.0025	< 0.002
	11/23/2021	2.7	110	130	0.71	7.07	230	990	< 0.003	0.012	0.091	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	0.0011	0.013	< 0.0002	0.048	2.22	< 0.0025	< 0.002
	2/24/2022	2.6	130	120	0.53	7.02	170	840	< 0.003	0.0072	0.1	^1+ < 0.001	< 0.0005	< 0.005	0.0012	0.001	0.014	< 0.0002	0.043	0.768	< 0.0025	< 0.002
	6/14/2022	2.9	100	140	0.86	6.99	280	790	< 0.003	0.008	0.081	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.12	1.55	< 0.0025	< 0.002
	8/25/2022	2.6	130	140	0.99	7.47	280	910	< 0.003	0.019	0.11	< 0.001	^1+ < 0.0005	0.0053	0.001	0.0077	0.015	< 0.0002	0.12	1.2	< 0.0025	< 0.002
	9/28/2022 (R)	NA	NA	NA	NA	NA	NA	NA	NA	0.0088	NA	NA	NA	NA	NA	0.00093	NA	NA	NA	NA	NA	NA
	11/16/2022	4.4	130	160	0.94	7.15	220	910	< 0.003	0.015	0.1	^+ < 0.001	< 0.0005	< 0.005	< 0.001	0.002	0.018	< 0.0002	0.097	2.74	< 0.0025	< 0.002
	2/23/2023	3.7	140	140	0.71	7.11	250	930	< 0.003	0.015	0.12	^1+ ^+ < 0.001	< 0.0005	< 0.005	< 0.001	0.0008	0.016	< 0.0002	0.073	1.35	< 0.0025	< 0.002
	4/26/2023	2.8	99	150	0.94	7.23	250	900	< 0.0030	0.013	0.079	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00067	0.015	< 0.0002	0.12	1.37	< 0.0025	< 0.0020
	7/26/2023	3.7	120	150	0.81	7.37	260	910	< 0.0030	0.017	0.099	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.017	< 0.00020	0.097	0.959	< 0.0025	< 0.0020
MW-11 down-gradient	11/10/2015	2.6	120	89	0.61	7.60	180	620	< 0.003	0.007	0.098	< 0.001	< 0.0005	< 0.005	< 0.001	0.00064	< 0.01	< 0.0002	0.0600	0.736	< 0.0025	< 0.002
	2/16/2016	3.0	100	88	0.68	7.47	170	640	< 0.003	0.0059	0.11	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.078	1.14	< 0.0025	< 0.002
	5/25/2016	2.8	82	98	0.75	7.43	170	640	< 0.003	0.0073	0.093	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.083	0.775	< 0.0025	< 0.002
	8/10/2016	3.1	96	86	0.72	7.57	150	660	< 0.003	0.0072	0.12	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.087	0.807	< 0.0025	< 0.002
	10/26/2016	2.5	110	67	0.53	7.82	120	630	< 0.003	0.0082	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	0.00052	< 0.01	< 0.0002	0.043	0.51	< 0.0025	< 0.002
	2/1/2017	3.9	110	72	0.65	7.54	110	600	< 0.003	0.011	0.15	* < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.076	0.909	< 0.0025	< 0.002
	5/10/2017	3.1	95	84	0.46	8.37	170	590	< 0.003	0.014	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.074	1.03	< 0.0025	< 0.002
	6/27/2017	2.8	87	90	0.59	7.57	150	680	< 0.003	0.0058	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.069	0.692	< 0.0025	< 0.002
	9/7/2017	2.8	90	94	0.58	7.40	150	*730*	< 0.003	0.0074	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.067	0.676	< 0.0025	< 0.002
	11/15/2017	2.9	96	100	0.65	7.41	160	*750*	< 0.003	0.0082	0.15	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.075	1.04	< 0.0025	< 0.002
	5/3/2018	3.8	73	110	0.69	6.74	190	670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	3.1	78	110	0.66	7.65	120	680	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	2.2	86	110	0.49	7.55	120	610	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2019	2.5	100	80	0.55	7.26	91	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2020	2.3	89	100	0.54	7.4	90	540	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	4.3	85	140	0.72	7.17	68	710	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/25/2021	3.8	94	130	0.74	7.68	57	660	< 0.003	0.0067	0.16	^1+< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.077	1.29	< 0.0025	< 0.002
	8/26/2021	1.9	110	150	0.39	7.73	100	710	< 0.003	0.0076	0.1	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.034	1.29	< 0.0025	< 0.002
	11/23/2021	2.0	130	150	0.48	6.94	94	810	< 0.003	0.0085	0.11	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.025	2.35	< 0.0025	< 0.002
	12/22/2021 R	NA	NA	150	NA	7.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/23/2022	1.8	130	150	0.38	6.94	91	760	< 0.003	0.013	0.12	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	0.0006	0.011	< 0.0002	0.031	1.65	< 0.0025	< 0.002
	6/13/2022	2.8	120	140	0.4	7.22	97	700	< 0.003	0.0088	0.17	< 0.001	< 0.0005	< 0.005	0.0022	0.0018	0.011	< 0.0002	0.058	1.44	< 0.0025	< 0.002
	8/23/2022	2.5	110	140	0.53	6.94	160	740	< 0.003	0.0082	0.12	< 0.001	^1+ < 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.033	2.02	< 0.0025	< 0.002
	11/16/2022	3.8	120	130	0.71	7.34	66	700	< 0.003	0.013	0.14	^+ < 0.001	< 0.0005	< 0.005	0.0015	0.0014	0.01	< 0.0002	0.052	1.61	< 0.0025	< 0.002
	2/21/2023	2.2	120	130	0.45	7.08	81	710	< 0.003	0.016	0.18	< 0.001	< 0.0005	< 0.005	< 0.001	0.00096	< 0.01	< 0.0002	0.037	1.57	< 0.0025	< 0.002
	4/25/2023	2.8	110	130	0.53	7.14	75	730	< 0.0030	0.015	0.18	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.043	< 0.734	< 0.0025	< 0.0020
	7/25/2023	2.2	120	120	0.46	7.12	80	740	< 0.0030	0.0077	0.14	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.031	1.02	< 0.0025	< 0.0020
MW-12 down-gradient	11/10/2015	2.3	150	160	0.59	7.44	290	1,000	< 0.003	0.0016	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.034	0.8139	< 0.0025	< 0.002
	2/16/2016	1.8	130	140	0.52	7.38	220	850	< 0.003	0.0013	0.084	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.031	< 0.407	< 0.0025	< 0.002
	5/25/2016	1.9	130	150	0.54	7.23	250	890	< 0.003	0.0013	0.12	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00063	0.014	< 0.0002	0.03	0.41	0.0026	< 0.002
	8/10/2016	2.4	170	140	0.49	7.20	280	1000	< 0.003	0.0017	0.12	< 0.001	< 0.0005	< 0.005	< 0.001	0.0006	0.017	< 0.0002	0.04	< 0.426	0.0077	< 0.002
	10/26/2016	2.6	140	120	0.49	7.44	220	980	< 0.003	0.0016	0.11	< 0.001	< 0.0005	0.025	< 0.001	< 0.0005	0.013	< 0.0002	0.036	< 0.664	< 0.0025	< 0.002
	2/1/2017	2.0	160	120	0.48	7.30	150	900	< 0.003	0.0017	0.11	* < 0.001	< 0.0005	< 0.005	< 0.001	0.00065	0.013	< 0.0002	0.023	0.949	< 0.0025	< 0.002
	5/10/2017	2.3	200	240	0.30	7.65	260	1,300	< 0.003	0.0013	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.029	< 0.464	0.017	< 0.002
	6/27/2017	2.4	180	280	0.44	7.31	260	1,300	< 0.003	0.0014	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.03	0.455	0.0032	< 0.002
	9/6/2017	2.6	190	270	0.49	7.26	260	1,400	< 0.003	0.0017	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.032	< 0.317	0.0043	< 0.002
	11/15/2017	1.7	55	200	0.47	6.90	250	1,200	< 0.003	0.0054	0.034	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.11	0.434	< 0.0025	< 0.002
	5/3/2018	1.8	140	170	0.47	6.60	170	960	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/2018	F1 2.2	150	160	0.49	7.30	170	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	1.9	140	140	0.42	7.23	190	930	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2019	2.1	140	71	0.53	7.02	110	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/22/2020	1.9	180	120	0.4	6.95	140	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	2.2	160	190	0.52	7.27	160	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/25/2021	1.8	140	170	0.49	7.37	180	930	< 0.003	0.0017	0.14	^1+ < 0.001	< 0.0005	< 0.005	0.001	< 0.00085	0.014	< 0.0002	0.029	0.529	< 0.0025	< 0.002
	8/26/2021	2.1	170	200	0.47	7.49	170	1000	< 0.003	0.002	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.027	1.03	< 0.0025	< 0.002
	11/23/2021	2.3	180	210	0.44	7.01	180	1200	< 0.003	0.002	0.15	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.022	0.58	0.0055	< 0.002
	2/24/2022	1.7	150	150	0.4	7.06	150	1000	< 0.003	0.0025	0.27	^1+ < 0.001	< 0.0005	< 0.005	0.0011	0.0016	0.018	< 0.0002	0.024	< 1.62	0.0061	< 0.002
	6/13/2022	1.9	160	^+ 210	0.45	7.03	170	1000	< 0.003	0.0015	0.15	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.024	0.957	0.0045	< 0.002
	8/23/2022	1.9	150	170	0.37	6.62	160	1000	< 0.003	0.0011	0.18	< 0.001	^1+ < 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.015	0.709	0.0086	< 0.002
	11/16/2022	2.3	160	180	0.97	7.34	180	1000	< 0.003	0.0017	0.14	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.029	< 0.139	< 0.0025	< 0.002
	2/21/2023	1.6	150	150	0.41	7.15	180	980	< 0.003	0.0015	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.025	< 0.651	< 0.0025	< 0.002
	4/25/2023	1.8	150	170	0.42	6.91	180	980	< 0.0030	0.0017	0.12	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.012	< 0.0002	0.022	< 0.510	0.0044	< 0.0020
	7/25/2023	2.1	180	180	0.44	6.96	190	1100	< 0.0030	0.0017	0.13	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.017	< 0.00020	0.026	< 0.664	0.018	< 0.0020

Notes: All units are in mg/l except pH is in standard units and radium is in pCi/L

Italics Date - First round of Detection Monitoring and resample after statistical background establishment.

F1 - MS and/or MSD Recovery outside of limits.

NA - Not analyzed. No confirmation resample required.

R - Resample

V - Serial Dilution exceeds the control limits

^ - Instrument related QC is outside acceptance limits.

* - LCS or LCSD is outside acceptance limits.

^1+ or ^+ - Initial or Continuing Calibration Verification limits is outside acceptable limits, high biased.

Table 2. Groundwater Turbidity - Ponds 2S and 3S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well ID	Date	Turbidity (NTU)
MW-05	2/23/2021	0.63
	4/10/2021	1.28
	4/25/2021	2.41
	5/24/2021	3.78
	6/11/2021	2.4
	6/28/2021	2.89
	7/12/2021	3.93
	8/4/2021	1.35
	8/24/2021	3.5
	9/24/2021	3.59
	11/23/2021	4.45
	2/24/2022	0.37
	6/16/2022	1.76
	8/25/2022	2.99
	11/15/2022	38.9
	2/23/2023	2.18
	4/26/2023	1.6
	7/26/2023	7.1
MW-06	2/23/2021	0.31
	4/10/2021	11.17
	4/25/2021	15.04
	5/24/2021	5.18
	6/11/2021	2.96
	6/29/2021	4.06
	7/12/2021	6.43
	8/4/2021	3.5
	8/24/2021	7.0
	9/24/2021	4.2
	11/23/2021	6.38
	2/22/2022	0.47
	6/14/2022	3.87
	8/25/2022	2.6
	11/16/2022	8.12
	2/23/2023	10.08
	4/26/2023	47.6
	7/26/2023	3.7
MW-09	3/1/2021	0.86
	4/10/2021	6.91
	4/25/2021	2.08
	5/25/2021	14.12
	6/11/2021	2.39
	6/29/2021	2.97
	7/12/2021	3.94
	8/4/2021	0.0
	8/25/2021	19.9
	9/24/2021	3.67
	11/23/2021	19.07
	2/22/2022	0.59
	6/15/2022	113.77
	8/25/2022	1.93
	11/16/2022	11.73
	2/23/2023	10.34
	4/27/2023	2.9
	7/26/2023	6.5
MW-10	2/25/2021	172.14
	4/10/2021	29.99
	4/25/2021	34.77
	5/25/2021	44.14
	6/11/2021	92.03
	6/29/2021	29.35
	7/12/2021	23.45
	8/4/2021	47.68
	8/26/2021	27.5
	9/24/2021	542
	11/23/2021	312.05
	2/24/2022	72.18
	6/14/2022	55.5
	8/25/2022	8.83
	11/16/2022	32.4
	2/23/2023	53.32
	4/26/2023	85.3
	7/26/2023	1.4
MW-11	4/10/2021	269.25
	4/25/2021	60.28
	5/25/2021	9.56
	6/11/2021	77.09
	6/29/2021	7.43
	7/12/2021	39.12
	8/4/2021	9.53
	8/26/2021	11.4
	9/24/2021	9.68
	11/23/2021	1.85
	2/23/2022	162.43
	6/13/2022	27.05
	8/23/2022	10.9
	11/16/2022	60.3
	2/21/2023	51.3
	4/25/2023	56.6
	7/25/2023	1.0
MW-12	4/10/2021	31.67
	4/25/2021	15.04
	5/25/2021	28.65
	6/11/2021	6.1
	6/29/2021	13.04
	7/12/2021	12.99
	8/4/2021	11.97
	8/26/2021	10.9
	9/24/2021	11.97
	11/23/2021	3.88
	2/24/2022	82.8
	6/13/2022	4.24
	8/23/2022	7.35
	11/16/2022	2.85
	2/21/2023	1.82
	4/25/2023	2.1
	7/25/2023	6.8

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: James Thorne
Midwest Generation EME LLC
1800 Channahon Road
Joliet, Illinois 60436

Generated 8/16/2023 3:31:58 PM

JOB DESCRIPTION

Will County 2S/3S CCR
Quarterly GW Monitoring

JOB NUMBER

500-237220-1

Eurofins Chicago
2417 Bond Street
University Park IL 60484

See page two for job notes and contact information.

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Chicago Project Manager.

Authorization

Generated
8/16/2023 3:31:58 PM

Authorized for release by
Diana Mockler, Project Manager I
Diana.Mockler@et.eurofinsus.com
(219)252-7570

Table of Contents

Job ID: 500-237220-1

Laboratory: Eurofins Chicago

Narrative

Job Narrative
500-237220-1

Receipt
The samples were received on 7/26/2023 4:40 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.7º C, 2.5º C and 5.4º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Method Summary

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS)	SW846	EET CHI
7470A	Mercury (CVAA)	SW846	EET CHI
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET CHI
SM 4500 Cl- E	Chloride, Total	SM	EET CHI
SM 4500 F C	Fluoride	SM	EET CHI
SM 4500 SO4 E	Sulfate, Total	SM	EET CHI
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	EET CHI
7470A	Preparation, Mercury	SW846	EET CHI

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET CHI = Eurofins Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-237220-1	MW-05	Water	07/26/23 08:49	07/26/23 16:40
500-237220-2	MW-06	Water	07/26/23 10:56	07/26/23 16:40
500-237220-3	MW-09	Water	07/26/23 13:10	07/26/23 16:40
500-237220-4	MW-10	Water	07/26/23 11:55	07/26/23 16:40
500-237220-5	MW-11	Water	07/25/23 10:55	07/26/23 16:40
500-237220-6	MW-12	Water	07/25/23 10:03	07/26/23 16:40
500-237220-7	2S/3S Duplicate	Water	07/26/23 00:00	07/26/23 16:40

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-05

Date Collected: 07/26/23 08:49
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-1

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 00:52	1
Arsenic	**0.0014**		0.0010		mg/L		08/01/23 09:15	08/03/23 00:52	1
Barium	**0.061**		0.0025		mg/L		08/01/23 09:15	08/03/23 00:52	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:52	1
Boron	**4.8**		1.0		mg/L		08/01/23 09:15	08/04/23 12:53	20
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:52	1
Calcium	**180**		0.20		mg/L		08/01/23 09:15	08/03/23 00:52	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 00:52	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:52	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:52	1
Lithium	**0.021**		0.010		mg/L		08/01/23 09:15	08/04/23 14:29	1
Molybdenum	**0.053**		0.0050		mg/L		08/01/23 09:15	08/03/23 00:52	1
Selenium	**0.070**		0.0025		mg/L		08/01/23 09:15	08/03/23 00:52	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 00:52	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1200**		10		mg/L			08/01/23 11:26	1
Chloride (SM 4500 Cl- E)	**18**		2.0		mg/L			07/28/23 12:42	1
Fluoride (SM 4500 F C)	**0.50**		0.10		mg/L			07/27/23 11:22	1
Sulfate (SM 4500 SO4 E)	**440**		100		mg/L			07/27/23 14:05	20

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-06

Date Collected: 07/26/23 10:56
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-2

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 00:56	1
Arsenic	**0.0022**		0.0010		mg/L		08/01/23 09:15	08/03/23 00:56	1
Barium	**0.083**		0.0025		mg/L		08/01/23 09:15	08/03/23 00:56	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:56	1
Boron	**2.5**		0.50		mg/L		08/01/23 09:15	08/04/23 12:56	10
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:56	1
Calcium	**110**		0.20		mg/L		08/01/23 09:15	08/03/23 00:56	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 00:56	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:56	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:56	1
Lithium	**0.018**		0.010		mg/L		08/01/23 09:15	08/04/23 14:33	1
Molybdenum	**0.022**		0.0050		mg/L		08/01/23 09:15	08/03/23 00:56	1
Selenium	<0.0025		0.0025		mg/L		08/01/23 09:15	08/03/23 00:56	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 00:56	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**610**		10		mg/L			08/01/23 11:30	1
Chloride (SM 4500 Cl- E)	**16**		2.0		mg/L			07/28/23 12:42	1
Fluoride (SM 4500 F C)	**0.42**		0.10		mg/L			07/27/23 11:35	1
Sulfate (SM 4500 SO4 E)	**170**		50		mg/L			07/27/23 14:06	10

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-09

Date Collected: 07/26/23 13:10
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-3

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 00:59	1
Arsenic	**0.0087**		0.0010		mg/L		08/01/23 09:15	08/03/23 00:59	1
Barium	**0.036**		0.0025		mg/L		08/01/23 09:15	08/03/23 00:59	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:59	1
Boron	**2.0**		0.50		mg/L		08/01/23 09:15	08/04/23 13:00	10
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:59	1
Calcium	**44**		0.20		mg/L		08/01/23 09:15	08/03/23 00:59	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 00:59	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:59	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:59	1
Lithium	<0.010		0.010		mg/L		08/01/23 09:15	08/04/23 14:36	1
Molybdenum	**0.074**		0.0050		mg/L		08/01/23 09:15	08/03/23 00:59	1
Selenium	<0.0025		0.0025		mg/L		08/01/23 09:15	08/03/23 00:59	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 00:59	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**720**		10		mg/L			08/01/23 11:34	1
Chloride (SM 4500 Cl- E)	**190**		20		mg/L			07/28/23 12:42	10
Fluoride (SM 4500 F C)	**0.49**		0.10		mg/L			07/27/23 11:40	1
Sulfate (SM 4500 SO4 E)	**250**		50		mg/L			07/27/23 14:06	10

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-10

Date Collected: 07/26/23 11:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-4

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 01:03	1
Arsenic	**0.017**		0.0010		mg/L		08/01/23 09:15	08/03/23 01:03	1
Barium	**0.099**		0.0025		mg/L		08/01/23 09:15	08/03/23 01:03	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:03	1
Boron	**3.7**		0.50		mg/L		08/01/23 09:15	08/04/23 13:03	10
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:03	1
Calcium	**120**		0.20		mg/L		08/01/23 09:15	08/03/23 01:03	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 01:03	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:03	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:03	1
Lithium	**0.017**		0.010		mg/L		08/01/23 09:15	08/04/23 14:39	1
Molybdenum	**0.097**		0.0050		mg/L		08/01/23 09:15	08/03/23 01:03	1
Selenium	<0.0025		0.0025		mg/L		08/01/23 09:15	08/03/23 01:03	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 01:03	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**910**		10		mg/L			08/01/23 11:38	1
Chloride (SM 4500 Cl- E)	**150**		20		mg/L			07/28/23 12:43	10
Fluoride (SM 4500 F C)	**0.81**		0.10		mg/L			07/27/23 11:44	1
Sulfate (SM 4500 SO4 E)	**260**		50		mg/L			07/27/23 14:06	10

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-11

Date Collected: 07/25/23 10:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-5

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 01:06	1
Arsenic	**0.0077**		0.0010		mg/L		08/01/23 09:15	08/03/23 01:06	1
Barium	**0.14**		0.0025		mg/L		08/01/23 09:15	08/03/23 01:06	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:06	1
Boron	**2.2**		0.50		mg/L		08/01/23 09:15	08/04/23 13:06	10
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:06	1
Calcium	**120**		0.20		mg/L		08/01/23 09:15	08/03/23 01:06	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 01:06	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:06	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:06	1
Lithium	<0.010		0.010		mg/L		08/01/23 09:15	08/04/23 14:43	1
Molybdenum	**0.031**		0.0050		mg/L		08/01/23 09:15	08/03/23 01:06	1
Selenium	<0.0025		0.0025		mg/L		08/01/23 09:15	08/03/23 01:06	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 01:06	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**740**		10		mg/L			07/28/23 09:40	1
Chloride (SM 4500 Cl- E)	**120**		20		mg/L			07/28/23 12:43	10
Fluoride (SM 4500 F C)	**0.46**		0.10		mg/L			07/27/23 11:48	1
Sulfate (SM 4500 SO4 E)	**80**		50		mg/L			07/27/23 14:08	10

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-12

Date Collected: 07/25/23 10:03
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-6

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 01:09	1
Arsenic	**0.0017**		0.0010		mg/L		08/01/23 09:15	08/03/23 01:09	1
Barium	**0.13**		0.0025		mg/L		08/01/23 09:15	08/03/23 01:09	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:09	1
Boron	**2.1**		0.50		mg/L		08/01/23 09:15	08/04/23 13:10	10
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:09	1
Calcium	**180**		0.20		mg/L		08/01/23 09:15	08/03/23 01:09	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 01:09	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:09	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:09	1
Lithium	**0.017**		0.010		mg/L		08/01/23 09:15	08/04/23 14:46	1
Molybdenum	**0.026**		0.0050		mg/L		08/01/23 09:15	08/03/23 01:09	1
Selenium	**0.018**		0.0025		mg/L		08/01/23 09:15	08/03/23 01:09	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 01:09	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1100**		10		mg/L			07/28/23 09:12	1
Chloride (SM 4500 Cl- E)	**180**		20		mg/L			07/28/23 12:44	10
Fluoride (SM 4500 F C)	**0.44**		0.10		mg/L			07/27/23 11:53	1
Sulfate (SM 4500 SO4 E)	**190**		50		mg/L			07/27/23 14:08	10

Client Sample Results

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: 2S/3S Duplicate

Date Collected: 07/26/23 00:00
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-7

Matrix: Water

Method: SW846 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 01:13	1
Arsenic	**0.0013**		0.0010		mg/L		08/01/23 09:15	08/03/23 01:13	1
Barium	**0.062**		0.0025		mg/L		08/01/23 09:15	08/03/23 01:13	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:13	1
Boron	**4.8**		1.0		mg/L		08/01/23 09:15	08/04/23 13:13	20
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:13	1
Calcium	**180**		0.20		mg/L		08/01/23 09:15	08/03/23 01:13	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 01:13	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 01:13	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 01:13	1
Lithium	**0.021**		0.010		mg/L		08/01/23 09:15	08/04/23 14:50	1
Molybdenum	**0.053**		0.0050		mg/L		08/01/23 09:15	08/03/23 01:13	1
Selenium	**0.069**		0.0025		mg/L		08/01/23 09:15	08/03/23 01:13	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 01:13	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**1200**		10		mg/L			08/01/23 11:40	1
Chloride (SM 4500 Cl- E)	**18**		2.0		mg/L			07/28/23 13:23	1
Fluoride (SM 4500 F C)	**0.50**		0.10		mg/L			07/27/23 12:08	1
Sulfate (SM 4500 SO4 E)	**430**		50		mg/L			07/27/23 17:00	10

Definitions/Glossary

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Metals

Prep Batch: 725771

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total Recoverable	Water	3005A	
500-237220-2	MW-06	Total Recoverable	Water	3005A	
500-237220-3	MW-09	Total Recoverable	Water	3005A	
500-237220-4	MW-10	Total Recoverable	Water	3005A	
500-237220-5	MW-11	Total Recoverable	Water	3005A	
500-237220-6	MW-12	Total Recoverable	Water	3005A	
500-237220-7	2S/3S Duplicate	Total Recoverable	Water	3005A	
MB 500-725771/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 500-725771/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 726205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total Recoverable	Water	6020A	725771
500-237220-2	MW-06	Total Recoverable	Water	6020A	725771
500-237220-3	MW-09	Total Recoverable	Water	6020A	725771
500-237220-4	MW-10	Total Recoverable	Water	6020A	725771
500-237220-5	MW-11	Total Recoverable	Water	6020A	725771
500-237220-6	MW-12	Total Recoverable	Water	6020A	725771
500-237220-7	2S/3S Duplicate	Total Recoverable	Water	6020A	725771
MB 500-725771/1-A	Method Blank	Total Recoverable	Water	6020A	725771
LCS 500-725771/2-A	Lab Control Sample	Total Recoverable	Water	6020A	725771

Analysis Batch: 726635

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total Recoverable	Water	6020A	725771
500-237220-1	MW-05	Total Recoverable	Water	6020A	725771
500-237220-2	MW-06	Total Recoverable	Water	6020A	725771
500-237220-2	MW-06	Total Recoverable	Water	6020A	725771
500-237220-3	MW-09	Total Recoverable	Water	6020A	725771
500-237220-3	MW-09	Total Recoverable	Water	6020A	725771
500-237220-4	MW-10	Total Recoverable	Water	6020A	725771
500-237220-4	MW-10	Total Recoverable	Water	6020A	725771
500-237220-5	MW-11	Total Recoverable	Water	6020A	725771
500-237220-5	MW-11	Total Recoverable	Water	6020A	725771
500-237220-6	MW-12	Total Recoverable	Water	6020A	725771
500-237220-6	MW-12	Total Recoverable	Water	6020A	725771
500-237220-7	2S/3S Duplicate	Total Recoverable	Water	6020A	725771
500-237220-7	2S/3S Duplicate	Total Recoverable	Water	6020A	725771
MB 500-725771/1-A	Method Blank	Total Recoverable	Water	6020A	725771
LCS 500-725771/2-A	Lab Control Sample	Total Recoverable	Water	6020A	725771

Prep Batch: 727487

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	7470A	
500-237220-2	MW-06	Total/NA	Water	7470A	
500-237220-3	MW-09	Total/NA	Water	7470A	
500-237220-4	MW-10	Total/NA	Water	7470A	
500-237220-5	MW-11	Total/NA	Water	7470A	
500-237220-6	MW-12	Total/NA	Water	7470A	
500-237220-7	2S/3S Duplicate	Total/NA	Water	7470A	
MB 500-727487/13-A	Method Blank	Total/NA	Water	7470A	

Metals (Continued)

Prep Batch: 727487 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 500-727487/12-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 727670

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	7470A	727487
500-237220-2	MW-06	Total/NA	Water	7470A	727487
500-237220-3	MW-09	Total/NA	Water	7470A	727487
500-237220-4	MW-10	Total/NA	Water	7470A	727487
500-237220-5	MW-11	Total/NA	Water	7470A	727487
500-237220-6	MW-12	Total/NA	Water	7470A	727487
500-237220-7	2S/3S Duplicate	Total/NA	Water	7470A	727487
MB 500-727487/13-A	Method Blank	Total/NA	Water	7470A	727487
LCS 500-727487/12-A	Lab Control Sample	Total/NA	Water	7470A	727487

General Chemistry

Analysis Batch: 725196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	SM 4500 F C	
500-237220-2	MW-06	Total/NA	Water	SM 4500 F C	
500-237220-3	MW-09	Total/NA	Water	SM 4500 F C	
500-237220-4	MW-10	Total/NA	Water	SM 4500 F C	
500-237220-5	MW-11	Total/NA	Water	SM 4500 F C	
500-237220-6	MW-12	Total/NA	Water	SM 4500 F C	
500-237220-7	2S/3S Duplicate	Total/NA	Water	SM 4500 F C	
MB 500-725196/3	Method Blank	Total/NA	Water	SM 4500 F C	
LCS 500-725196/4	Lab Control Sample	Total/NA	Water	SM 4500 F C	
500-237220-1 MS	MW-05	Total/NA	Water	SM 4500 F C	
500-237220-1 MSD	MW-05	Total/NA	Water	SM 4500 F C	

Analysis Batch: 725237

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	SM 4500 SO4 E	
500-237220-2	MW-06	Total/NA	Water	SM 4500 SO4 E	
500-237220-3	MW-09	Total/NA	Water	SM 4500 SO4 E	
500-237220-4	MW-10	Total/NA	Water	SM 4500 SO4 E	
500-237220-5	MW-11	Total/NA	Water	SM 4500 SO4 E	
500-237220-6	MW-12	Total/NA	Water	SM 4500 SO4 E	
500-237220-7	2S/3S Duplicate	Total/NA	Water	SM 4500 SO4 E	
MB 500-725237/133	Method Blank	Total/NA	Water	SM 4500 SO4 E	
MB 500-725237/97	Method Blank	Total/NA	Water	SM 4500 SO4 E	
LCS 500-725237/134	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
LCS 500-725237/98	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	

Analysis Batch: 725326

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-5	MW-11	Total/NA	Water	SM 2540C	
500-237220-6	MW-12	Total/NA	Water	SM 2540C	
MB 500-725326/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-725326/2	Lab Control Sample	Total/NA	Water	SM 2540C	
500-237220-6 MS	MW-12	Total/NA	Water	SM 2540C	

General Chemistry

Analysis Batch: 725450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	SM 4500 Cl- E	
500-237220-2	MW-06	Total/NA	Water	SM 4500 Cl- E	
500-237220-3	MW-09	Total/NA	Water	SM 4500 Cl- E	
500-237220-4	MW-10	Total/NA	Water	SM 4500 Cl- E	
500-237220-5	MW-11	Total/NA	Water	SM 4500 Cl- E	
500-237220-6	MW-12	Total/NA	Water	SM 4500 Cl- E	
500-237220-7	2S/3S Duplicate	Total/NA	Water	SM 4500 Cl- E	
MB 500-725450/4	Method Blank	Total/NA	Water	SM 4500 Cl- E	
MB 500-725450/46	Method Blank	Total/NA	Water	SM 4500 Cl- E	
LCS 500-725450/47	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
LCS 500-725450/5	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 725803

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	SM 2540C	
500-237220-2	MW-06	Total/NA	Water	SM 2540C	
500-237220-3	MW-09	Total/NA	Water	SM 2540C	
500-237220-4	MW-10	Total/NA	Water	SM 2540C	
500-237220-7	2S/3S Duplicate	Total/NA	Water	SM 2540C	
MB 500-725803/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-725803/2	Lab Control Sample	Total/NA	Water	SM 2540C	
500-237220-1 MS	MW-05	Total/NA	Water	SM 2540C	
500-237220-2 DU	MW-06	Total/NA	Water	SM 2540C	
500-237220-3 DU	MW-09	Total/NA	Water	SM 2540C	

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 500-725771/1-A
Matrix: Water
Analysis Batch: 726205

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 725771

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		08/01/23 09:15	08/03/23 00:07	1
Arsenic	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:07	1
Barium	<0.0025		0.0025		mg/L		08/01/23 09:15	08/03/23 00:07	1
Beryllium	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:07	1
Boron	<0.050		0.050		mg/L		08/01/23 09:15	08/03/23 00:07	1
Cadmium	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:07	1
Calcium	<0.20		0.20		mg/L		08/01/23 09:15	08/03/23 00:07	1
Chromium	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 00:07	1
Cobalt	<0.0010		0.0010		mg/L		08/01/23 09:15	08/03/23 00:07	1
Lead	<0.00050		0.00050		mg/L		08/01/23 09:15	08/03/23 00:07	1
Molybdenum	<0.0050		0.0050		mg/L		08/01/23 09:15	08/03/23 00:07	1
Selenium	<0.0025		0.0025		mg/L		08/01/23 09:15	08/03/23 00:07	1
Thallium	<0.0020		0.0020		mg/L		08/01/23 09:15	08/03/23 00:07	1

Lab Sample ID: MB 500-725771/1-A
Matrix: Water
Analysis Batch: 726635

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 725771

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<0.050		0.050		mg/L		08/01/23 09:15	08/04/23 12:46	1
Lithium	<0.010		0.010		mg/L		08/01/23 09:15	08/04/23 12:46	1

Lab Sample ID: LCS 500-725771/2-A
Matrix: Water
Analysis Batch: 726205

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 725771

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.500	0.510		mg/L		102	80 - 120
Arsenic	0.100	0.0877		mg/L		88	80 - 120
Barium	2.00	1.99		mg/L		99	80 - 120
Beryllium	0.0500	0.0511		mg/L		102	80 - 120
Boron	1.00	1.07		mg/L		107	80 - 120
Cadmium	0.0500	0.0503		mg/L		101	80 - 120
Calcium	10.0	10.6		mg/L		106	80 - 120
Chromium	0.200	0.211		mg/L		106	80 - 120
Cobalt	0.500	0.530		mg/L		106	80 - 120
Lead	0.100	0.107		mg/L		107	80 - 120
Molybdenum	1.00	0.978		mg/L		98	80 - 120
Selenium	0.100	0.0964		mg/L		96	80 - 120
Thallium	0.100	0.108		mg/L		108	80 - 120

Lab Sample ID: LCS 500-725771/2-A
Matrix: Water
Analysis Batch: 726635

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 725771

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Boron	1.00	1.02		mg/L		102	80 - 120
Lithium	0.500	0.508		mg/L		102	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-727487/13-A
Matrix: Water
Analysis Batch: 727670

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 727487

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		08/11/23 10:00	08/14/23 08:40	1

Lab Sample ID: LCS 500-727487/12-A
Matrix: Water
Analysis Batch: 727670

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 727487

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00201	0.00201		mg/L		100	80 - 120

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 500-725326/1
Matrix: Water
Analysis Batch: 725326

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10		mg/L			07/28/23 09:08	1

Lab Sample ID: LCS 500-725326/2
Matrix: Water
Analysis Batch: 725326

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	250	286		mg/L		114	80 - 120

Lab Sample ID: 500-237220-6 MS
Matrix: Water
Analysis Batch: 725326

Client Sample ID: MW-12
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1100		250	1380	4	mg/L		111	75 - 125

Lab Sample ID: MB 500-725803/1
Matrix: Water
Analysis Batch: 725803

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10		mg/L			08/01/23 11:23	1

Lab Sample ID: LCS 500-725803/2
Matrix: Water
Analysis Batch: 725803

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	250	294		mg/L		118	80 - 120

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: 500-237220-1 MS
Matrix: Water
Analysis Batch: 725803

Client Sample ID: MW-05
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1200		250	1440	4	mg/L		114	75 - 125

Lab Sample ID: 500-237220-2 DU
Matrix: Water
Analysis Batch: 725803

Client Sample ID: MW-06
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	610		608		mg/L		0.7	5

Lab Sample ID: 500-237220-3 DU
Matrix: Water
Analysis Batch: 725803

Client Sample ID: MW-09
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	720		720		mg/L		0.6	5

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 500-725450/4
Matrix: Water
Analysis Batch: 725450

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0		mg/L			07/28/23 12:38	1

Lab Sample ID: MB 500-725450/46
Matrix: Water
Analysis Batch: 725450

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0		mg/L			07/28/23 13:23	1

Lab Sample ID: LCS 500-725450/47
Matrix: Water
Analysis Batch: 725450

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	20.0	20.1		mg/L		100	85 - 115

Lab Sample ID: LCS 500-725450/5
Matrix: Water
Analysis Batch: 725450

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	20.0	20.1		mg/L		101	85 - 115

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-725196/3
Matrix: Water
Analysis Batch: 725196

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.10		0.10		mg/L			07/27/23 11:14	1

Lab Sample ID: LCS 500-725196/4
Matrix: Water
Analysis Batch: 725196

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Fluoride			10.0	10.3		mg/L		103	90 - 119		

Lab Sample ID: 500-237220-1 MS
Matrix: Water
Analysis Batch: 725196

Client Sample ID: MW-05
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Fluoride	0.50		5.00	5.56		mg/L		101	75 - 125		

Lab Sample ID: 500-237220-1 MSD
Matrix: Water
Analysis Batch: 725196

Client Sample ID: MW-05
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Fluoride	0.50		5.00	5.53		mg/L		101	75 - 125	1	20

Method: SM 4500 SO4 E - Sulfate, Total

Lab Sample ID: MB 500-725237/133
Matrix: Water
Analysis Batch: 725237

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			07/27/23 16:59	1

Lab Sample ID: MB 500-725237/97
Matrix: Water
Analysis Batch: 725237

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			07/27/23 14:00	1

Lab Sample ID: LCS 500-725237/134
Matrix: Water
Analysis Batch: 725237

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Sulfate			20.0	20.9		mg/L		104	88 - 123		

Method: SM 4500 SO4 E - Sulfate, Total (Continued)

Lab Sample ID: LCS 500-725237/98
Matrix: Water
Analysis Batch: 725237

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Sulfate			20.0	20.8		mg/L		104	88 - 123		

Eurofins Chicago
2417 Bond Street
University Park IL 60484
Phone 708-534-5200 Fax 708-534-5211

Chain of Custody Record

eurofins Environment Testing

500-237220 COC

Client Information	Sampler: IAN JOHN HONIESON	Lab PM: Mockler Diana J	COC No: 500-114451-45942 1
Client Contact: Patrick Allenstein	Phone: 630 325 1300	E-Mail: Diana Mockler@et.eurofinsus com	Page: Page 1 of 1
Company: KPRG and Associates Inc	PWSID:	Analysis Requested	Job #: 500-237220
Address: 14665 West Lisbon Road Suite 1A	Due Date Requested:		
City: Brookfield	TAT Requested (days):		
State Zip: WI 53005	Compliance Project: Δ Yes Δ No		
Phone:	PO #: 4502116506		
Email: patricka@kprginc com	WO #:		
Project Name: Will County 2S/3S Event Desc Quarterly GW Monitoring CCR	Project #: 50011609		
Site: Illinois	SSOW#:		

Preservation Codes
A HCL, B NaOH, C Zn Acetate, D Nitric Acid, E NaHSO4, F MeOH, G Amchlor, H Ascorbic Acid, I Ice, J DI Water, K EDTA, L EDA
M Hexane, N None, O AsNaO2, P Na2O4S, Q Na2SO3, R Na2S2O3, S H2SO4, T TSP Dodecahydrate, U Acetone, V MCAA, W pH 4-5, Y Trizma, Z other (specify)
Other:

	Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, 904.0	6010C, 6020A, 7470A	2540C, 4500_F_C, SM4500_Cl_E, SM4500_SO4_E	Total Number of containers	Special Instructions/Note
					Preservation Code:			D	D	N		
1	MW-05	7-26-23	08:49	G	Water	N	N	X	X	X	5	
2	MW-06	7-26-23	10:56	G	Water	N	N	X	X	X	5	
3	MW-09	7-26-23	13:10	G	Water	N	N	X	X	X	5	
4	MW-10	7-26-23	11:55	G	Water	N	N	X	X	X	5	
5	MW-11	7-25-23	10:55	G	Water	N	N	X	X	X	5	
6	MW-12	7-25-23	10:03	G	Water	N	N	X	X	X	5	
7	2S/3S Duplicate	7-26-23	—	G	Water	N	N	X	X	X	5	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested I II III IV Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date	Time	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	7-26-23 16:40	KPRG	Stephanie Hernandez	7/26/23 1640	EETA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No | Cooler Temperature(s) °C and Other Remarks: 2.1+1.7, 2.9+2.5, 5.8+5.4

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: Midwest Generation EME LLC

Job Number: 500-237220-1

Login Number: 237220
List Number: 1
Creator: Hernandez, Stephanie

List Source: Eurofins Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.7,2.5,5.4
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-05

Date Collected: 07/26/23 08:49
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 00:52
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		20	726635	FXG	EET CHI	08/04/23 12:53
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:29
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:47
Total/NA	Analysis	SM 2540C		1	725803	MB	EET CHI	08/01/23 11:26
Total/NA	Analysis	SM 4500 Cl- E		1	725450	MM	EET CHI	07/28/23 12:42
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 11:22
Total/NA	Analysis	SM 4500 SO4 E		20	725237	MM	EET CHI	07/27/23 14:05

Client Sample ID: MW-06

Date Collected: 07/26/23 10:56
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 00:56
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		10	726635	FXG	EET CHI	08/04/23 12:56
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:33
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:49
Total/NA	Analysis	SM 2540C		1	725803	MB	EET CHI	08/01/23 11:30
Total/NA	Analysis	SM 4500 Cl- E		1	725450	MM	EET CHI	07/28/23 12:42
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 11:35
Total/NA	Analysis	SM 4500 SO4 E		10	725237	MM	EET CHI	07/27/23 14:06

Client Sample ID: MW-09

Date Collected: 07/26/23 13:10
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 00:59
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		10	726635	FXG	EET CHI	08/04/23 13:00
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:36
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:51

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-09

Date Collected: 07/26/23 13:10
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	SM 2540C		1	725803	MB	EET CHI	08/01/23 11:34
Total/NA	Analysis	SM 4500 Cl- E		10	725450	MM	EET CHI	07/28/23 12:42
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 11:40
Total/NA	Analysis	SM 4500 SO4 E		10	725237	MM	EET CHI	07/27/23 14:06

Client Sample ID: MW-10

Date Collected: 07/26/23 11:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 01:03
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		10	726635	FXG	EET CHI	08/04/23 13:03
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:39
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:53
Total/NA	Analysis	SM 2540C		1	725803	MB	EET CHI	08/01/23 11:38
Total/NA	Analysis	SM 4500 Cl- E		10	725450	MM	EET CHI	07/28/23 12:43
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 11:44
Total/NA	Analysis	SM 4500 SO4 E		10	725237	MM	EET CHI	07/27/23 14:06

Client Sample ID: MW-11

Date Collected: 07/25/23 10:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 01:06
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		10	726635	FXG	EET CHI	08/04/23 13:06
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:43
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:55
Total/NA	Analysis	SM 2540C		1	725326	MB	EET CHI	07/28/23 09:40
Total/NA	Analysis	SM 4500 Cl- E		10	725450	MM	EET CHI	07/28/23 12:43
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 11:48
Total/NA	Analysis	SM 4500 SO4 E		10	725237	MM	EET CHI	07/27/23 14:08

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR

Job ID: 500-237220-1

Client Sample ID: MW-12

Lab Sample ID: 500-237220-6

Date Collected: 07/25/23 10:03

Matrix: Water

Date Received: 07/26/23 16:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 01:09
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		10	726635	FXG	EET CHI	08/04/23 13:10
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:46
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:57
Total/NA	Analysis	SM 2540C		1	725326	MB	EET CHI	07/28/23 09:12
Total/NA	Analysis	SM 4500 Cl- E		10	725450	MM	EET CHI	07/28/23 12:44
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 11:53
Total/NA	Analysis	SM 4500 SO4 E		10	725237	MM	EET CHI	07/27/23 14:08

Client Sample ID: 2S/3S Duplicate

Lab Sample ID: 500-237220-7

Date Collected: 07/26/23 00:00

Matrix: Water

Date Received: 07/26/23 16:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726205	FXG	EET CHI	08/03/23 01:13
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		20	726635	FXG	EET CHI	08/04/23 13:13
Total Recoverable	Prep	3005A			725771	BDE	EET CHI	08/01/23 09:15 - 08/01/23 09:45 [1]
Total Recoverable	Analysis	6020A		1	726635	FXG	EET CHI	08/04/23 14:50
Total/NA	Prep	7470A			727487	MJG	EET CHI	08/11/23 10:00 - 08/11/23 12:00 [1]
Total/NA	Analysis	7470A		1	727670	MJG	EET CHI	08/14/23 08:59
Total/NA	Analysis	SM 2540C		1	725803	MB	EET CHI	08/01/23 11:40
Total/NA	Analysis	SM 4500 Cl- E		1	725450	MM	EET CHI	07/28/23 13:23
Total/NA	Analysis	SM 4500 F C		1	725196	EH	EET CHI	07/27/23 12:08
Total/NA	Analysis	SM 4500 SO4 E		10	725237	MM	EET CHI	07/27/23 17:00

[1] This procedure uses a method stipulated length of time for the process. Both start and end times are displayed.

Laboratory References:

EET CHI = Eurofins Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: James Thorne
Midwest Generation EME LLC
1800 Channahon Road
Joliet IL 60436

Generated 8/24/2023 9:47 AM

JOB DESCRIPTION

Quarterly GW Monitoring
Will County 2S/3S CCR (RAD)

JOB NUMBER

500-237220-2

Eurofins Chicago
2417 Bond Street
University Park IL 60484

See page two for job notes and contact information.

Eurofins Chicago

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Chicago Project Manager.

Authorization

Generated
8/24/2023 9:47 AM

Authorized for release by
Diana J Mockler, Project Manager I
Diana.Mockler@et.eurofinsus.com
219 252-7570

Table of Contents

Table of Contents

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job Narrative
500-237220-2

Receipt
The samples were received on 7/26/2023 4:40 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.7°C, 2.5°C and 5.4°C

Gas Flow Proportional Counter
Method 903.0: Radium-226 batch 622153Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.MW-05 (500-237220-1), MW-06 (500-237220-2), MW-09 (500-237220-3), MW-10 (500-237220-4), MW-11 (500-237220-5), MW-12 (500-237220-6), 2S/3S Duplicate (500-237220-7), (LCS 160-622153/2-A), (MB 160-622153/1-A) and (500-237220-D-7-A DU)

Method 904.0: Radium-228 batch 622159Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.MW-05 (500-237220-1), MW-06 (500-237220-2), MW-09 (500-237220-3), MW-10 (500-237220-4), MW-11 (500-237220-5), MW-12 (500-237220-6), 2S/3S Duplicate (500-237220-7), (LCS 160-622159/2-A), (MB 160-622159/1-A) and (500-237220-D-7-B DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
Radium-226 Prep Batch 160-622153 The following sample was prepared at a reduced aliquot due to matrix. The sample 890-4998-1 was cloudy. The rest of the selected samples were slightly cloudy. MW-10 (500-237220-4)

Radium-228 Prep Batch 160-622159 The following sample was prepared at a reduced aliquot due to matrix. The sample 890-4998-1 was cloudy. The rest of the selected samples were slightly cloudy. MW-10 (500-237220-4)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample ID: MW-05
Date Collected: 07/26/23 08:49
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-1
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0672	U	0.0772	0.0775	1.00	0.126	pCi/L	07/31/23 10:32	08/22/23 08:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:19*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.756**		0.396	0.402	1.00	0.547	pCi/L	07/31/23 10:36	08/14/23 14:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*
Y Carrier	*87.5*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.823**		0.403	0.409	5.00	0.547	pCi/L		08/23/23 16:36	1

Client Sample ID: MW-06
Date Collected: 07/26/23 10:56
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-2
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.212**		0.111	0.112	1.00	0.123	pCi/L	07/31/23 10:32	08/22/23 08:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.1*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:20*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.139	U	0.318	0.318	1.00	0.653	pCi/L	07/31/23 10:36	08/14/23 14:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.1*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*
Y Carrier	*86.7*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0729	U	0.337	0.337	5.00	0.653	pCi/L		08/23/23 16:36	1

Client Sample ID: MW-09
Date Collected: 07/26/23 13:10
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-3
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.152**		0.0904	0.0914	1.00	0.114	pCi/L	07/31/23 10:32	08/22/23 08:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.7*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:20*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.140	U	0.413	0.413	1.00	0.733	pCi/L	07/31/23 10:36	08/14/23 14:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.7*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*
Y Carrier	*85.6*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.292	U	0.423	0.423	5.00	0.733	pCi/L		08/23/23 16:36	1

Client Sample ID: MW-10
Date Collected: 07/26/23 11:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-4
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.349**		0.140	0.143	1.00	0.140	pCi/L	07/31/23 10:32	08/22/23 08:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:20*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.610	U	0.539	0.542	1.00	0.844	pCi/L	07/31/23 10:36	08/14/23 14:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*
Y Carrier	*78.5*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.959**		0.557	0.561	5.00	0.844	pCi/L		08/23/23 16:36	1

Client Sample ID: MW-11
Date Collected: 07/25/23 10:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-5
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.335**		0.141	0.144	1.00	0.146	pCi/L	07/31/23 10:32	08/22/23 08:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.6*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:20*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.683	U	0.539	0.543	1.00	0.823	pCi/L	07/31/23 10:36	08/14/23 14:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.6*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*
Y Carrier	*78.9*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.02**		0.557	0.562	5.00	0.823	pCi/L		08/23/23 16:36	1

Client Sample ID: MW-12
Date Collected: 07/25/23 10:03
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-6
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.144		0.0918	0.0927	1.00	0.121	pCi/L	07/31/23 10:32	08/22/23 08:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:21*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.316	U	0.400	0.401	1.00	0.664	pCi/L	07/31/23 10:36	08/14/23 14:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.3*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*
Y Carrier	*81.5*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:23*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.460	U	0.410	0.412	5.00	0.664	pCi/L		08/23/23 16:36	1

Client Sample ID: 2S/3S Duplicate
Lab Sample ID: 500-237220-7

Date Collected: 07/26/23 00:00
Matrix: Water
Date Received: 07/26/23 16:40

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0909	U	0.0796	0.0801	1.00	0.118	pCi/L	07/31/23 10:32	08/22/23 08:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.3*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:21*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.972**		0.547	0.554	1.00	0.792	pCi/L	07/31/23 10:36	08/14/23 14:28	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.3*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:28*	*1*
Y Carrier	*84.5*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:28*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.06**		0.553	0.560	5.00	0.792	pCi/L		08/23/23 16:36	1

Tracer/Carrier Summary

Client: Midwest Generation EME LLC
Job ID: 500-237220-2
Project/Site: Will County 2S/3S CCR (RAD)

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba (30-110)
500-237220-1	MW-05	90.0
500-237220-2	MW-06	82.1
500-237220-3	MW-09	77.7
500-237220-4	MW-10	83.3
500-237220-5	MW-11	81.6
500-237220-6	MW-12	83.3
500-237220-7	2S/3S Duplicate	84.3
500-237220-7 DU	2S/3S Duplicate	81.9
LCS 160-622153/2-A	Lab Control Sample	94.6
MB 160-622153/1-A	Method Blank	88.7

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba (30-110)	Y (30-110)
500-237220-1	MW-05	90.0	87.5
500-237220-2	MW-06	82.1	86.7
500-237220-3	MW-09	77.7	85.6
500-237220-4	MW-10	83.3	78.5
500-237220-5	MW-11	81.6	78.9
500-237220-6	MW-12	83.3	81.5
500-237220-7	2S/3S Duplicate	84.3	84.5
500-237220-7 DU	2S/3S Duplicate	81.9	83.7
LCS 160-622159/2-A	Lab Control Sample	94.6	85.2
MB 160-622159/1-A	Method Blank	88.7	80.4

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-622153/1-A
Matrix: Water
Analysis Batch: 625099

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 622153

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.01269	U	0.0413	0.0413	1.00	0.0993	pCi/L	07/31/23 10:32	08/22/23 08:00	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.7*		*30 - 110*	*07/31/23 10:32*	*08/22/23 08:00*	*1*

Lab Sample ID: LCS 160-622153/2-A
Matrix: Water
Analysis Batch: 625099

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 622153

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	10.49		1.10	1.00	0.107	pCi/L	93	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.6*		*30 - 110*

Lab Sample ID: 500-237220-7 DU
Matrix: Water
Analysis Batch: 625099

Client Sample ID: 2S/3S Duplicate
Prep Type: Total/NA
Prep Batch: 622153

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	0.0909	U		0.05405	U	0.0651	1.00	0.106	pCi/L			0.25	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*81.9*		*30 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-622159/1-A
Matrix: Water
Analysis Batch: 624094

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 622159

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3418	U	0.403	0.404	1.00	0.664	pCi/L	07/31/23 10:36	08/14/23 14:25	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.7*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:25*	*1*
Y Carrier	*80.4*		*30 - 110*	*07/31/23 10:36*	*08/14/23 14:25*	*1*

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-622159/2-A
Matrix: Water
Analysis Batch: 624094

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 622159

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			7.96	6.517		1.03	1.00	0.504	pCi/L	82	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.6*		*30 - 110*
Y Carrier	*85.2*		*30 - 110*

Lab Sample ID: 500-237220-7 DU
Matrix: Water
Analysis Batch: 624093

Client Sample ID: 2S/3S Duplicate
Prep Type: Total/NA
Prep Batch: 622159

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-228	0.972			0.3348	U	0.504	1.00	0.849	pCi/L			0.60	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*81.9*		*30 - 110*
Y Carrier	*83.7*		*30 - 110*

QC Association Summary

Client: Midwest Generation EME LLC
Job ID: 500-237220-2
Project/Site: Will County 2S/3S CCR (RAD)

Rad

Prep Batch: 622153

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	PrecSep-21	
500-237220-2	MW-06	Total/NA	Water	PrecSep-21	
500-237220-3	MW-09	Total/NA	Water	PrecSep-21	
500-237220-4	MW-10	Total/NA	Water	PrecSep-21	
500-237220-5	MW-11	Total/NA	Water	PrecSep-21	
500-237220-6	MW-12	Total/NA	Water	PrecSep-21	
500-237220-7	2S/3S Duplicate	Total/NA	Water	PrecSep-21	
MB 160-622153/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-622153/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
500-237220-7 DU	2S/3S Duplicate	Total/NA	Water	PrecSep-21	

Prep Batch: 622159

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-237220-1	MW-05	Total/NA	Water	PrecSep_0	
500-237220-2	MW-06	Total/NA	Water	PrecSep_0	
500-237220-3	MW-09	Total/NA	Water	PrecSep_0	
500-237220-4	MW-10	Total/NA	Water	PrecSep_0	
500-237220-5	MW-11	Total/NA	Water	PrecSep_0	
500-237220-6	MW-12	Total/NA	Water	PrecSep_0	
500-237220-7	2S/3S Duplicate	Total/NA	Water	PrecSep_0	
MB 160-622159/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-622159/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
500-237220-7 DU	2S/3S Duplicate	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: Midwest Generation EME LLC
Project/Site: Will County 2S/3S CCR (RAD)

Job ID: 500-237220-2

Client Sample ID: MW-05
Date Collected: 07/26/23 08:49
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:19
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624094	FLC	EET SL	08/14/23 14:23
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Client Sample ID: MW-06
Date Collected: 07/26/23 10:56
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:20
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624094	FLC	EET SL	08/14/23 14:23
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Client Sample ID: MW-09
Date Collected: 07/26/23 13:10
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:20
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624094	FLC	EET SL	08/14/23 14:23
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Client Sample ID: MW-10
Date Collected: 07/26/23 11:55
Date Received: 07/26/23 16:40

Lab Sample ID: 500-237220-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:20
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624094	FLC	EET SL	08/14/23 14:23
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Lab Chronicle

Client: Midwest Generation EME LLC
Job ID: 500-237220-2
Project/Site: Will County 2S/3S CCR (RAD)

Client Sample ID: MW-11
Lab Sample ID: 500-237220-5
Date Collected: 07/25/23 10:55
Matrix: Water
Date Received: 07/26/23 16:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:20
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624094	FLC	EET SL	08/14/23 14:23
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Client Sample ID: MW-12
Lab Sample ID: 500-237220-6
Date Collected: 07/25/23 10:03
Matrix: Water
Date Received: 07/26/23 16:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:21
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624094	FLC	EET SL	08/14/23 14:23
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Client Sample ID: 2S/3S Duplicate
Lab Sample ID: 500-237220-7
Date Collected: 07/26/23 00:00
Matrix: Water
Date Received: 07/26/23 16:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep-21			622153	KAC	EET SL	07/31/23 10:32
Total/NA	Analysis	903.0		1	625099	FLC	EET SL	08/22/23 08:21
Total/NA	Prep	PrecSep_0			622159	KAC	EET SL	07/31/23 10:36
Total/NA	Analysis	904.0		1	624093	SWS	EET SL	08/14/23 14:28
Total/NA	Analysis	Ra226_Ra228		1	625293	SCB	EET SL	08/23/23 16:36

Laboratory References:
EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Midwest Generation EME LLC
Job ID: 500-237220-2
Project/Site: Will County 2S/3S CCR (RAD)

Laboratory: Eurofins St. Louis

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Illinois	NELAP	200023	11-30-23

Method Summary

Client: Midwest Generation EME LLC
Job ID: 500-237220-2
Project/Site: Will County 2S/3S CCR (RAD)

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Midwest Generation EME LLC
Job ID: 500-237220-2
Project/Site: Will County 2S/3S CCR (RAD)

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-237220-1	MW-05	Water	07/26/23 08:49	07/26/23 16:40
500-237220-2	MW-06	Water	07/26/23 10:56	07/26/23 16:40
500-237220-3	MW-09	Water	07/26/23 13:10	07/26/23 16:40
500-237220-4	MW-10	Water	07/26/23 11:55	07/26/23 16:40
500-237220-5	MW-11	Water	07/25/23 10:55	07/26/23 16:40
500-237220-6	MW-12	Water	07/25/23 10:03	07/26/23 16:40
500-237220-7	2S/3S Duplicate	Water	07/26/23 00:00	07/26/23 16:40

Reagent

Ba carrier_00133

Standardization of Carrier

Carrier Reagent ID: Ba Carrier_00133
ID from TALS or lot number

#	Tare Wght (g)	Gross Wght (g)	Net Wght (g)	Z Score
1	8.6572	8.6977	0.0405	0.4182
2	8.7046	8.7463	0.0417	1.4636
3	8.6991	8.7391	0.0400	1.2022
4	8.7070	8.7483	0.0413	0.8363
5	8.7021	8.7424	0.0403	0.7318
6	8.7185	8.7593	0.0408	0.0523

Average: 0.0408 Standardized value
StDev: 0.0006
StDev %: 1.56%

Record the Reagent IDs of all chemicals used to create this carrier in the spaces below.

Reagent ID:
Reagent ID:
Reagent ID:
Reagent ID:
Reagent ID:
Reagent ID:
Reagent ID:

SOP Reference: ST-RC-0002, ST-RC-0041
SOP reference containing prep procedure must be documented

Minimum Criteria:

- Z Score must be within 3 sigma (**2.58**) and no more than one score outside of 2 sigma (**1.96**)
- 4 points required
- Any criteria stipulated in the above referenced SOP must be satisfied in addition.

Carrier: 0 ***Standardized Value:*** 0.0408 Carrier Reagent or Lot ID: Ba Carrier_00133

Approved By: CMM Date Approved: ***7/11/2023***

NOTE: spreadsheet MUST be attached in TALS as a PDF (either print to PDF, or print hardcopy and then scan)

Reagent

Ra-226_00024

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 104858
Source Description: 5 mL Liquid in Flame Sealed Vial
Product Code: 8226
Customer: TestAmerica St. Louis
P.O. Number: 2665998, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA) using a germanium gamma-ray spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 05-December-2016 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Ra-226	5.844E+05	1.408E+04	1.0	2.1	4.7	HPGe

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

SRS Number: 104858

Comments:
5.00002 g 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Impurities:
γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved by: _____ Date: 05-DEC-16
J. Lahr, Spectroscopist

Reagent

Ra-226_00025

SRS Number: 104858

Comments:

5.00002 g 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Impurities:

γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____

Z. Dimitrova, Radiochemist

QC Approved by: _____ Date: 05-DEC-16

J. Lahr, Spectroscopist

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 104858
Source Description: 5 mL Liquid in Flame Sealed Vial
Product Code: 8226
Customer: TestAmerica St. Louis
P.O. Number: 2665998, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA) using a germanium gamma-ray spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 05-December-2016 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Ra-226	5.844E+05	1.408E+04	1.0	2.1	4.7	HPGe

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Reagent

Ra-226_00041

Standard ID Number: a-226_00041 (2309057/230905
True Value = 113650 pCi/L or g
Date Analyzed: 9/15/2022

Radionuclide: Ra-226

Replicates

#1	107700	pCi/L or g
#2	110200	pCi/L or g
#3	105600	pCi/L or g

Mean = 107833.33

1 sigma = 2302.8967

1.96 sigma = 4513.678

True Value minus 10% = 102285 (True Value - 10%)
True Value plus 10% = 125015 (True Value + 10%)

Accuracy:
Mean value within 10% of Certified (True) Value? Yes (Acceptance Criteria)

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes (Acceptance Criteria)

Standard Reverification Acceptable? Yes

1st Reviewed By/Date: MichaKoniuminger 9/15/2022

2nd Reviewed By/Date: Sarah C. Beusen 9/16/22

MANUAL DATA ENTRY REQUIRED AT INSTRUMENT? (circle one) YES NO
If YES, data entry MUST be 2nd reviewed

1st Reviewed By/Date: _____

2nd Reviewed By/Date: _____

eurofins | Environment Testing America

Ra - 226 _ 00039

Reagent ID: Ra-226_00039

Description:	Ra-226 Spike	Expiration Date:	09/18/2022
No. of Bottles:	2	Laboratory:	Eurofins St. Louis
Storage Location:	RAD Separations Reagents - Rm 131	Prepared By:	Mazariegos, Chelsea M
Reagent Volume:	500.000 mL	Solvent:	0.1M HCl
Creation Date:	09/16/2021	Solvent Lot:	N/A
Open Date:			
Container(s):	2131808, 2131809		
Comment:	standard split into (2) 250 mL bottles		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Ra	Ra-226_00025	09/18/2022	8409.78500	dpm/mL	252.29356	dpm/mL
Ra-226	Ra-226_00025	09/18/2022	8409.78500	dpm/mL	252.29356	dpm/mL
Rn-222	Ra-226_00025	09/18/2022	8409.78500	dpm/mL	252.29356	dpm/mL
Total Alpha Emitting Radium Isotopes	Ra-226_00025	09/18/2022	8409.78500	dpm/mL	252.29356	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Ra-226_00025	Ra-226 Parent		09/18/22				15.00000	mL

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	12/5/2022 0:00		
Decayto Date/Time (t):	9/15/22 0:00		
Initial Activity (A_0):	252.29	dpm	
Initial Aliquot:	1	mL	
Initial Conc:	252.29	dpm/mL	
***Soln. Density:**		g/mL	
Nuclide:	Ra-226		
Half-Life (days):	584400	decay days	fraction
****Decay Factor:**	1.0001	-81.00	-0.00014
Decay Corr Activity:	2.5231E+02	dpm	
Decay Corr Conc:	2.5231E+02	dpm/mL	

Conversion/Calculations

Final Activity Unit:	pCi	
Activity Unit Factor:	0.45045	
Final Volume Unit:	L	
Volume Unit Factor:	0.001	
Final Concentration:	1.1365E+05	pCi/L
Aliquot Volume:	1.0000E+00	L
Final Activity (A):	1.1365E+05	pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

eurofins Environment Testing TestAmerica

Analysis Report for Total Alpha-Emitting Radium

Batch: 581978 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Ba Yield CPMb	Trunc Yield	Ingrowth Activity	Ba Precip Time UncCount	InstrID UncTotal	Eff MDA	Cal Type DLC	Cnt Date Time MQO	Sigma
160-46998-A-2-B	160-46998-A-2-B		0.1000mL		0.0385	96.01%		False	1.0149	9/15/22 11:00	Red13	0.1937	2	9/15/22 10:49	1.00
Total Alpha Emitting		100.00	1000.00	462	108	4.62	0.11		1.077E+005pCi/L	5.137E+003	7.062E+003	3.423E+003	1.917E+003	7061.9826	
160-46998-A-3-B	160-46998-A-3-B		0.1000mL		0.0395	98.58%		False	1.0150	9/15/22 11:00	Red14	0.1920	2	9/15/22 10:49	1.00
Total Alpha Emitting		100.00	1000.00	480	103	4.80	0.10		1.102E+005pCi/L	5.145E+003	7.146E+003	3.302E+003	1.840E+003	7145.9155	
160-46998-B-1-B	160-46998-B-1-B		0.1000mL		0.0371	92.52%		False	1.0149	9/15/22 11:00	Red10	0.1993	2	9/15/22 10:49	1.00
Total Alpha Emitting		100.00	1000.00	446	72	4.46	0.07		1.056E+005pCi/L	5.088E+003	6.963E+003	2.951E+003	1.578E+003	6962.8945	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Radium-226 Standard Verification

Std #: Ra-226_00039 (2131809)
Activity: 252.2935552dpm/mL
Reference Date: 12/05/2016

Ver#	D.I. H2O	Barium Carrier mL	Ra-226 Spike mL	18M Sulfuric mL	EDTA mL	Ammonium Sulfate mL	Acetic Acid mL
Ra-226_00039	*N/A*	*2179499*	*2131809*	*2285368*	*2291818*	*2291233*	*2300893*
1	10	1	0.1	1	15	1	2
2	10	1	0.1	1	15	1	2
3	10	1	0.1	1	15	1	2

In a clean centrifuge tube add the following:

- 10mL D.I.
- 0.1mL Radium-226 standard
- 1mL Barium Carrier
- 1mL 18M Sulfuric Acid

Heat in hot bath for 30mins **agitate every 10 mins**
Centrifuge/Decant and wash with 10mL D.I. H2O
Dissolve in 15mL EDTA
Add 1mL Ammonium Sulfate and 2mL Acetic Acid
Heat in hot bath for 30mins **agitate every 10 mins**
Centrifuge/Decant and wash with 10mL D.I. H2O
Plate with minimal D.I. H2O onto a tared planchet

Prepared by: Micha Korrinhizer
Date: 9/15/2022

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-581978

Analyst: Korrinhizer, Micha L

Batch Open: 9/13/2022 5:11:00PM

Batch End: 9/13/2022 6:00:00PM

Preparation, Precipitate Separation

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Div Rank	Comments 9/15/22	Output Sample Lab ID
1	160-46998-B-1 (903.0_TAR)	N/A (160-46998-1)	Water	0.1 mL		10/7/22	18_Days	4	Ra-226_00039 VERIFICATION Red 10	160-46998-B-1-B
2	160-46998-A-2 (903.0_TAR)	N/A (160-46998-1)	Water	0.1 mL		10/7/22	18_Days	4	Ra-226_00039 VERIFICATION 13	160-46998-A-2-B
3	160-46998-A-3 (903.0_TAR)	N/A (160-46998-1)	Water	0.1 mL		10/7/22	18_Days	4	Ra-226_00039 VERIFICATION 14	160-46998-A-3-B

Reagent

Ra-228_00050

Eckert & Ziegler
Analytics

Kalibrierschein / Calibration Certificate

erstellt durch das Kalibrierlaboratorium

issued by the calibration laboratory

DAkkS Deutsche Akkreditierungsstelle D-K-19023-01-00

Eckert & Ziegler Analytics, Inc.
1380 Seaboard Industrial Blvd.
Atlanta, GA 30318, USA
Tel 1-404-352-8677
Fax 1-404-352-2837

Kalibrierzeichen
Calibration mark

002018
D-K-19023-01-00
2022-05

Gegenstand *Object*	**5 mL Liquid in 5 mL Flame Sealed Ampoule**
Hersteller *Manufacturer*	**Eckert & Ziegler Analytics, Inc.**
Typ *Type*	**8328-5FSA-370BQ-D**
Serien-Nr. *Serial number*	**121695**
Auftraggeber *Customer*	**Test America Laboratories- St. Louis**
Auftragsnummer *Order No.*	**CO-053651**
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	**2**
Datum der Kalibrierung *Date of calibration*	**31-May-2022 1200 EST (1700 UTC)**

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the metrological traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.
The user is obliged to have the object recalibrated at appropriate intervals.

Datum der Ausstellung *Date of issue*	Freigabe des Kalibrierscheins durch *Approval of the certificate of calibration by*
26-May-22	Levan Tkavadze

002018
D-K-19023-01-00
2022-05

- **Customer Purchase Order No.:**
  GamCred001, Item 1

- **Calibration Results:**

Nuclide	Half-Life *, d	Activity, Bq	Uncertainty, %	Calibration Method
Ra-228	2.100E+03	3.416E+02	4.9	HPGe

- **Calibration Method(s):**
  This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics using a germanium gamma-ray spectrometer system (HPGe).

- **Uncertainty:**
  The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor $k = 2$. It has been determined in accordance with EA-4/02 M. The value of the measurand lies within the assigned range of values with a probability of approximately 95%. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

- **Traceability:**
  Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

- **Impurities:**
  α-impurities: Ra-226 6.5E+00 Bq, other α-impurities (other than decay products) < 0.1 %
  γ-impurities (other than decay products) < 0.1 %

- **Expiration Date:**
  No expiration date has been given for this source.

- **Wipe Test *:**
  This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

- **Additional Information:**
  - 5.00238 g of 0.1 M HCl solution with approximately 30 µg/g Ba carrier.
  - Separation date: 01-March-2018
  - *Values not calibrated by EZA (i.e. published nuclear data, uncertified values, etc.)
  - Date of Calibration corresponds to Reference Date for this source.
  - Expiration Date refers to useful life of this source.

End of Certificate

Reagent

Ra-228_00051

Standard ID Number: Ra-228_00051
True Value = 8.2961 pCi/L or g
Date Analyzed: 4/10/2023

Radionuclide: Ra-228

	Replicates	
#1	9.38	pCi/L or g
#2	8.232	pCi/L or g
#3	8.417	pCi/L or g
#4	8.393	pCi/L or g
#5	8.94	pCi/L or g
#6	8.425	pCi/L or g

Mean = 8.63116667

1 sigma = 0.43830556 1.96 sigma = 0.859079

True Value minus 5% = 7.881295 (True Value - 5%)
True Value plus 5% = 8.710905 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

1st Reviewed By/Date: MichaKonwinger 4/11/2023

2nd Reviewed By/Date: Sarah Bussen 4/11/23

MANUAL DATA ENTRY REQUIRED AT INSTRUMENT? (circle one) YES NO
If YES, data entry MUST be 2nd reviewed

1st Reviewed By/Date: _____

2nd Reviewed By/Date: _____

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	5/21/2022 0:00		
Decayto Date/Time (t):	4/10/23 0:00		
Initial Activity (A_0):	20.50	dpm	
Initial Aliquot:	1	mL	
Initial Conc:	20.49597	dpm/mL	
***Soln. Density:**	1	g/mL	
Nuclide:	Ra-228		
Half-Life (days):	2100.1875	decay days	fraction
****Decay Factor:**	0.8986	324.00	0.15427
Decay Corr Activity:	1.8417E+01	dpm	
Decay Corr Conc:	1.8417E+01	dpm/mL	

Conversion/Calculations

Final Activity Unit:	pCi	
Activity Unit Factor:	0.45045	
Final Volume Unit:	mL	
Volume Unit Factor:	1.000	
Final Concentration:	8.2961E+00	pCi/mL
Aliquot Volume:	1.0000E+00	mL
Final Activity (A):	8.2961E+00	pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

eurofins | Environment Testing TestAmerica

Analysis Report for Radium 228

Batch: 606428 **Operator:**

SampID / Analyte	WRKNO / SampCntD	Aliquot / BkgCntDur	TruncYields SampCnt	BaYield / BkgCnt	YYield / Activity	InstrID	Eff / UncCount	Y Ingrowth Time / UncTotal	Y Precip Time / MDA	DLC	CountDateTime / MQO	Sigma	CalType
160-46998-A-2-E	160-46998-A-2-E	1000.0000mL	False	90.89%	84.11%	Orange17	0.4404	4/7/23 14:00	4/10/23 9:00		4/10/23 12:31	1.00	1
	Ra-228	100.00	1000.00 461	312	9.380E+000 pCi/L		4.702E-001	6.381E-001	4.861E-001	2.979E-001	0.6381		
160-46998-A-2-F	160-46998-A-2-F	1000.0000mL	False	95.19%	88.60%	Orange18	0.4417	4/7/23 14:00	4/10/23 9:00		4/10/23 12:31	1.00	1
	Ra-228	100.00	1000.00 451	337	8.232E+000 pCi/L		4.205E-001	5.659E-001	4.543E-001	2.798E-001	0.5659		
160-46998-A-2-G	160-46998-A-2-G	1000.0000mL	False	97.47%	84.11%	Orange19	0.4457	4/7/23 14:00	4/10/23 9:00		4/10/23 12:31	1.00	1
	Ra-228	100.00	1000.00 457	386	8.417E+000 pCi/L		4.319E-001	5.800E-001	4.916E-001	3.054E-001	0.5800		
160-46998-A-2-H	160-46998-A-2-H	1000.0000mL	False	98.48%	85.23%	Orange20	0.4422	4/7/23 14:00	4/10/23 9:00		4/10/23 12:31	1.00	1
	Ra-228	100.00	1000.00 454	302	8.393E+000 pCi/L		4.234E-001	5.730E-001	4.349E-001	2.660E-001	0.5730		
160-46998-A-2-I	160-46998-A-2-I	1000.0000mL	False	97.22%	82.99%	Orange21	0.4460	4/7/23 14:00	4/10/23 9:00		4/10/23 12:31	1.00	1
	Ra-228	100.00	1000.00 465	275	8.940E+000 pCi/L		4.420E-001	6.037E-001	4.311E-001	2.619E-001	0.6037		
160-46998-A-2-J	160-46998-A-2-J	1000.0000mL	False	94.18%	82.24%	Orange23	0.4411	4/7/23 14:00	4/10/23 9:00		4/10/23 12:31	1.00	1
	Ra-228	100.00	1000.00 423	315	8.425E+000 pCi/L		4.443E-001	5.896E-001	4.813E-001	2.952E-001	0.5896		

Laboratory Control Sample Information

SampID	WRKNO	ComponentName	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

eurofins | Environment Testing

Ra-228_00051

Reagent ID: Ra-228_00051

		Expiration Date:	10/03/2023
Description:	Ra-228 Spike	Laboratory:	Eurofins St. Louis
No. of Bottles:	2	Prepared By:	Korrinhizer, Micha L
Storage Location:	RAD Separations Reagents - Rm 112	Solvent:	0.1M HCl
Reagent Volume:	1.000 L	Solvent Lot:	N/A
Creation Date:	10/03/2022		
Open Date:			
Container(s):	2318210, 2318211		
Comment:	Spike at 1mL		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Ra-228	Ra-228_00050	10/03/2023	68.28700	Bq/g	20.49597	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Ra-228_00050	Ra-228 Ampoule	ASTD	10/03/23	Eckert & Ziegler	121695	D-K-19023-01-00	5.00238	g

Reagent

Sr-90_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

80573-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis
P.O. No.: 2324797, Item 1

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	10515.5	3.782E+04	0.1	0.9	1.8	09/17/2009

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities <0.1%. 5.04317 grams 0.1M HCl solution with approximately 30 microg/g each of Sr and Y carriers. NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total beta emission rate for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 9-22-09
D. M. Montgomery, QA Manager

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

Reagent

Sr-90_00017

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92352

Sr-90 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502682, Item 1 Product Code: 8090-5FSA-37kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	1.052E+04	3.749E+04	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities<0.1%.
5.02357 g 0.1M HCl solution with approximately 30 µg/g each Sr and Y carriers.

NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total activity for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 26 Nov 12
J.D. McCorvey, Counting Room Manager

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

RAD12-0042
Sr-90
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/29/2062
Exp(2): 11/29/2062

51511
ID Sr-90_00017
Sr-90 Ampoule

Reagent

Sr-90_00018

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Sr-90_00018

		Expiration Date:	11/29/2062
Description:	Sr-90 Calibration STD	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Hurst, Sarah
Storage Location:	RAD Separations Reagents - 1	Solvent:	0.1M HCL
Reagent Volume:	100.000 mL	Solvent Lot:	0
Creation Date:	11/28/2012		
Container(s):	51512		
Comment:	Rad12-0043		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Gross Beta	Sr-90_00017	11/29/2062	14925.64000	Bq/g	44774.23338	dpm/mL
Sr-90	Sr-90_00017	11/29/2062	7462.82000	Bq/g	22387.11669	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Sr-90_00017	Sr-90 Ampoule	ASTD	11/29/62	Analytics	92352		4.99970	g

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1976.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Low mass)

	Replicates	
#1	1935	pCi/sample or g
#2	1941	pCi/sample or g
#3	1924	pCi/sample or g

Mean = 1933.333

1 sigma = 8.621678 1.96 sigma = 16.89849

True Value minus 5% = 1877.913 (True Value - 5%)
True Value plus 5% = 2075.588 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1948.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Medium mass)

Replicates		
#1	1911	pCi/sample or g
#2	1945	pCi/sample or g
#3	1893	pCi/sample or g

Mean = 1916.333

1 sigma = 26.40707 1.96 sigma = 51.75786

True Value minus 5% = 1851.313 (True Value - 5%)
True Value plus 5% = 2046.188 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1992 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (High mass)

Replicates		
#1	1907	pCi/sample or g
#2	1930	pCi/sample or g
#3	1937	pCi/sample or g

Mean = 1924.667

1 sigma = 15.69501 1.96 sigma = 30.76222

True Value minus 5% = 1892.4 (True Value - 5%)
True Value plus 5% = 2091.6 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

Protean Beta ICV-ACV recoveries from March 2013			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
0	1962	1945	1971
1	2003	1947	1995
2	1960	1965	1998
3	1988	1942	1995
4	1977	1940	1997
5	1969	1949	2013
6	1986	1938	1986
7	1969	1964	1981
Average pCi/sample	1976.75	1948.75	1992

Protean Beta ICV-ACV recoveries from February 2014			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
4	1935	1911	1907
5	1941	1945	1930
6	1924	1893	1937
Average pCi/sample	1933.33	1916.33	1924.67

Standard ID
Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000sample		0.0513 g	Protean4	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	49	0.00	0.000E+000	4.900E-002	0.1157	**-1.908E-001**pCi/sample	5.869E-002	5.452E-002	3.382E+000	8.968E-001
	Gross Beta	9072	417	0.00	1.814E+003	4.170E-001	0.4224	**1.935E+003**pCi/sample	1.977E+002	4.063E+001	1.594E+000	7.165E-001
ICVABT-51512;B2	NA	1.000E+000sample		0.1114 g	Protean4	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0830	**8.194E-001**pCi/sample	2.174E+000	2.172E+000	4.713E+000	1.250E+000
	Gross Beta	8432	417	0.00	1.686E+003	4.170E-001	0.3973	**1.911E+003**pCi/sample	1.956E+002	4.164E+001	1.694E+000	7.616E-001
ICVABT-51512;B3	NA	1.000E+000sample		0.1813 g	Protean4	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0540	**1.260E+000**pCi/sample	3.343E+000	3.340E+000	7.248E+000	1.922E+000
	Gross Beta	8054	417	0.00	1.611E+003	4.170E-001	0.3804	**1.907E+003**pCi/sample	1.954E+002	4.251E+001	1.770E+000	7.956E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO / Analyte	Aliquot Cs	Cb	Mass XT		Instr ID CPMs	CountTime CPMb	Eff	Activity	Ts	Tb UncTot	Dilution UncCnt	Sigma MDA	DLC
ICVABT-51512;B1	NA	1.000E+000 sample		0.0513	g	Protean5	2/10/14 23:04			5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.1145		**-1.692E-001** pCi/sample		5.510E-002	5.161E-002	3.337E+000	8.490E-001
	Gross Beta	9111	398	0.00	1.822E+003	3.980E-001	0.4228		**1.941E+003** pCi/sample		1.983E+002	4.068E+001	1.569E+000	6.992E-001
ICVABT-51512;B2	NA	1.000E+000 sample		0.1114	g	Protean5	2/10/14 22:54			5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.0823		**-2.353E-001** pCi/sample		7.661E-002	7.176E-002	4.639E+000	1.180E+000
	Gross Beta	8552	398	0.00	1.710E+003	3.980E-001	0.3960		**1.945E+003** pCi/sample		1.990E+002	4.207E+001	1.675E+000	7.465E-001
ICVABT-51512;B3	NA	1.000E+000 sample		0.1813	g	Protean5	2/10/14 23:19			5.00	1000.00	1.00	2.00	
	Gross Alpha	2	43	0.00	4.000E-001	4.300E-002	0.0532		**3.022E+000** pCi/sample		4.802E+000	4.790E+000	7.178E+000	1.826E+000
	Gross Beta	8046	398	0.00	1.609E+003	3.980E-001	0.3755		**1.930E+003** pCi/sample		1.977E+002	4.304E+001	1.766E+000	7.873E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean6	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.1165		**-3.362E-001** pCi/sample	8.166E-002	7.210E-002	3.776E+000	1.186E+000
	Gross Beta	8992	520	0.00	1.798E+003	5.200E-001	0.4209		**1.924E+003** pCi/sample	1.966E+002	4.059E+001	1.718E+000	8.029E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean6	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0842		**-4.657E-001** pCi/sample	1.131E-001	9.985E-002	5.230E+000	1.642E+000
	Gross Beta	8356	520	0.00	1.671E+003	5.200E-001	0.3976		**1.893E+003** pCi/sample	1.937E+002	4.142E+001	1.819E+000	8.499E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean6	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0559		**-7.014E-001** pCi/sample	1.703E-001	1.504E-001	7.877E+000	2.474E+000
	Gross Beta	8127	520	0.00	1.625E+003	5.200E-001	0.3778		**1.937E+003** pCi/sample	1.985E+002	4.300E+001	1.914E+000	8.945E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0042, Sr-90 Sr-90_00017 #51511 Analyst: hursts

Vendor: Analytics Lot No.: 92352
Solvent: None
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)
Cert: 92352 Activity: 37490Bq Mass: 5.02357 Ref. Date: 11/29/12

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Sr-90	447,769	447,769

RAD12-0043, Sr-90 Calibration STD Sr-90_00018 #51512 Analyst: hursts

Solvent: None Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0042, Sr-90 Aliquot Amount (g): 4.9997
Parent Date Expires(1): 11-29-2062 Parent Date Expires(2): 11-29-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Sr-90	447,769	22,387

Reviewed By: SR

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0043
True Value = 2016.7 pCi/L or g
Date Analyzed: 11/30/2012

Radionuclide: Sr90

	Replicates	
#1	1964	pCi/L or g
#2	1958	pCi/L or g
#3	2015	pCi/L or g

Mean = 1979

1 sigma = 31.32092 1.96 sigma = 61.389

True Value minus 5% = 1915.865 (True Value - 5%)
True Value plus 5% = 2117.535 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122629 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification-1b	NA	1.000E+000sample		0.0536 g	Purple16	11/30/12 10:42		8.00	1000.00	1.00	1.00	
	Gross Alpha	123	175	0.00	1.538E+001	1.750E-001	0.4314	**1.587E+001**pCi/sample	1.707E+000	1.448E+000	8.638E-001	3.593E-001
	Gross Beta	14954	485	0.00	1.869E+003	4.850E-001	0.4285	**1.964E+003**pCi/sample	9.953E+001	1.607E+001	1.211E+000	6.021E-001
verification-2b	NA	1.000E+000sample		0.0529 g	Purple17	11/30/12 10:43		8.00	1000.00	1.00	1.00	
	Gross Alpha	53	87	0.00	6.625E+000	8.700E-002	0.1306	**2.254E+001**pCi/sample	3.391E+000	3.138E+000	2.356E+000	8.365E-001
	Gross Beta	15152	362	0.00	1.894E+003	3.620E-001	0.4356	**1.958E+003**pCi/sample	9.919E+001	1.591E+001	1.077E+000	5.117E-001
verification-3b	NA	1.000E+000sample		0.0528 g	Purple18	11/30/12 10:43		8.00	1000.00	1.00	1.00	
	Gross Alpha	85	62	0.00	1.063E+001	6.200E-002	0.1313	**3.624E+001**pCi/sample	4.462E+000	3.954E+000	2.160E+000	7.027E-001
	Gross Beta	15378	395	0.00	1.922E+003	3.950E-001	0.4296	**2.015E+003**pCi/sample	1.020E+002	1.625E+001	1.125E+000	5.420E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122629 **Prep Analyst:** 250

SampID	WRKNO	Aliquot		Gross	Tare	Mass	Dilution
verification-1b	NA	1.000E+000	sample	8.7067 g	8.6531 g	0.0536 g	1.00
verification-2b	NA	1.000E+000	sample	8.6615 g	8.6086 g	0.0529 g	1.00
verification-3b	NA	1.000E+000	sample	8.6935 g	8.6407 g	0.0528 g	1.00

purple 16 17 18

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0043	SR-90	22.387 dpm/mL	0.1 mL	11-29-12	

MS — Spiked By

LM — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

Reviewed By — 11/30/12 Review Date

MS — Analyst/Relenquished By — 11/28/12 Release Date

Received By — 11/28/12 Receipt Date

MS 11-30-12 ~~112~~ 112343897/MS/11-28-12

Balance ID / Initials / Date

Reagent

Th-230_00051

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 114474
Source Description: 5 mL Liquid in Flame Sealed Ampoule
Product Code: 8230
Customer: Test America Laboratories- St. Louis
P.O. Number: 3053229, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA). The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 29-October-2019 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty			Calibration Method**
			u_A, %	u_B, %	U, %*	
Th-230	2.753E+07	3.786E+03	0.2	1.0	2.0	4π LS

***Uncertainty:** U - Relative expanded uncertainty, $k = 2$. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Th-230-00051

Reagent

Th-230_00052

Standard ID Number: Th-230_00053
True Value = 20311 pCi/L or g
Date Analyzed: 11/16/2019

Radionuclide: Th-230

	Replicates	
#1	19840	pCi/L or g
#2	20910	pCi/L or g
#3	19879	pCi/L or g

Mean = 20209.667

1 sigma = 606.81985

1.96 sigma = 1189.367

True Value minus 5% = 19295.45 (True Value - 5%)
True Value plus 5% = 21326.55 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: TJR 11/18/19

2nd Reviewed By/Date: 11/18/19

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	10/29/2019 0:00		
Decayto Date/Time (t):	11/16/19 0:00		
Initial Activity (A_0):	45.09 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	45.0915 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-230		
Half-Life (days):	27539850	decay days	fraction
****Decay Factor:**	1.0000	18.00	0.00000
Decay Corr Activity:	4.5091E+01 dpm		
Decay Corr Conc:	4.5091E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	pCi
Activity Unit Factor:	0.45045
Final Volume Unit:	L
Volume Unit Factor:	0.001
Final Concentration:	2.0311E+04 pCi/L
Aliquot Volume:	1.0000E+00 L
Final Activity (A):	2.0311E+04 pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:37:53AM 11/18/2019

Sample

Sample Name: 160-36383-A-1-A Type: Sample
Spectrum #1 Analysis #1
: 160-36383-A-1-A
Sample Collection Date: 11/15/2019 12:00:00PM
Comment:

Sample Volume : 0.00 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 450711
AnalysisResultsID: 246263
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

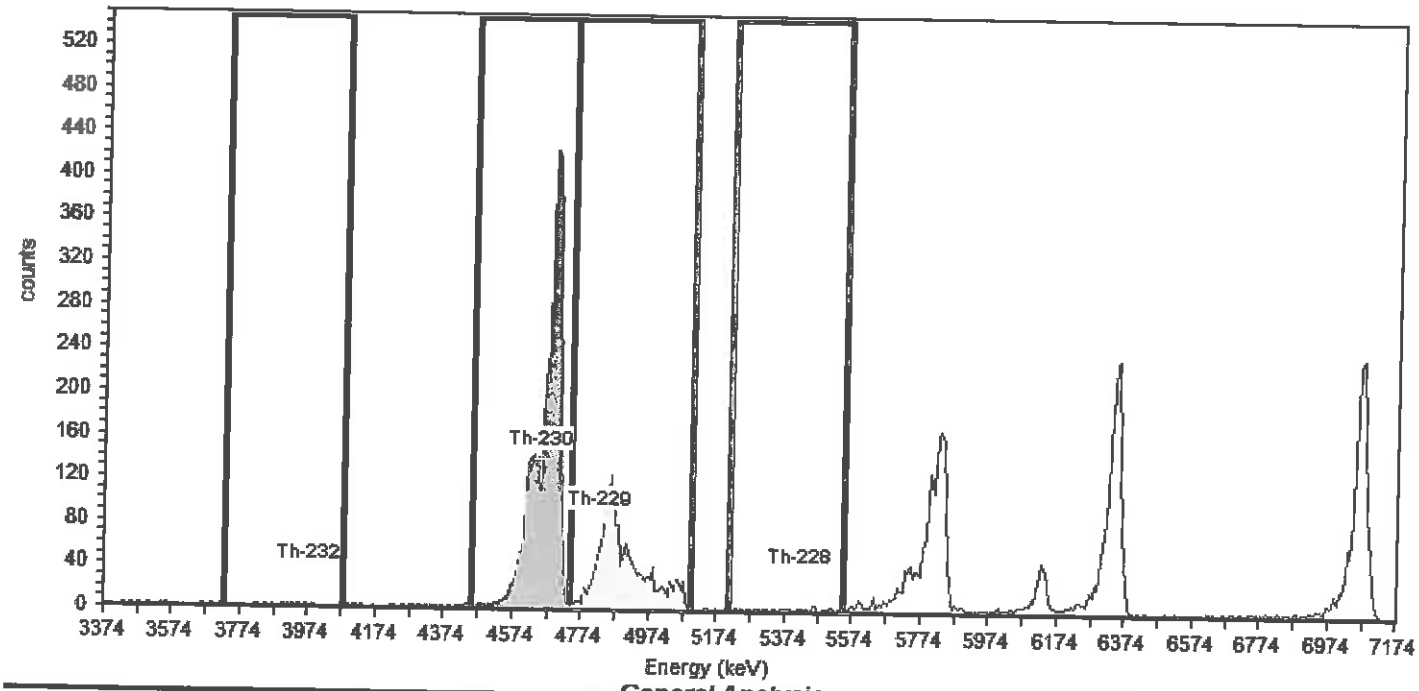
Tracer Name: Th-229_00028
Tracer Activity: 66.16 DPM / mL x (Vol.) 0.10 mL = 6.62 DPM
Tracer Ref. Date: 8/29/2018 9:44:32AM

Tracer Nuclide: Th-229
Tracer Recovery: 92.98%

Acquisition

Detector: AV244 SN: 51-005EE3
Acquisition Start Date: 11/16/2019 1:40:35PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/9/2019 2:31:27PM
Bkgd Info: Sample: ICB;AV244; Det: AV244; Spectrum #1; 11/9/2019 2:31:27 PM

Energy Calibration: IC-1370619;AV244-11152018
Efficiency Calibration:IC-1370619;AV244-11152018
Calibration Date: 11/15/2018 10:58:47PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 28.89% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:11/16/2019 1:38:32PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	.3	100.2	11	2.0000	9.00	5.229E+001	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4739.1	34.6	99.7	3399	1.0000	3398.00	1.984E+004	pCi/L
Th-229	4828.6	4,845.3	-16.7	4739.1	5097.1	73.2	99.6	1706	6.0000	1700.00	9.237E+003	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	.9	99.8	45	19.0000	26.00	1.517E+002	pCi/L

Sample

Sample Name: 160-36383-A-1-B Type: Sample
Spectrum #1 Analysis #1
: 160-36383-A-1-B
Sample Collection Date: 11/15/2019 12:00:00PM
Comment:

Sample Volume : 0.00 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 450711
AnalysisResultsID: 246269
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

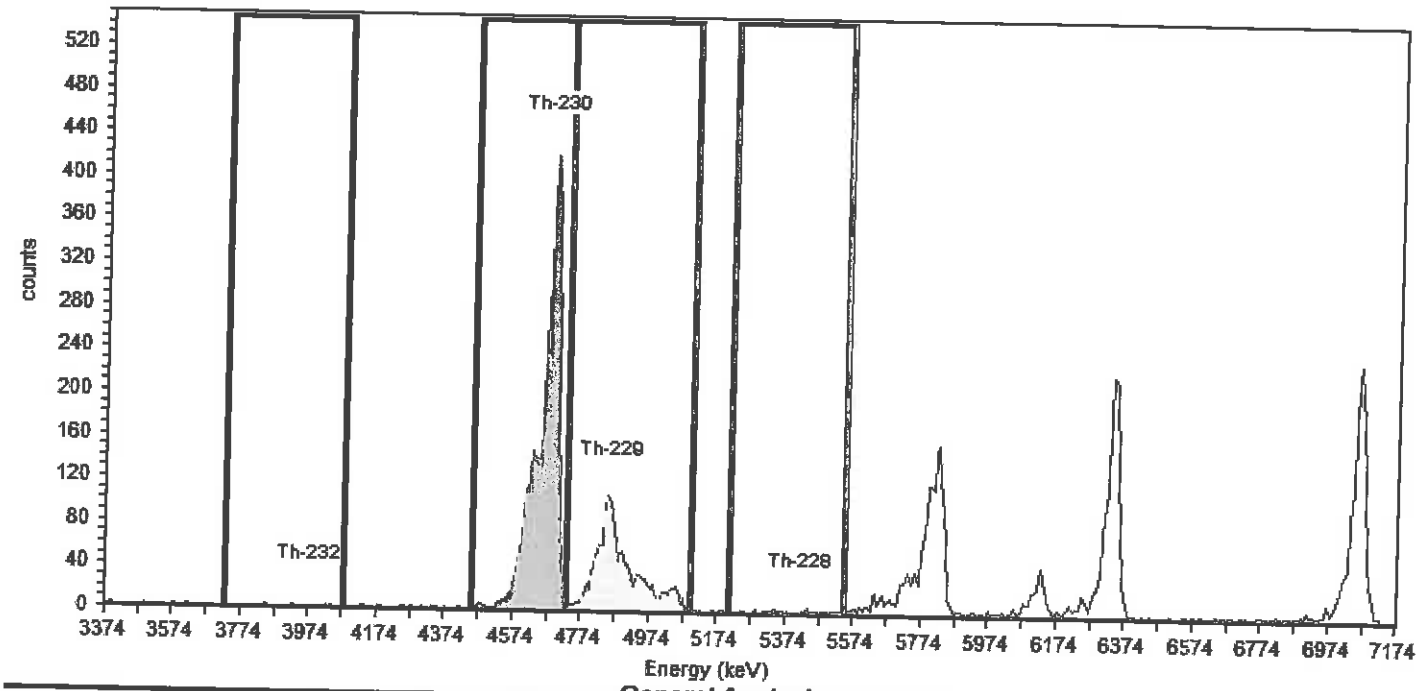
Tracer Name: Th-229_00028
Tracer Activity: 66.16 DPM / mL x (Vol.) 0.10 mL = 6.62 DPM
Tracer Ref. Date: 8/29/2018 9:44:32AM

Tracer Nuclide: Th-229
Tracer Recovery: 94.23%

Acquisition

Detector: AV245 SN: 49-037W4
Acquisition Start Date: 11/16/2019 1:40:35PM
Live Time: 960.00 min.
Real Time: 960.04 min.
Background Date: 11/9/2019 2:31:27PM
Bkgd Info: Sample: ICB;AV245; Det: AV245; Spectrum #1; 11/9/2019 2:31:27 PM

Energy Calibration: IC-1370620;AV245-11152018
Efficiency Calibration:IC-1370620;AV245-11152018
Calibration Date: 11/15/2018 10:58:51PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.18% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:11/16/2019 1:38:32PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	10.5	100.2	4	0.0000	4.00	2.531E+001	pCi/L
Th-230	4686.9	4,687.5	-0.6	4455.8	4731.7	30.4	99.7	3292	4.0000	3288.00	2.091E+004	pCi/L
Th-229	4858.5	4,845.3	13.2	4731.7	5097.1	80.2	99.6	1567	6.0000	1561.00	9.361E+003	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	227.6	99.8	38	16.0000	22.00	1.398E+002	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:08:38AM 11/18/2019

Sample

Sample Name: 160-36383-A-1-C Type: Sample
Spectrum #1 Analysis #1
: 160-36383-A-1-C
Sample Collection Date: 11/15/2019 12:00:00PM
Comment:

Sample Volume : 0.00 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 450711
AnalysisResultsID: 246265
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

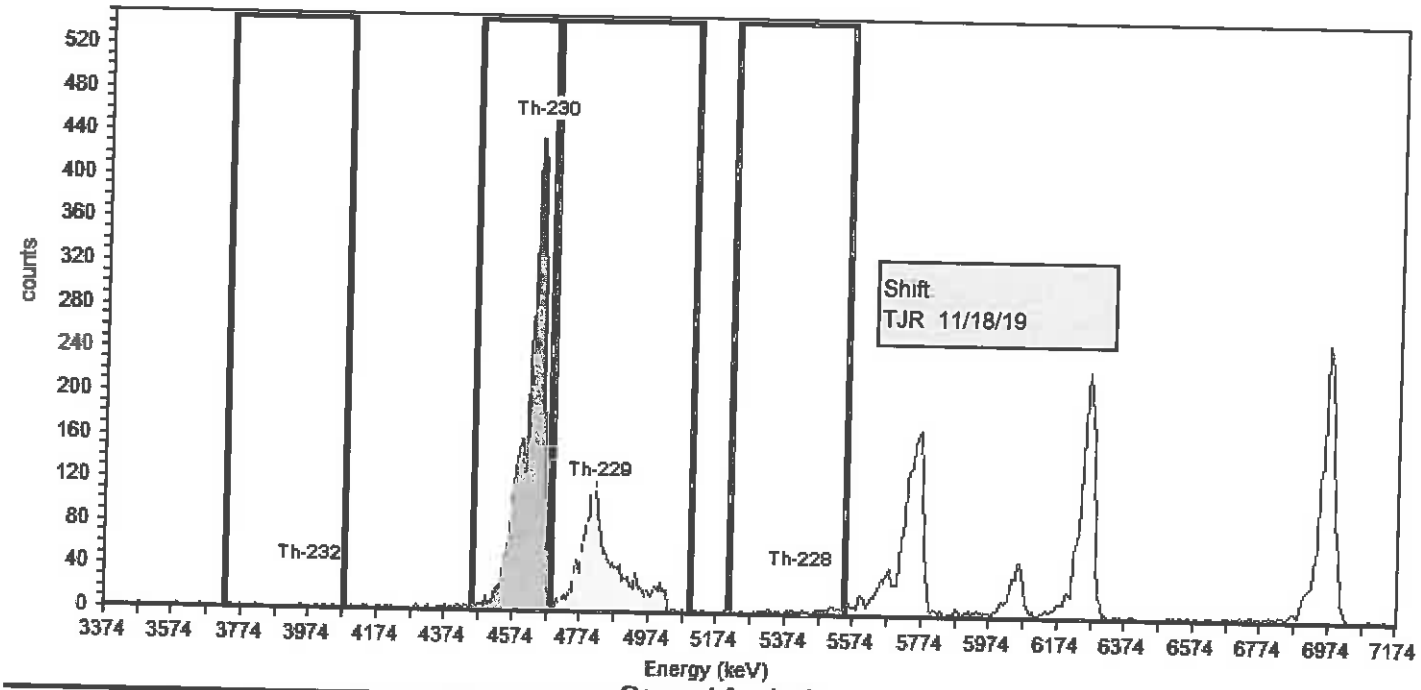
Tracer Name: Th-229_00028
Tracer Activity: 66.16 DPM / mL x (Vol.) 0.10 mL = 6.62 DPM
Tracer Ref. Date: 8/29/2018 9:44:32AM

Tracer Nuclide: Th-229
Tracer Recovery: 102.72%

Acquisition

Detector: AV246 SN: 51-005Q2
Acquisition Start Date: 11/16/2019 1:40:36PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/9/2019 2:31:27PM
Bkgd Info: Sample: ICB;AV246; Det: AV246; Spectrum #1; 11/9/2019 2:31:27 PM

Energy Calibration: IC-7107;AV246-11152018
Efficiency Calibration:IC-7107;AV246-11152018
Calibration Date: 11/15/2018 10:58:54PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.21% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Interactive ROI Analysis
Decay Correction:11/16/2019 1:38:32PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	29.9	100.2	8	2.0000	6.00	3.479E+001	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4679.5	46.7	~~23.4~~ 99.7	3412	1.0000	3411.00	~~8.470E+004~~	pCi/L
Th-229	4828.6	4,845.3	-16.7	4686.9	5097.1	70.6	99.8	1711	5.0000	1706.00	1.020E+004	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	.0	99.8	84	14.0000	70.00	4.077E+002	pCi/L

TJK 11/18/19

84700 . .234/.997 = 19879

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:35:47AM 11/18/2019

Sample

Sample Name: 160-36383-A-1-D Type: Sample
Spectrum #1 Analysis #1
: 160-36383-A-1-D
Sample Collection Date: 11/15/2019 12:00:00PM
Comment:

Sample Volume : 0.00 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 450711
AnalysisResultsID: 246266
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

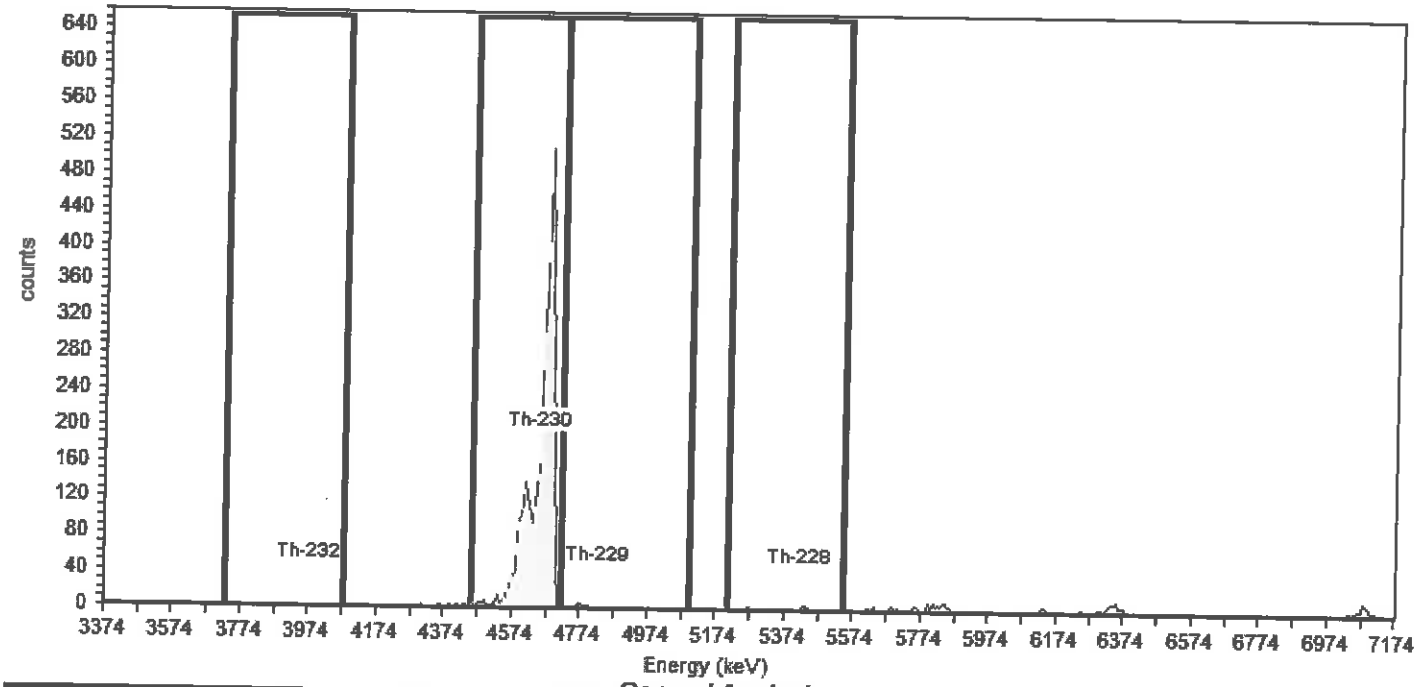
Tracer Name: Th-230_00053
Tracer Activity: 45.09 DPM / mL x (Vol.) 0.30 mL = 13.53 DPM
Tracer Ref. Date: 10/29/2019 9:30:47AM

Tracer Nuclide: Th-230
Tracer Recovery: 94.74%

Acquisition

Detector: AV247 SN: 51-027F3
Acquisition Start Date: 11/16/2019 1:40:36PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 11/9/2019 2:31:27PM
Bkgd Info: Sample: ICB;AV247; Det: AV247; Spectrum #1; 11/9/2019 2:31:27 PM

Energy Calibration: IC-8874;AV247-11152018
Efficiency Calibration:IC-8874;AV247-11152018
Calibration Date: 11/16/2018 11:45:39AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.31% +/- 0.37% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-230 (T)
Decay Correction:11/16/2019 1:38:32PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	32.5	100.2	4	0.0000	4.00	2.505E+001	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	19.6	99.7	3227	0.0000	3227.00	1.924E+004	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	42.6	99.6	19	9.0000	10.00	6.298E+001	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	43.0	99.8	22	12.0000	10.00	6.290E+001	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:36:27AM 11/18/2019

Sample

Sample Name: 160-36383-A-1-E Type: Sample
Spectrum #1 Analysis #1
: 160-36383-A-1-E
Sample Collection Date: 11/15/2019 12:00:00PM
Comment:

Sample Volume : 0.00 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 450711
AnalysisResultsID: 246267
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

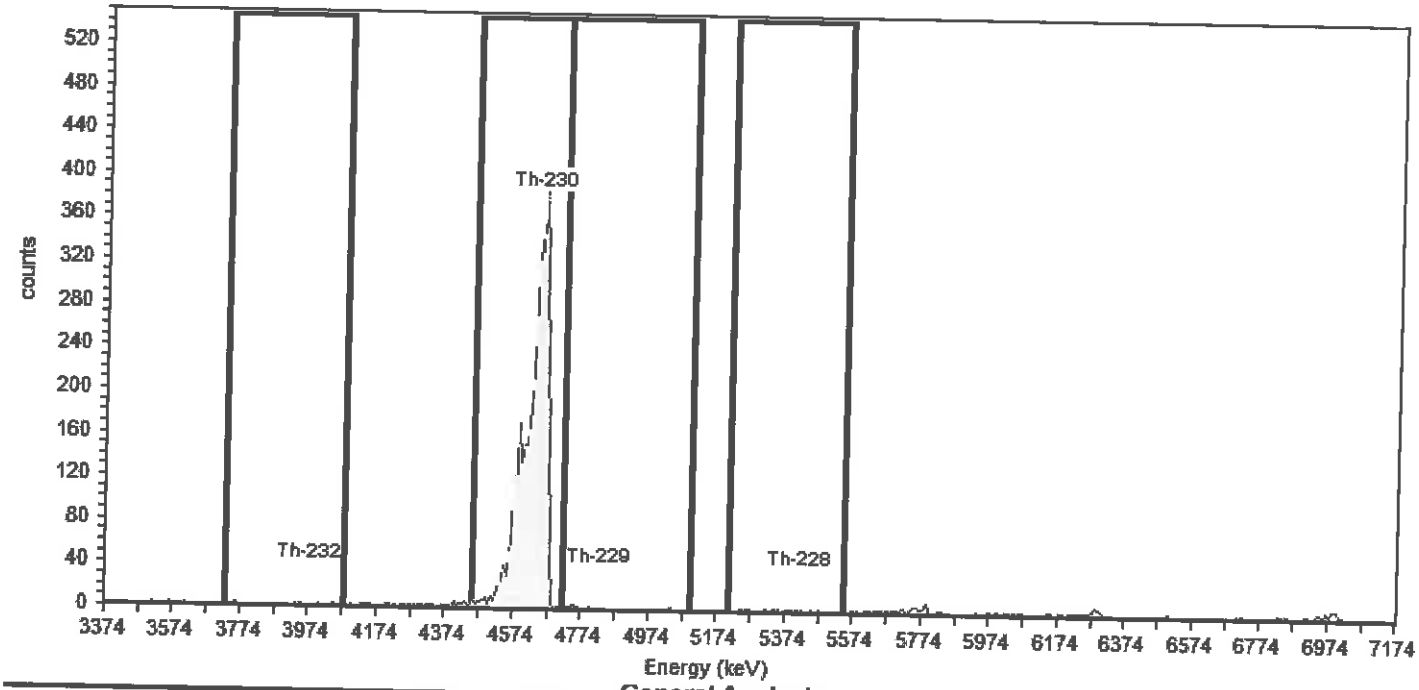
Tracer Name: Th-230_00053
Tracer Activity: 45.09 DPM / mL x (Vol.) 0.30 mL = 13.53 DPM
Tracer Ref. Date: 10/29/2019 9:30:47AM

Tracer Nuclide: Th-230
Tracer Recovery: 110.62%

Acquisition

Detector: AV249 SN: 51-005EE5
Acquisition Start Date: 11/16/2019 1:40:36PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/9/2019 2:31:28PM
Bkgd Info: Sample: ICB;AV249; Det: AV249; Spectrum #1; 11/9/2019 2:31:28 PM

Energy Calibration: IC-9520;AV249-11152018
Efficiency Calibration:IC-9520;AV249-11152018
Calibration Date: 11/15/2018 10:59:03PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.81% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-230 (T)
Decay Correction:11/16/2019 1:38:32PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	9.5	100.2	5	1.0000	4.00	2.371E+001	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	65.6	99.7	3411	1.0000	3410.00	2.247E+004	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	39.7	99.6	19	7.0000	12.00	7.152E+001	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	186.1	99.8	17	13.0000	4.00	2.381E+001	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:37:05AM 11/18/2019

Sample

Sample Name: 160-36383-A-1-F Type: Sample
Spectrum #1 Analysis #1
: 160-36383-A-1-F
Sample Collection Date: 11/15/2019 12:00:00PM
Comment:

Sample Volume : 0.00 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 450711
AnalysisResultsID: 246268
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

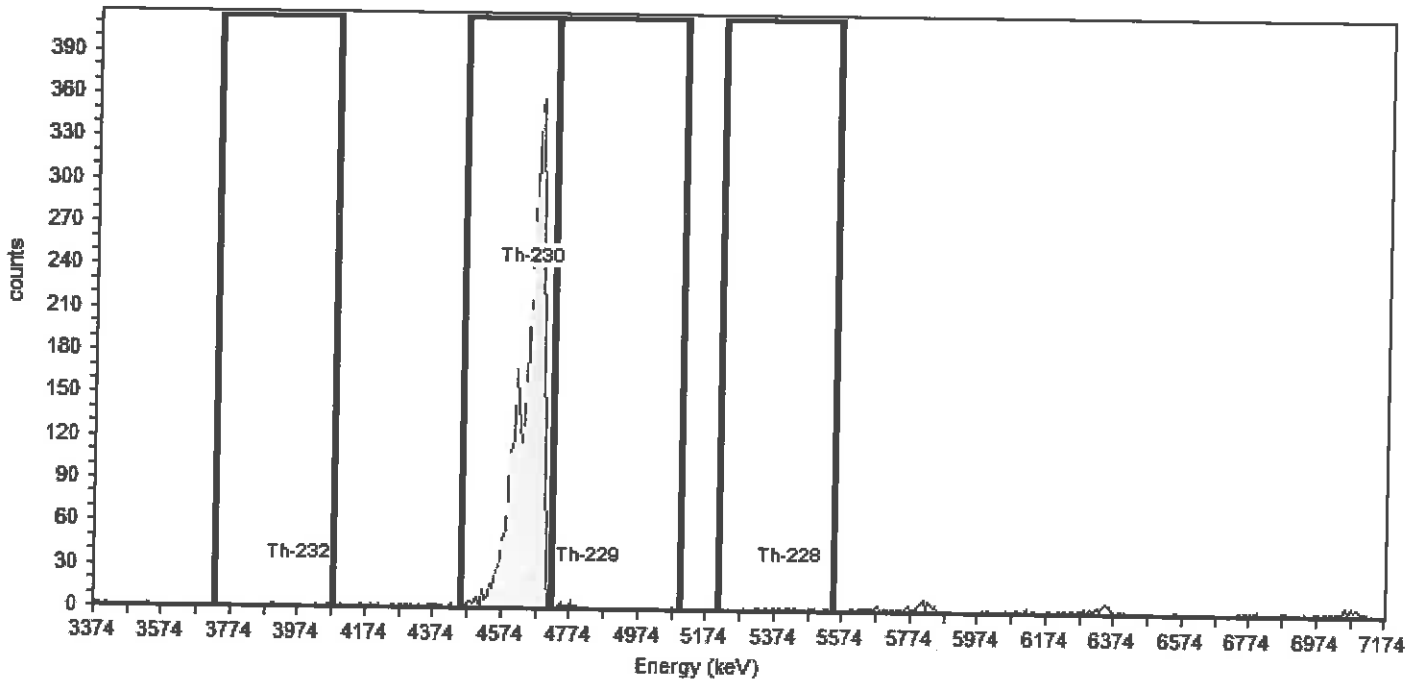
Tracer Name: Th-230_00053
Tracer Activity: 45.09 DPM / mL x (Vol.) 0.30 mL = 13.53 DPM
Tracer Ref. Date: 10/29/2019 9:30:47AM

Tracer Nuclide: Th-230
Tracer Recovery: 107.83%

Acquisition

Detector: AV250 SN: 47-052x7
Acquisition Start Date: 11/16/2019 1:40:36PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 11/9/2019 2:31:28PM
Bkgd Info: Sample: ICB;AV250; Det: AV250; Spectrum #1; 11/9/2019 2:31:28 PM

Energy Calibration: IC-9792;AV250-11152018
Efficiency Calibration:IC-9792;AV250-11152018
Calibration Date: 11/15/2018 10:59:07PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.66% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-230 (T)
Decay Correction:11/16/2019 1:38:32PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	10.4	100.2	3	7.0000	-4.00	2.556E+001	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	19.5	99.7	3168	5.0000	3163.00	2.190E+004	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	51.0	99.6	20	7.0000	13.00	8.353E+001	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	134.4	99.8	17	16.0000	1.00	6.418E+000	pCi/L

Rad Worksheet

Batch Number: 160-450711
Method: ExtChrom
Analyst: Mazariegos, Chelsea M

Date Open: Nov 15 2019 4:08PM
Batch End: Nov 15 2019 4:41PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Th-229_00028	Th-230_00053	Th-230_00057
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL

Balance ID: N/A
Analyst ID - Reagent Drop: CMM
Analyst ID - Reagent Drop Witness: KLH per CMM
Pipette ID: RAD104
Analyst ID - Column: N/A
Column Date: N/A
Analyst ID - CoPrecipitation: CMM
CoPrecipitation Date: 11/15/2019
SOP Number: ST-RC-0100

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Radiochemistry Data Review Checklist

Batch: 450711 **Analysis:** Thorium, Isotopic by Alpha Spectroscopy

Review Item	Yes	No	N/A	2 Rvw
Rad Prep				
1 Are all samples on batch sheet present or removed from batch?	☑	☐	☐	☐
2 Are all samples, QC and methods in compliance with client requirements?	☑	☐	☐	☐
3 Were forms checked for transcription errors?	☑	☐	☐	☐
4 Are all TALS entries complete? (End Dates and appropriate worksheet fields completed)	☑	☐	☐	☐
5 Are all problems and deviations documented? (NCM printed and attached with paperwork)	☐	☐	☑	☐
6 Does this batch contain re-extracts?	☐	☑	☐	☐
Sample Analysis				
1 Are carrier/tracer yields within acceptance limits? 183810	☐	☑	☐	☐
2 Were all sample holding times met?	☑	☐	☐	☐
3 If alpha or LSC, were samples analyzed using normal ROI's, and were spectra evaluated for interferences? 183815	☑	☐	☐	☐
QC Samples				
1 Is the blank activity </= MDA	☐	☐	☑	☐
2 Is the blank activity </= client CRDL?	☐	☐	☑	☐
3 If blank activity exceeds limit, is sample activity >/= 5X blank activity?	☐	☐	☑	☐
4 Is LCS recovery within acceptance limits?	☐	☐	☑	☐
5 Is duplicate precision (e.g. RPD/RER/DER/z-score) within acceptance limits?	☐	☐	☑	☐
6 Is MS/MSD recovery within acceptance limits?	☐	☐	☑	☐
7 Do samples meet CRDL?	☐	☐	☑	☐
8 Is the absolute value of any negative result < 3sigma uncert.?	☐	☐	☑	☐
Other				
1 Are all nonconformances documented and noted? 183819, 183821	☑	☐	☐	☐
2 Were manual data entries and/or calculations checked?	☐	☐	☑	☐
Data Packaging				
1 Run logs included?	☐	☐	☐	☐
2 Daily checks included?	☐	☐	☐	☐
3 Backgrounds included?	☐	☐	☐	☐
4 Calibrations included?	☐	☐	☐	☐

Lot Number	Analytical Due Date
160-36383-A-1-A	
160-36383-A-1-B	
160-36383-A-1-C	
160-36383-A-1-D	
160-36383-A-1-E	
160-36383-A-1-F	
160-36383-A-2-A	
160-36383-A-2-B	
160-36383-A-2-C	
160-36383-A-2-D	
160-36383-A-2-E	
160-36383-A-2-F	

Batch: 450711 **Analysis:** Thorium, Isotopic by Alpha Spectroscopy

Comments:

Prep Analyst: cmm Date: 11/15/2019

Analyst: _____ Date: _____

Second Level Reviewer _____ Date: _____

Date Uploaded: _____

Date Verified: _____

Date Review Released: _____

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

960min
240min. pe 11/16/19

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Preparation, Extraction Chromatography Resin Actinide Separation

TA 1.00 pi/L

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Div Rank	Comments	Output Sample Lab ID
1	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ adjust 244	160-36383-A-1-A
2	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	adjust / 245	160-36383-A-1-B
3	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 246 swift	160-36383-A-1-C
4	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 247	160-36383-A-1-D
5	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 249	160-36383-A-1-E
6	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 250	160-36383-A-1-F
8	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	1	160-36383-A-2-A
9	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	3	160-36383-A-2-B
10	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	4	160-36383-A-2-C
11	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	14 6	160-36383-A-2-D
12	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	15 7	160-36383-A-2-E
									16 8 pe 11/16/19	160-36383-A-2-F

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Isotopic Thorium (Alpha Spectrometry)

	Input Sample Lab ID (Analytical Method)	(Sub-List)	Analytes
1	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
2	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
3	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
4	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
5	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
6	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
7	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
8	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
9	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
10	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
11	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
12	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232

Analytes that are not being reported with be displayed in [...] brackets. Analytes that are not being reported but are on the spike list with be displayed in (...) parentheses.

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Batch Notes

Balance ID	N/A
Analyst ID - Reagent Drop	CMM
Analyst ID - Reagent Drop Witness	KLH per CMM
Pipette ID	RAD104
Analyst ID - Column	N/A
Column Date	N/A
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	11/15/2019
SOP Number	ST-RC-0100
Batch Comment	

Comments

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
160-36383-A-1	Th-229_00028	0.1 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-229_00028	0.1 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-229_00028	0.1 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-2	Th-229_00028	0.1 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-229_00028	0.1 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-229_00028	0.1 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-230_00057	0.3 mL			

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

160-36383-A-2	Th-230_00057	0.3 mL			

Other Reagents:

Reagent	Amount/Units	Lot#:

Rad Worksheet

Batch Number: 160-450711
Method: ExtChrom
Analyst: Mazariegos, Chelsea M

Date Open: Nov 15 2019 4:08PM
Batch End: Nov 15 2019 4:41PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Th-229_00028	Th-230_00053	Th-230_00057
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL

Balance ID: N/A
Analyst ID - Reagent Drop: CMM
Analyst ID - Reagent Drop Witness: KLH per CMM
Pipette ID: RAD104
Analyst ID - Column: N/A
Column Date: N/A
Analyst ID - CoPrecipitation: CMM
CoPrecipitation Date: 11/15/2019
SOP Number: ST-RC-0100

Reagent

Th-230_00054

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 114475
Source Description: 5 mL Liquid in Flame Sealed Ampoule
Product Code: 8230
Customer: Test America Laboratories- St. Louis
P.O. Number: 3053229, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA). The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 29-October-2019 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty			Calibration Method**
			u_A, %	u_B, %	U, %*	
Th-230	2.753E+07	3.843E+03	0.2	1.0	2.0	4π LS

***Uncertainty:** U - Relative expanded uncertainty, $k = 2$. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Reagent

Th-230_00056

Standard ID Number: Th-230_00057
True Value = 20627 pCi/L or g
Date Analyzed: 11/16/2019

Radionuclide: Th-230

	Replicates	
#1	19791	pCi/L or g
#2	20695	pCi/L or g
#3	18802	pCi/L or g

Mean = 19762.667

1 sigma = 946.818

1.96 sigma = 1855.763

True Value minus 5% = 19595.65 (True Value - 5%)
True Value plus 5% = 21658.35 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: TJR 11/18/19

2nd Reviewed By/Date: 11/18/19

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	10/29/2019 0:00		
Decayto Date/Time (t):	11/16/19 0:00		
Initial Activity (A_0):	45.79 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	45.7916 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-230		
Half-Life (days):	27539850	decay days	fraction
****Decay Factor:**	1.0000	18.00	0.00000
Decay Corr Activity:	4.5792E+01 dpm		
Decay Corr Conc:	4.5792E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	pCi
Activity Unit Factor:	0.45045
Final Volume Unit:	L
Volume Unit Factor:	0.001
Final Concentration:	2.0627E+04 pCi/L
Aliquot Volume:	1.0000E+00 L
Final Activity (A):	2.0627E+04 pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:43:23AM 11/17/2019

Sample

Sample Name: 160-36383-A-2-A
SampleType: Sample
: 160-36383-A-2-A
Sample Collection Date: 11/15/2019 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 450711
AnalysisID: 775471

Analyst: 60040

Tracer

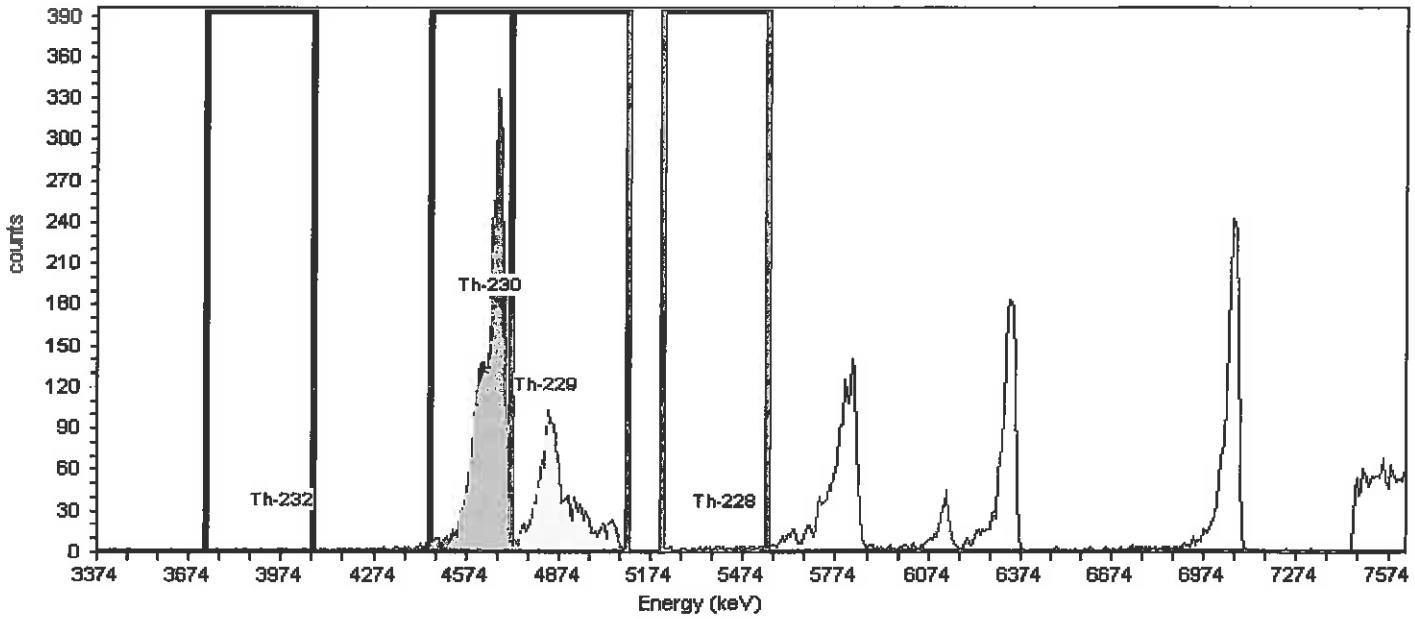
Tracer Name: Th-229_00028
Tracer Activity: 66.16 DPM/mL x (Vol.)0.10 mL = 6.62 DPM
Tracer Ref. Date: 8/29/2018 12:00:31PM

Tracer Nuclide: Th-229
Tracer Recovery: 101.73%

Acquisition

Detector: AV1
Serial Number: 49-188 AA4
Acquisition Start Date: 11/16/2019 1:42:29PM
Live Time: 960.00 min.
Real Time: 960.03 min.
Background Date: 11/13/2019 1:56:34PM
Background Info: Sample: ICB;AV1; Det: AV1; Spectrum #2; Nov-13-2019 13:56

Calibration Name: IC-7107;AV1-05142018
Calibration Date: 5/14/2018 6:23:45PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.36% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-229 (T)
Decay Correction: 11/16/2019 1:41:05PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	32.5	100.2	9	4.0000	5.00	31.497	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	23.5	99.7	3137	11.0000	3126.00	19,790.970	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	78.3	99.6	1571	3.0000	1568.00	10,105.280	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	27.5	99.8	51	7.0000	44.00	278.400	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:51:27AM 11/18/2019

Sample

Sample Name: 160-36383-A-2-B
SampleType: Sample
: 160-36383-A-2-B
Sample Collection Date: 11/15/2019 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 450711
AnalysisID: 775566

Analyst: 60040

Tracer

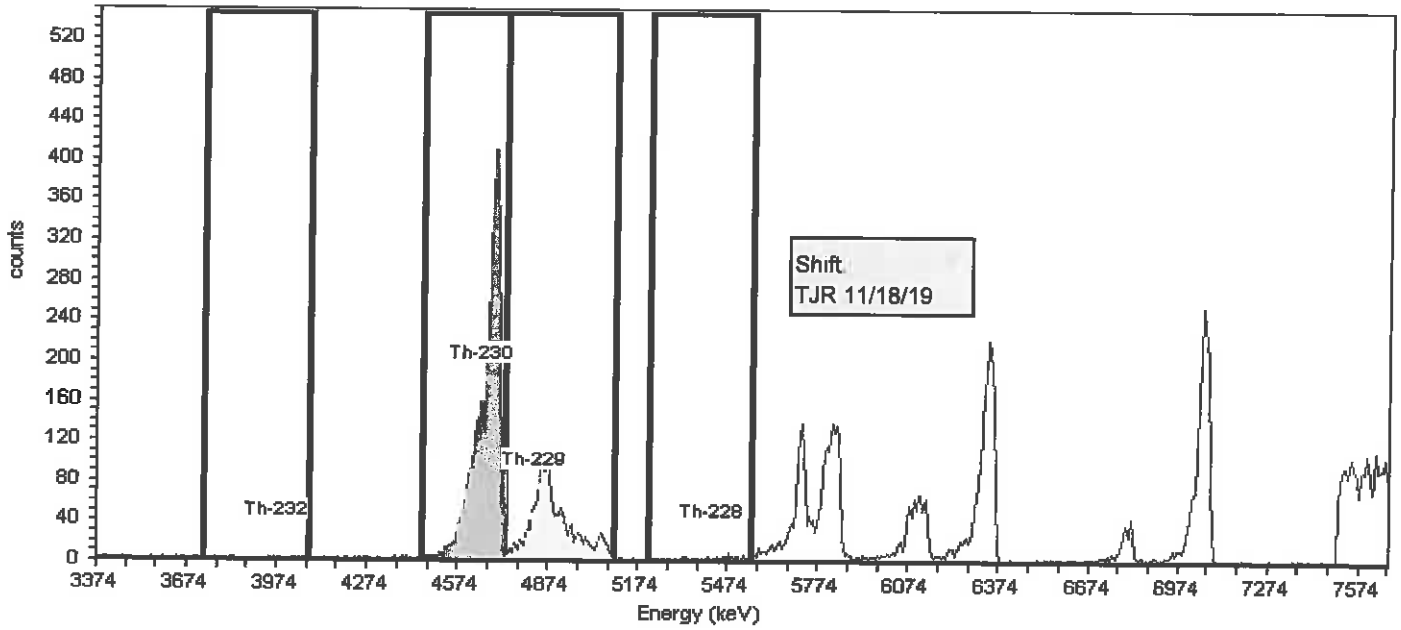
Tracer Name: Th-229_00028
Tracer Activity: 66.16 DPM/mL x (Vol.)0.10 mL = 6.62 DPM
Tracer Ref. Date: 8/29/2018 12:00:31PM

Tracer Nuclide: Th-229
Tracer Recovery: 102.38%

Acquisition

Detector: AV3
Serial Number: 49-202 FF7
Acquisition Start Date: 11/16/2019 1:42:31PM
Live Time: 960.00 min.
Real Time: 960.03 min.
Background Date: 11/13/2019 1:56:37PM
Background Info: Sample: ICB;AV3; Det: AV3; Spectrum #2; Nov-13-2019 13:56

Calibration Name: IC-8877;AV3-05142018
Calibration Date: 5/14/2018 6:25:15PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.44% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-229 (T)
Decay Correction: 11/16/2019 1:41:05PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	12.1	100.2	14	16.0000	-2.00	-12.480	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4731.7	22.3	99.7	3313	13.0000	3300.00	20,694.600	pCi/L
Th-229	4828.6	4,845.3	-16.7	4731.7	5097.1	82.4	99.6	1591	8.0000	1583.00	10,169.700	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	18.4	99.8	79	4.0000	75.00	470.050	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:42:33AM 11/17/2019

Sample

Sample Name: 160-36383-A-2-C
SampleType: Sample
: 160-36383-A-2-C
Sample Collection Date: 11/15/2019 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 450711
AnalysisID: 775467

Analyst: 60040

Tracer

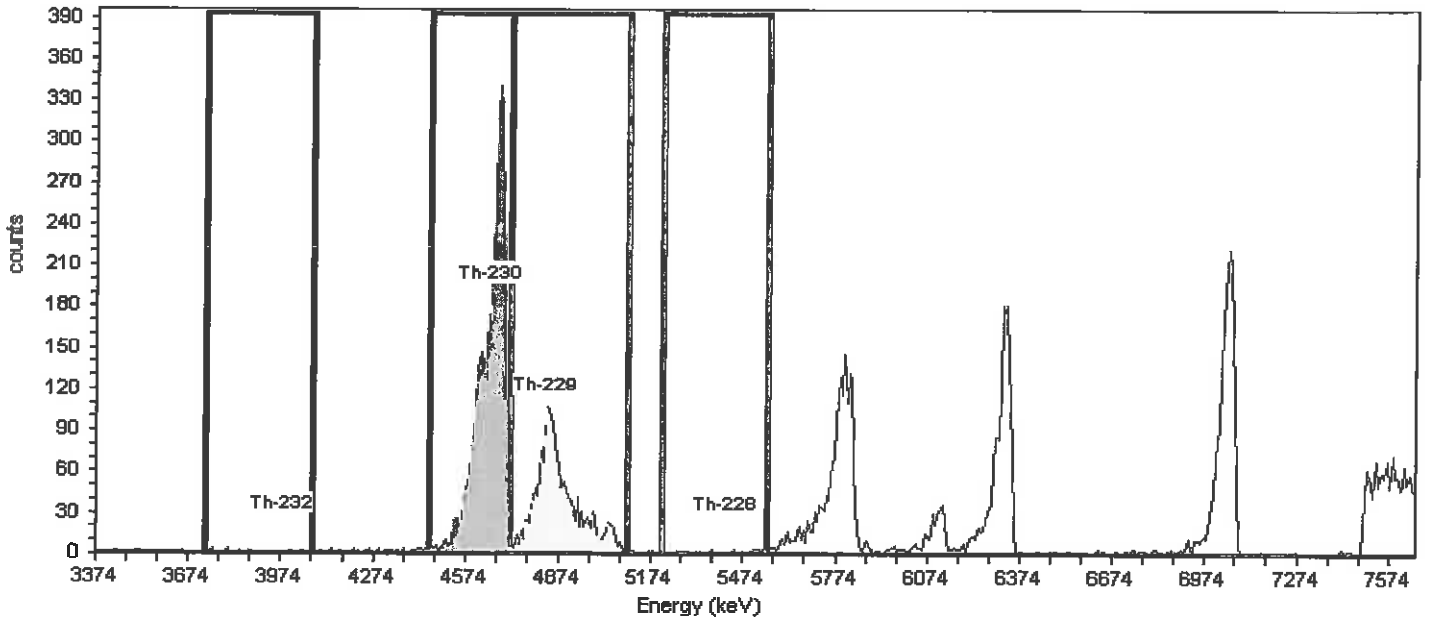
Tracer Name: Th-229_00028
Tracer Activity: 66.16 DPM/mL x (Vol.)0.10 mL = 6.62 DPM
Tracer Ref. Date: 8/29/2018 12:00:31PM

Tracer Nuclide: Th-229
Tracer Recovery: 116.50%

Acquisition

Detector: AV4
Serial Number: 46-033Q4
Acquisition Start Date: 11/16/2019 1:42:33PM
Live Time: 960.00 min.
Real Time: 960.03 min.
Background Date: 11/13/2019 1:54:23PM
Background Info: Sample: ICB;AV4; Det: AV4; Spectrum #2; Nov-13-2019 13:54

Calibration Name: IC-9520;AV4-05142018
Calibration Date: 5/14/2018 6:25:34PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.79% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-229 (T)
Decay Correction: 11/16/2019 1:41:05PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	305.2	100.2	9	7.0000	2.00	11.759	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	24.7	99.7	3184	2.0000	3182.00	18,802.470	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	87.4	99.6	1685	5.0000	1680.00	11,572.560	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	29.2	99.8	33	7.0000	26.00	153.542	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:42:35AM 11/18/2019

Sample

Sample Name: 160-36383-A-2-D
SampleType: Sample
: 160-36383-A-2-D
Sample Collection Date: 11/15/2019 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 450711
AnalysisID: 775571

Analyst: 60040

Tracer

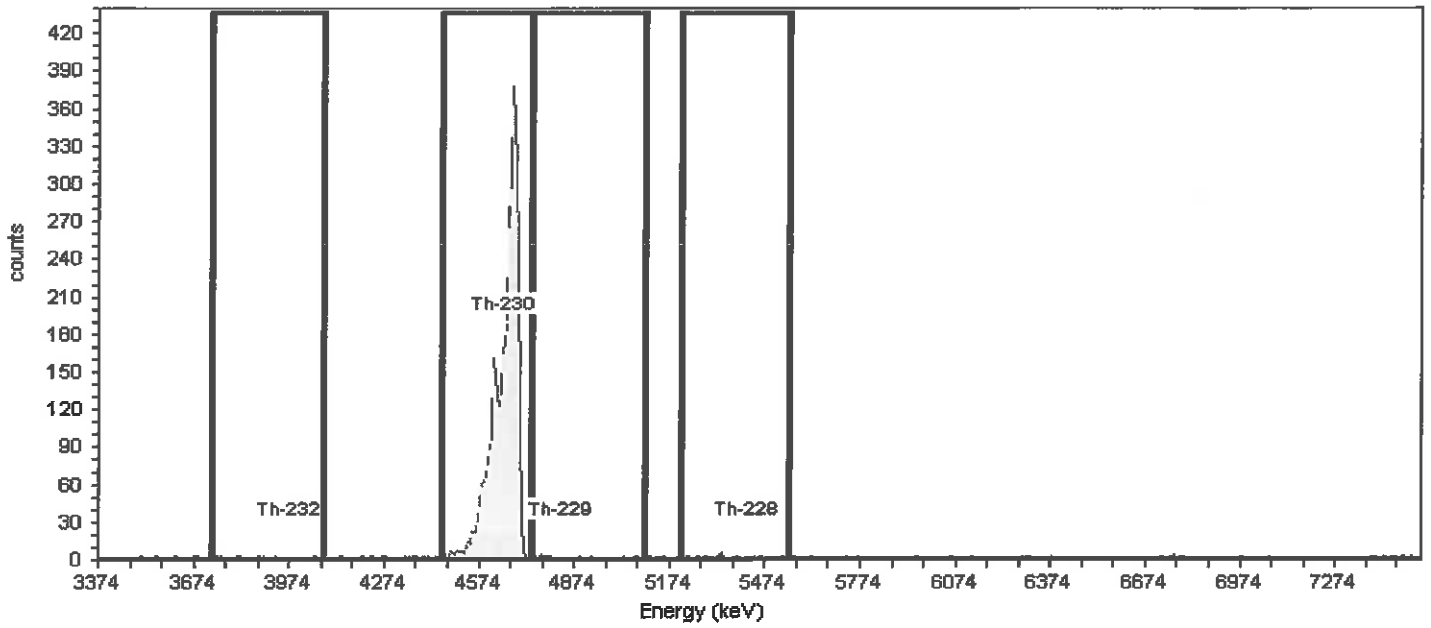
Tracer Name: Th-230_00057
Tracer Activity: 45.79 DPM/mL x (Vol.)0.30 mL = 13.74 DPM
Tracer Ref. Date: 10/29/2019 11:00:53AM

Tracer Nuclide: Th-230
Tracer Recovery: 89.46%

Acquisition

Detector: AV14
Serial Number: 50-060W4
Acquisition Start Date: 11/16/2019 1:42:42PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/13/2019 1:54:35PM
Background Info: Sample: ICB;AV14; Det: AV14; Spectrum #2; Nov-13-2019 13:54

Calibration Name: IC-1370622;AV14-05142018
Calibration Date: 5/14/2018 6:27:53PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-230 (T)
Decay Correction: 11/16/2019 1:41:05PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	15.9	100.2	9	2.0000	7.00	46.270	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4739.1	63.3	99.7	3108	3.0000	3105.00	18,452.200	pCi/L
Th-229	4828.6	4,845.3	-16.7	4739.1	5097.1	306.2	99.6	18	3.0000	15.00	99.700	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	223.9	99.8	14	11.0000	3.00	19.917	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:42:50AM 11/18/2019

Sample

Sample Name: 160-36383-A-2-E
SampleType: Sample
: 160-36383-A-2-E
Sample Collection Date: 11/15/2019 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 450711
AnalysisID: 775569

Analyst: 60040

Tracer

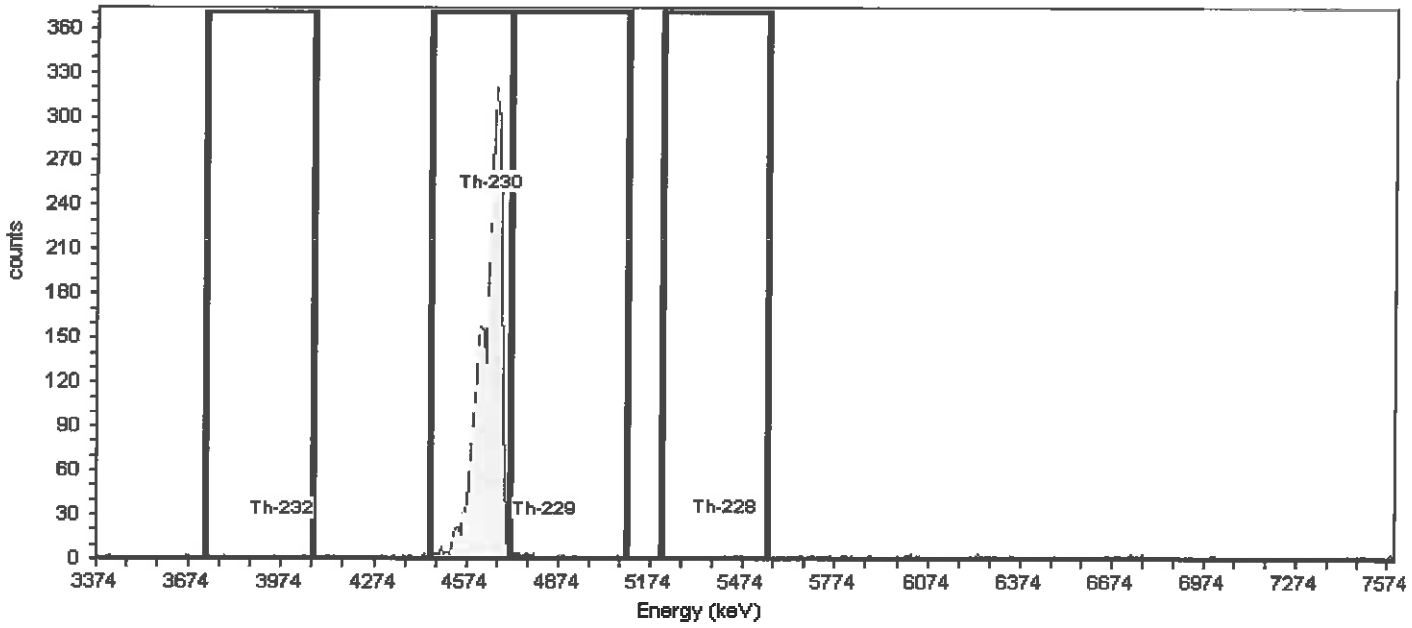
Tracer Name: Th-230_00057
Tracer Activity: 45.79 DPM/mL x (Vol.)0.30 mL = 13.74 DPM
Tracer Ref. Date: 10/29/2019 11:00:53AM

Tracer Nuclide: Th-230
Tracer Recovery: 86.22%

Acquisition

Detector: AV15
Serial Number: 41-172C5
Acquisition Start Date: 11/16/2019 1:42:43PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/13/2019 1:54:37PM
Background Info: Sample: ICB;AV15; Det: AV15; Spectrum #2; Nov-13-2019 13:54

Calibration Name: IC-1370619;AV15-05142018
Calibration Date: 5/14/2018 6:28:04PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 27.26% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-230 (T)
Decay Correction: 11/16/2019 1:41:05PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	29.5	100.2	5	5.0000	0.00	0.000	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	33.0	99.7	3098	8.0000	3090.00	17,785.010	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	60.9	99.6	19	9.0000	10.00	66.789	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	55.9	99.8	4	6.0000	-2.00	-13.343	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:43:04AM 11/18/2019

Sample

Sample Name: 160-36383-A-2-F
SampleType: Sample
: 160-36383-A-2-F
Sample Collection Date: 11/15/2019 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 450711
AnalysisID: 775570

Analyst: 60040

Tracer

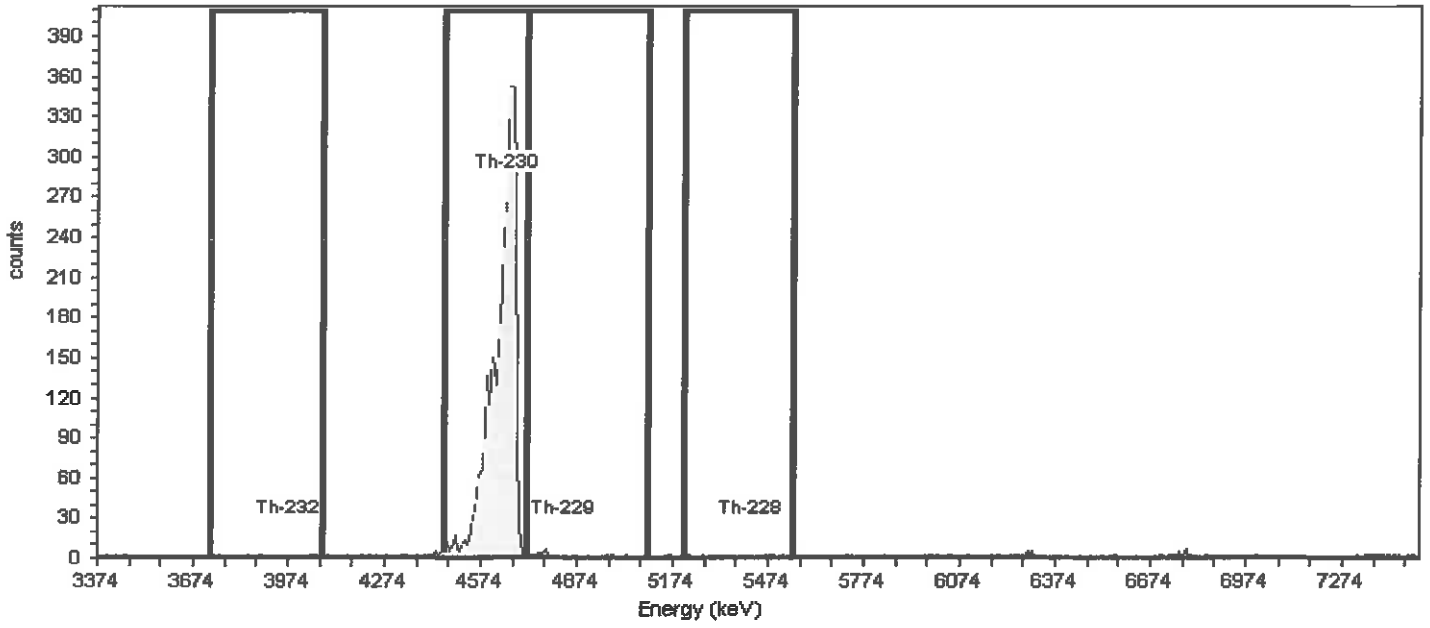
Tracer Name: Th-230_00057
Tracer Activity: 45.79 DPM/mL x (Vol.)0.30 mL = 13.74 DPM
Tracer Ref. Date: 10/29/2019 11:00:53AM

Tracer Nuclide: Th-230
Tracer Recovery: 93.47%

Acquisition

Detector: AV16
Serial Number: 51-082B6
Acquisition Start Date: 11/16/2019 1:42:45PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/13/2019 1:54:38PM
Background Info: Sample: ICB;AV16; Det: AV16; Spectrum #2; Nov-13-2019 13:54

Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = Thorium_Th-230 (T)
Decay Correction: 11/16/2019 1:41:05PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3971.0	4,010.0	-39.0	3724.9	4075.4	23.8	100.2	7	1.0000	6.00	37.170	pCi/L
Th-230	4649.7	4,687.5	-37.8	4455.8	4716.8	42.4	99.7	3321	8.0000	3313.00	19,279.790	pCi/L
Th-229	4828.6	4,845.3	-16.7	4716.8	5097.1	.0	99.6	28	6.0000	22.00	137.046	pCi/L
Th-228	5417.8	5,423.3	-5.5	5209.0	5552.0	10.3	99.8	6	5.0000	1.00	6.222	pCi/L

Rad Worksheet

Batch Number: 160-450711
Method: ExtChrom
Analyst: Mazariegos, Chelsea M

Date Open: Nov 15 2019 4:08PM
Batch End: Nov 15 2019 4:41PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Th-229_00028	Th-230_00053	Th-230_00057
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL

Page 94 of 588

Balance ID: N/A
Analyst ID - Reagent Drop: CMM
Analyst ID - Reagent Drop Witness: KLH per CMM
Pipette ID: RAD104
Analyst ID - Column: N/A
Column Date: N/A
Analyst ID - CoPrecipitation: CMM
CoPrecipitation Date: 11/15/2019
SOP Number: ST-RC-0100

8/24/2023 9:47 AM

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Radiochemistry Data Review Checklist

Batch: 450711 **Analysis:** Thorium, Isotopic by Alpha Spectroscopy

Review Item	Yes	No	N/A	2 Rvw
Rad Prep				
1 Are all samples on batch sheet present or removed from batch?	☑	☐	☐	☐
2 Are all samples, QC and methods in compliance with client requirements?	☑	☐	☐	☐
3 Were forms checked for transcription errors?	☑	☐	☐	☐
4 Are all TALS entries complete? (End Dates and appropriate worksheet fields completed)	☑	☐	☐	☐
5 Are all problems and deviations documented? (NCM printed and attached with paperwork)	☐	☐	☑	☐
6 Does this batch contain re-extracts?	☐	☑	☐	☐
Sample Analysis				
1 Are carrier/tracer yields within acceptance limits? 183810	☐	☑	☐	☐
2 Were all sample holding times met?	☑	☐	☐	☐
3 If alpha or LSC, were samples analyzed using normal ROI's, and were spectra evaluated for interferences? 183815	☑	☐	☐	☐
QC Samples				
1 Is the blank activity </= MDA	☐	☐	☑	☐
2 Is the blank activity </= client CRDL?	☐	☐	☑	☐
3 If blank activity exceeds limit, is sample activity >/= 5X blank activity?	☐	☐	☑	☐
4 Is LCS recovery within acceptance limits?	☐	☐	☑	☐
5 Is duplicate precision (e.g. RPD/RER/DER/z-score) within acceptance limits?	☐	☐	☑	☐
6 Is MS/MSD recovery within acceptance limits?	☐	☐	☑	☐
7 Do samples meet CRDL?	☐	☐	☑	☐
8 Is the absolute value of any negative result < 3sigma uncert.?	☐	☐	☑	☐
Other				
1 Are all nonconformances documented and noted? 183819, 183821	☑	☐	☐	☐
2 Were manual data entries and/or calculations checked?	☐	☐	☑	☐
Data Packaging				
1 Run logs included?	☐	☐	☐	☐
2 Daily checks included?	☐	☐	☐	☐
3 Backgrounds included?	☐	☐	☐	☐
4 Calibrations included?	☐	☐	☐	☐

Lot Number	Analytical Due Date
160-36383-A-1-A	
160-36383-A-1-B	
160-36383-A-1-C	
160-36383-A-1-D	
160-36383-A-1-E	
160-36383-A-1-F	
160-36383-A-2-A	
160-36383-A-2-B	
160-36383-A-2-C	
160-36383-A-2-D	
160-36383-A-2-E	
160-36383-A-2-F	

Batch: 450711 **Analysis:** Thorium, Isotopic by Alpha Spectroscopy

Comments:

Prep Analyst: cmm Date: 11/15/2019

Analyst: _____ Date: _____

Second Level Reviewer _____ Date: _____

Date Uploaded: _____

Date Verified: _____

Date Review Released: _____

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

960min
240min pr 11/16/19

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Preparation, Extraction Chromatography Resin Actinide Separation

TA 1.00 pi/L

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Div Rank	Comments	Output Sample Lab ID
1	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ adjust 244	160-36383-A-1-A
2	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	adjust / 245	160-36383-A-1-B
3	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 246 shift	160-36383-A-1-C
4	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 247	160-36383-A-1-D
5	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 249	160-36383-A-1-E
6	160-36383-A-1 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	/ 250	160-36383-A-1-F
8	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	1	160-36383-A-2-A
9	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	3	160-36383-A-2-B
10	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	4	160-36383-A-2-C
11	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	14 6	160-36383-A-2-D
12	160-36383-A-2 (A01R_Th)	N/A (160-36383-1)	Water	0.3 mL		12/12/19	18_Days	2	15 7	160-36383-A-2-E
									16 8 pr 11/16/19	160-36383-A-2-F

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Isotopic Thorium (Alpha Spectrometry)

	Input Sample Lab ID (Analytical Method)	(Sub-List)	Analytes
1	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
2	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
3	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
4	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
5	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
6	160-36383-A-1 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
7	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
8	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
9	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
10	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
11	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232
12	160-36383-A-2 (A01R_Th)	(Standard Target List)	Th-228, Th-229, Th-230, Th-232

Analytes that are not being reported with be displayed in [...] brackets. Analytes that are not being reported but are on the spike list with be displayed in (...) parentheses.

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Batch Notes

Balance ID	N/A
Analyst ID - Reagent Drop	CMM
Analyst ID - Reagent Drop Witness	KLH per CMM
Pipette ID	RAD104
Analyst ID - Column	N/A
Column Date	N/A
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	11/15/2019
SOP Number	ST-RC-0100
Batch Comment	

Comments

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
160-36383-A-1	Th-229_00028	0.1 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-229_00028	0.1 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-229_00028	0.1 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-1	Th-230_00053	0.3 mL			
160-36383-A-2	Th-229_00028	0.1 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-229_00028	0.1 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-229_00028	0.1 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-230_00057	0.3 mL			
160-36383-A-2	Th-230_00057	0.3 mL			

ExtChrom_Actin Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-450711

Analyst: Mazariegos, Chelsea M

Batch Open: 11/15/2019 4:08:00PM

Batch End: 11/15/2019 4:41:00PM

160-36383-A-2	Th-230_00057	0.3 mL			

Other Reagents:

Reagent	Amount/Units	Lot#:

Rad Worksheet

Batch Number: 160-450711
Method: ExtChrom
Analyst: Mazariegos, Chelsea M

Date Open: Nov 15 2019 4:08PM
Batch End: Nov 15 2019 4:41PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Th-229_00028	Th-230_00053	Th-230_00057
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL	0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-1	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL		0.3 mL	
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL	0.1 mL		0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL
160-36383-A-2	Th-230 Std Verify 1	ExtChrom_Actin, A01R_Th	T	0.3 mL			0.3 mL

Balance ID: N/A
Analyst ID - Reagent Drop: CMM
Analyst ID - Reagent Drop Witness: KLH per CMM
Pipette ID: RAD104
Analyst ID - Column: N/A
Column Date: N/A
Analyst ID - CoPrecipitation: CMM
CoPrecipitation Date: 11/15/2019
SOP Number: ST-RC-0100

GAS FLOW PROPORTIONAL COUNTER

Method 903.0

Radium-226 (GFPC) by Method 903.0

Prep Batch: 622153

Preparation, Precipitate Separation (21-Day In-Growth)

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 622153

Lab Id: MB 160-622153/1-A | Analyzed: 08/22/23 08:00 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Red16 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	-0.01269	0.0413	0.0413	U	pCi/L	1.00	0.0993	6	76	.	1.	0.19551	3.273	1.	625099

Carrier	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03620				g		0.0408	88.7	30 - 110

Lab Id: LCS 160-622153/2-A | Analyzed: 08/22/23 08:01 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Red17 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	10.49	0.563	1.10		pCi/L	1.00	0.107	1410	107	.	1.	0.19412	3.273	1.	625099

Carrier	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03860				g		0.0408	94.6	30 - 110

Lab Id: 500-237220-1 | Analyzed: 08/22/23 08:19 | Decay Corrected: No | Ts: 100
Client ID: MW-05 | Detector: Red5 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.0672	0.0772	0.0775	U	pCi/L	1.00	0.126	23	144	.	1.	0.19696	3.2747	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0367				g		0.0408	90.0	30 - 110

Lab Id: 500-237220-2 | Analyzed: 08/22/23 08:20 | Decay Corrected: No | Ts: 100
Client ID: MW-06 | Detector: Red8 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.212	0.111	0.112		pCi/L	1.00	0.123	25	57	.	1.	0.16548	3.2748	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0335				g		0.0408	82.1	30 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 622153

Lab Id: 500-237220-3 Analyzed: 08/22/23 08:20 Decay Corrected: No Ts: 100
Client ID: MW-09 Detector: Red9 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.152	0.0904	0.0914		pCi/L	1.00	0.114	26	86	.	1.	0.20236	3.2748	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0317				g		0.0408	77.7	30 - 110

Lab Id: 500-237220-4 Analyzed: 08/22/23 08:20 Decay Corrected: No Ts: 100
Client ID: MW-10 Detector: Red10 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.349	0.140	0.143		pCi/L	1.00	0.140	40	81	.	1.	0.20264	3.2748	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0340				g		0.0408	83.3	30 - 110

Lab Id: 500-237220-5 Analyzed: 08/22/23 08:20 Decay Corrected: No Ts: 100
Client ID: MW-11 Detector: Red12 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.335	0.141	0.144		pCi/L	1.00	0.146	38	83	.	1.	0.19705	3.2748	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0333				g		0.0408	81.6	30 - 110

Lab Id: 500-237220-6 Analyzed: 08/22/23 08:21 Decay Corrected: No Ts: 100
Client ID: MW-12 Detector: Red13 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.144	0.0918	0.0927		pCi/L	1.00	0.121	26	97	.	1.	0.19823	3.2749	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0340				g		0.0408	83.3	30 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 622153

Lab Id:	500-237220-7	Analyzed:	08/22/23 08:21	Decay Corrected:	No	Ts:	100
Client ID:	2S/3S Duplicate	Detector:	Red14	Yield Truncated:	No	Tb:	1000
Sigma:	2	Dil Fac:	1	Calibration Type:	2		

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.0909	0.0796	0.0801	U	pCi/L	1.00	0.118	18	81	.	1.	0.19737	3.2749	1.	625099

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0344				g		0.0408	84.3	30 - 110

Lab Id:	500-237220-7 DU	Analyzed:	08/22/23 10:17	Decay Corrected:	No	Ts:	100
Client ID:	2S/3S Duplicate	Detector:	Red16	Yield Truncated:	No	Tb:	1000
Sigma:	2	Dil Fac:	1	Calibration Type:	2		

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-226	0.05405	0.0649	0.0651	U	pCi/L	1.00	0.106	14	76	.	1.	0.19838	3.2854	1.	625099

Carrier	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03340				g		0.0408	81.9	30 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-622153/1-A	Radium-226			-0.01269	U	pCi/L							-.6151
Lab Control Sample ID:	**Analyte**	**Parent Result**	**Spike Added**	**LCS Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
LCS 160-622153/2-A	Radium-226		11.3	10.49		pCi/L	93	75 - 125					-1.3551
Duplicate ID:	**Analyte**	**Parent Result**	**Spike Added**	**DU Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
500-237220-7	Radium-226	0.0909		0.05405	U	pCi/L			51	0.25	0.71	1	.7142

Glossary:

Ts = Count Duration, Sample
Tb = Count Duration, Background
Cs = Total Counts, Sample
Cb = Total Counts, Background
X Talk = Crosstalk
Decay = Decay Factor
Eff = Efficiency
I = Ingrowth Factor
A = Abundance

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: Eurofins St. Louis Job No.: 500-237220-2

SDG No.:

Batch Number: 622153 Batch Start Date: 07/31/23 10:32 Batch Analyst: Cox, Kevin A

Batch Method: PrecSep-21 Batch End Date: 08/14/23 16:21

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Ba_TareWt	Ba_GrossWt	Ba_Mass	IngDecDate1	IngDecDate2
MB 160-622153/1		PrecSep-21, 903.0		1000 mL	8.6974 g	8.7336 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
LCS 160-622153/2		PrecSep-21, 903.0		1000 mL	8.6705 g	8.7091 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-1	MW-05	PrecSep-21, 903.0	T	994.05 mL	8.7063 g	8.7430 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-2	MW-06	PrecSep-21, 903.0	T	923.67 mL	8.7179 g	8.7514 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-3	MW-09	PrecSep-21, 903.0	T	1003.56 mL	8.6845 g	8.7162 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-4	MW-10	PrecSep-21, 903.0	T	745.25 mL	8.6727 g	8.7067 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-5	MW-11	PrecSep-21, 903.0	T	758.23 mL	8.7120 g	8.7453 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-6	MW-12	PrecSep-21, 903.0	T	942.16 mL	8.6838 g	8.7178 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-C-7	2S/3S Duplicate	PrecSep-21, 903.0	T	900.34 mL	8.6640 g	8.6984 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11
500-237220-D-7 DU	2S/3S Duplicate	PrecSep-21, 903.0	T	999.73 mL	8.6624 g	8.6958 g	0.0408 g	08/01/2023 14:24	08/14/2023 13:11

Lab Sample ID	Client Sample ID	Method Chain	Basis	IngDecDate3	NativeMassBa	Ba carrier 00133	Ra-226 00041		
MB 160-622153/1		PrecSep-21, 903.0		08/22/2023 00:00	0 g	1 mL			
LCS 160-622153/2		PrecSep-21, 903.0		08/22/2023 00:00	0 g	1 mL	0.1 mL		
500-237220-C-1	MW-05	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			
500-237220-C-2	MW-06	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			
500-237220-C-3	MW-09	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			
500-237220-C-4	MW-10	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			
500-237220-C-5	MW-11	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			
500-237220-C-6	MW-12	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			
500-237220-C-7	2S/3S Duplicate	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: Eurofins St. Louis Job No.: 500-237220-2

SDG No.:

Batch Number: 622153 Batch Start Date: 07/31/23 10:32 Batch Analyst: Cox, Kevin A

Batch Method: PrecSep-21 Batch End Date: 08/14/23 16:21

Lab Sample ID	Client Sample ID	Method Chain	Basis	IngDecDate3	NativeMassBa	Ba carrier 00133	Ra-226 00041		
500-237220-D-7 DU	2S/3S Duplicate	PrecSep-21, 903.0	T	08/22/2023 00:00	0 g	1 mL			

Batch Notes	
Balance ID	1121470622, B016
Analyst ID - Reagent Drop	KAC
Analyst ID - Reagent Drop Witness	BMP per KAC
Pipette ID	RAD132, RAD144, RAD169
SOP Number	ST-RC-0002, ST-RC-0041
Batch Comment	In: SRH, Out: BCC

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID MB 160-622153/1-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:00:52 AM

Count Ended 8/22/2023 9:40:59 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.076	6	0.060	-0.016
sd	0.009	2.449	0.024	0.032
Beta	0.345	37	0.370	0.025
sd	0.019	6.083	0.061	0.064

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID LCS 160-622153/2-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:01:03 AM

Count Ended 8/22/2023 9:41:11 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.107	1,410	14.100	13.993
sd	0.010	37.550	0.375	0.376
Beta	0.423	2,236	22.360	21.937
sd	0.021	47.286	0.473	0.473

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID 500-237220-C-1-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:19:03 AM

Count Ended 8/22/2023 9:59:11 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.144	23	0.230	0.086
sd	0.012	4.796	0.048	0.049
Beta	0.341	59	0.590	0.249
sd	0.018	7.681	0.077	0.079

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID 500-237220-C-2-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:20:35 AM

Count Ended 8/22/2023 10:00:43 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.057	25	0.250	0.193
sd	0.008	5.000	0.050	0.051
Beta	0.280	54	0.540	0.260
sd	0.017	7.348	0.073	0.075

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID 500-237220-C-3-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:20:43 AM

Count Ended 8/22/2023 10:00:52 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	26	0.260	0.174
sd	0.009	5.099	0.051	0.052
Beta	0.306	45	0.450	0.144
sd	0.017	6.708	0.067	0.069

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID 500-237220-C-4-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:20:50 AM

Count Ended 8/22/2023 10:00:58 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.081	40	0.400	0.319
sd	0.009	6.325	0.063	0.064
Beta	0.393	108	1.080	0.687
sd	0.020	10.392	0.104	0.106

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID 500-237220-C-5-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:20:58 AM

Count Ended 8/22/2023 10:01:05 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.083	38	0.380	0.297
sd	0.009	6.164	0.062	0.062
Beta	0.626	119	1.190	0.564
sd	0.025	10.909	0.109	0.112

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID 500-237220-C-6-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:21:10 AM

Count Ended 8/22/2023 10:01:18 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.097	26	0.260	0.163
sd	0.010	5.099	0.051	0.052
Beta	0.359	73	0.730	0.371
sd	0.019	8.544	0.085	0.088

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID 500-237220-C-7-A

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 8:21:19 AM

Count Ended 8/22/2023 10:01:28 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.081	18	0.180	0.099
sd	0.009	4.243	0.042	0.043
Beta	0.380	57	0.570	0.190
sd	0.019	7.550	0.075	0.078

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID 500-237220-D-7-A DU

Repeat 1

Carrier No. 0

Batch ID 622153

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/22/2023 10:17:13 AM

Count Ended 8/22/2023 11:57:19 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.076	14	0.140	0.064
sd	0.009	3.742	0.037	0.038
Beta	0.345	55	0.550	0.205
sd	0.019	7.416	0.074	0.076

Method 904.0

Radium-228 (GFPC) by Method 904.0

Prep Batch: 622159

Preparation, Precipitate Separation

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 622159

Lab Id: MB 160-622159/1-A | Analyzed: 08/14/23 14:25 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Orange0 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.3418	0.403	0.404	U	pCi/L	1.00	0.664	53	402	.	.5784	0.44862	.9117	1.	624094

Carrier	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03620				g		0.0408	88.7	30 - 110
Y Carrier	0.02150				g		0.0268	80.4	30 - 110

Lab Id: LCS 160-622159/2-A | Analyzed: 08/14/23 14:25 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Orange2 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	6.517	0.833	1.03		pCi/L	1.00	0.504	299	273	.	.5785	0.44154	.9117	1.	624094

Carrier	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03860				g		0.0408	94.6	30 - 110
Y Carrier	0.02280				g		0.0268	85.2	30 - 110

Lab Id: 500-237220-1 | Analyzed: 08/14/23 14:23 | Decay Corrected: No | Ts: 100
Client ID: MW-05 | Detector: Orange12 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.756	0.396	0.402		pCi/L	1.00	0.547	62	312	.	.5801	0.44351	.9117	1.	624094

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0367				g		0.0408	90.0	30 - 110
Y Carrier	0.0234				g		0.0268	87.5	30 - 110

Lab Id: 500-237220-2 | Analyzed: 08/14/23 14:23 | Decay Corrected: No | Ts: 100
Client ID: MW-06 | Detector: Orange14 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	-0.139	0.318	0.318	U	pCi/L	1.00	0.653	26	307	.	.5803	0.43877	.9117	1.	624094

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0335				g		0.0408	82.1	30 - 110
Y Carrier	0.0232				g		0.0268	86.7	30 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 622159

Lab Id: 500-237220-3 Analyzed: 08/14/23 14:23 Decay Corrected: No Ts: 100
Client ID: MW-09 Detector: Orange15 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.140	0.413	0.413	U	pCi/L	1.00	0.733	46	412	.	.5804	0.43749	.9117	1.	624094

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0317				g		0.0408	77.7	30 - 110
Y Carrier	0.0229				g		0.0268	85.6	30 - 110

Lab Id: 500-237220-4 Analyzed: 08/14/23 14:23 Decay Corrected: No Ts: 100
Client ID: MW-10 Detector: Orange20 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.610	0.539	0.542	U	pCi/L	1.00	0.844	44	285	.	.5806	0.44321	.9117	1.	624094

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0340				g		0.0408	83.3	30 - 110
Y Carrier	0.0210				g		0.0268	78.5	30 - 110

Lab Id: 500-237220-5 Analyzed: 08/14/23 14:23 Decay Corrected: No Ts: 100
Client ID: MW-11 Detector: Orange21 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.683	0.539	0.543	U	pCi/L	1.00	0.823	45	275	.	.5808	0.44658	.9117	1.	624094

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0333				g		0.0408	81.6	30 - 110
Y Carrier	0.0211				g		0.0268	78.9	30 - 110

Lab Id: 500-237220-6 Analyzed: 08/14/23 14:23 Decay Corrected: No Ts: 100
Client ID: MW-12 Detector: Orange23 Yield Truncated: No Tb: 1000
Sigma: 2 Dil Fac: 1 Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.316	0.400	0.401	U	pCi/L	1.00	0.664	41	305	.	.5809	0.44124	.9117	1.	624094

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0340				g		0.0408	83.3	30 - 110
Y Carrier	0.0218				g		0.0268	81.5	30 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 622159

Lab Id:	500-237220-7	Analyzed:	08/14/23 14:28	Decay Corrected:	No	Ts:	100
Client ID:	2S/3S Duplicate	Detector:	Blue3	Yield Truncated:	No	Tb:	1000
Sigma:	2	Dil Fac:	1	Calibration Type:	1		

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.972	0.547	0.554		pCi/L	1.00	0.792	78	457	.	.5751	0.44519	.9117	1.	624093

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0344				g		0.0408	84.3	30 - 110
Y Carrier	0.0226				g		0.0268	84.5	30 - 110

Lab Id:	500-237220-7 DU	Analyzed:	08/14/23 14:28	Decay Corrected:	No	Ts:	100
Client ID:	2S/3S Duplicate	Detector:	Blue19	Yield Truncated:	No	Tb:	1000
Sigma:	2	Dil Fac:	1	Calibration Type:	1		

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	X Talk	Decay	Eff	I	A	Anly Batch
Radium-228	0.3348	0.503	0.504	U	pCi/L	1.00	0.849	69	575	.	.575	0.43068	.9117	1.	624093

Carrier	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03340				g		0.0408	81.9	30 - 110
Y Carrier	0.02240				g		0.0268	83.7	30 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-622159/1-A	Radium-228			0.3418	U	pCi/L							1.69
Lab Control Sample ID:	**Analyte**	**Parent Result**	**Spike Added**	**LCS Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
LCS 160-622159/2-A	Radium-228		7.96	6.517		pCi/L	82	75 - 125					-2.6235
Duplicate ID:	**Analyte**	**Parent Result**	**Spike Added**	**DU Result**	**Qualifier**	**Unit**	**% Rec**	**% Rec Limits**	**RPD**	**RER**	**DER**	**RER Limit**	**Z Factor**
500-237220-7	Radium-228	0.972		0.3348	U	pCi/L			98	0.60	1.70	1	1.7005

Glossary:

Ts = Count Duration, Sample
Tb = Count Duration, Background
Cs = Total Counts, Sample
Cb = Total Counts, Background
X Talk = Crosstalk
Decay = Decay Factor
Eff = Efficiency
I = Ingrowth Factor
A = Abundance

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: Eurofins St. Louis Job No.: 500-237220-2

SDG No.:

Batch Number: 622159 Batch Start Date: 07/31/23 10:36 Batch Analyst: Cox, Kevin A

Batch Method: PrecSep_0 Batch End Date: 08/14/23 12:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Ba_TareWt	Ba_GrossWt	Ba_Mass	Y_TareWt	Y_GrossWt
MB 160-622159/1		PrecSep_0, 904.0		1000 mL	8.6974 g	8.7336 g	0.0408 g	8.6846 g	8.7061 g
LCS 160-622159/2		PrecSep_0, 904.0		1000 mL	8.6705 g	8.7091 g	0.0408 g	8.6856 g	8.7084 g
500-237220-C-1	MW-05	PrecSep_0, 904.0	T	994.05 mL	8.7063 g	8.7430 g	0.0408 g	8.8518 g	8.8752 g
500-237220-C-2	MW-06	PrecSep_0, 904.0	T	923.67 mL	8.7179 g	8.7514 g	0.0408 g	8.6648 g	8.6880 g
500-237220-C-3	MW-09	PrecSep_0, 904.0	T	1003.56 mL	8.6845 g	8.7162 g	0.0408 g	8.6588 g	8.6817 g
500-237220-C-4	MW-10	PrecSep_0, 904.0	T	745.25 mL	8.6727 g	8.7067 g	0.0408 g	8.6912 g	8.7122 g
500-237220-C-5	MW-11	PrecSep_0, 904.0	T	758.23 mL	8.7120 g	8.7453 g	0.0408 g	8.6514 g	8.6725 g
500-237220-C-6	MW-12	PrecSep_0, 904.0	T	942.16 mL	8.6838 g	8.7178 g	0.0408 g	8.6599 g	8.6817 g
500-237220-C-7	2S/3S Duplicate	PrecSep_0, 904.0	T	900.34 mL	8.6640 g	8.6984 g	0.0408 g	8.6752 g	8.6978 g
500-237220-D-7 DU	2S/3S Duplicate	PrecSep_0, 904.0	T	999.73 mL	8.6624 g	8.6958 g	0.0408 g	8.6993 g	8.7217 g

Lab Sample ID	Client Sample ID	Method Chain	Basis	Y_Mass	IngDecDate1	IngDecDate2	NativeMassBa	NativeMassY	Ba carrier 00133
MB 160-622159/1		PrecSep_0, 904.0		0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
LCS 160-622159/2		PrecSep_0, 904.0		0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-1	MW-05	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-2	MW-06	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-3	MW-09	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-4	MW-10	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-5	MW-11	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-6	MW-12	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL
500-237220-C-7	2S/3S Duplicate	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: Eurofins St. Louis Job No.: 500-237220-2

SDG No.:

Batch Number: 622159 Batch Start Date: 07/31/23 10:36 Batch Analyst: Cox, Kevin A

Batch Method: PrecSep_0 Batch End Date: 08/14/23 12:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	Y_Mass	IngDecDate1	IngDecDate2	NativeMassBa	NativeMassY	Ba carrier 00133
500-237220-D-7 DU	2S/3S Duplicate	PrecSep_0, 904.0	T	0.02675 g	08/01/2023 14:24	08/14/2023 09:34	0 g	0 g	1 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	Ra-228 00051	Y Carrier 00086				
MB 160-622159/1		PrecSep_0, 904.0			0.2 mL				
LCS 160-622159/2		PrecSep_0, 904.0		1 mL	0.2 mL				
500-237220-C-1	MW-05	PrecSep_0, 904.0	T		0.2 mL				
500-237220-C-2	MW-06	PrecSep_0, 904.0	T		0.2 mL				
500-237220-C-3	MW-09	PrecSep_0, 904.0	T		0.2 mL				
500-237220-C-4	MW-10	PrecSep_0, 904.0	T		0.2 mL				
500-237220-C-5	MW-11	PrecSep_0, 904.0	T		0.2 mL				
500-237220-C-6	MW-12	PrecSep_0, 904.0	T		0.2 mL				
500-237220-C-7	2S/3S Duplicate	PrecSep_0, 904.0	T		0.2 mL				
500-237220-D-7 DU	2S/3S Duplicate	PrecSep_0, 904.0	T		0.2 mL				

Batch Notes	
Balance ID	1121470622, B016
Analyst ID - Reagent Drop	KAC, SRH
Analyst ID - Reagent Drop Witness	BMP per KAC, BMP per SRH
Pipette ID	RAD132, RAD144, RAD136, RAD169
SOP Number	ST-RC-0002, ST-RC-0041
Batch Comment	In: SRH, Out: BCC

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID MB 160-622159/1-A

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:25:31 PM

Count Ended 8/14/2023 4:05:58 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.082	10	0.100	0.018
sd	0.009	3.162	0.032	0.033
Beta	0.402	53	0.530	0.128
sd	0.020	7.280	0.073	0.076

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID LCS 160-622159/2-A

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:25:26 PM

Count Ended 8/14/2023 4:05:37 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.085	20	0.200	0.115
sd	0.009	4.472	0.045	0.046
Beta	0.273	299	2.990	2.717
sd	0.017	17.292	0.173	0.174

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID 500-237220-C-1-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:23:56 PM

Count Ended 8/14/2023 4:04:09 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.134	27	0.270	0.136
sd	0.012	5.196	0.052	0.053
Beta	0.312	62	0.620	0.308
sd	0.018	7.874	0.079	0.081

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID 500-237220-C-2-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:23:47 PM

Count Ended 8/14/2023 4:03:54 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.121	15	0.150	0.029
sd	0.011	3.873	0.039	0.040
Beta	0.307	26	0.260	-0.047
sd	0.018	5.099	0.051	0.062

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID 500-237220-C-3-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:23:42 PM

Count Ended 8/14/2023 4:03:55 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.088	15	0.150	0.062
sd	0.009	3.873	0.039	0.040
Beta	0.412	46	0.460	0.048
sd	0.020	6.782	0.068	0.071

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID 500-237220-C-4-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:23:28 PM

Count Ended 8/14/2023 4:03:43 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.098	17	0.170	0.072
sd	0.010	4.123	0.041	0.042
Beta	0.285	44	0.440	0.155
sd	0.017	6.633	0.066	0.068

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID 500-237220-C-5-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:23:19 PM

Count Ended 8/14/2023 4:03:32 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.084	7	0.070	-0.014
sd	0.009	2.646	0.026	0.033
Beta	0.275	45	0.450	0.175
sd	0.017	6.708	0.067	0.069

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID 500-237220-C-6-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:23:11 PM

Count Ended 8/14/2023 4:03:18 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.101	11	0.110	0.009
sd	0.010	3.317	0.033	0.035
Beta	0.305	41	0.410	0.105
sd	0.017	6.403	0.064	0.066

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID 500-237220-C-7-B

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:28:33 PM

Count Ended 8/14/2023 4:08:43 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.164	26	0.260	0.096
sd	0.013	5.099	0.051	0.053
Beta	0.457	78	0.780	0.323
sd	0.021	8.832	0.088	0.091

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID 500-237220-D-7-B DU

Repeat 1

Carrier No. 0

Batch ID 622159

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/14/2023 2:28:40 PM

Count Ended 8/14/2023 4:09:10 PM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.255	24	0.240	-0.015
sd	0.016	4.899	0.049	0.054
Beta	0.575	69	0.690	0.115
sd	0.024	8.307	0.083	0.086

Daily Checks

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Check Type = Alpha										
Detector 0										
8/14/2023 1:15:00 PM	9524.68	9731.78	291.95	-207.10	Pass	3646.50	3783.75	55.06	-137.250	**WARNING**
8/15/2023 12:56:00 PM	9553.28	9731.78	291.95	-178.50	Pass	3658.50	3783.75	55.06	-125.250	**WARNING**
Detector 1										
8/14/2023 1:15:00 PM	11124.73	11203.08	336.09	-78.34	Pass	4261.00	4270.00	56.54	-9.000	Pass
8/15/2023 10:55:00 AM	11064.17	11203.08	336.09	-138.91	Pass	4279.00	4270.00	56.54	9.000	Pass
Detector 2										
8/14/2023 1:16:00 PM	10333.72	10359.33	310.78	-25.60	Pass	4079.00	4091.73	50.75	-12.725	Pass
8/15/2023 10:55:00 AM	10340.78	10359.33	310.78	-18.54	Pass	4150.50	4091.73	50.75	58.775	Pass
Detector 3										
8/14/2023 1:16:00 PM	11374.21	11400.95	342.03	-26.74	Pass	4081.00	4294.73	42.38	-213.725	**DOEF**
8/15/2023 10:55:00 AM	11247.52	11400.95	342.03	-153.43	Pass	4152.00	4294.73	42.38	-142.725	**DOEF**
Detector 4										
8/14/2023 1:17:00 PM	14199.60	14325.50	429.77	-125.90	Pass	6290.50	6338.90	205.79	-48.400	Pass
8/15/2023 12:56:00 PM	14434.11	14325.50	429.77	108.61	Pass	6069.50	6338.90	205.79	-269.400	Pass
Detector 5										
8/14/2023 1:17:00 PM	14813.77	14830.60	444.92	-16.83	Pass	5424.50	5533.48	81.19	-108.975	Pass
8/15/2023 12:56:00 PM	14770.76	14830.60	444.92	-59.84	Pass	5345.00	5533.48	81.19	-188.475	**WARNING**
Detector 6										
8/14/2023 1:17:00 PM	12303.48	12305.73	369.17	-2.24	Pass	4704.00	4715.55	63.03	-11.550	Pass
8/15/2023 12:57:00 PM	12280.49	12305.73	369.17	-25.23	Pass	4651.00	4715.55	63.03	-64.550	Pass
Detector 7										
8/14/2023 1:17:00 PM	12448.26	12708.25	381.25	-259.99	Pass	4959.50	4810.10	73.07	149.400	**WARNING**
8/15/2023 12:57:00 PM	12362.15	12708.25	381.25	-346.10	Pass	4883.50	4810.10	73.07	73.400	Pass
Detector 8										
8/14/2023 1:20:00 PM	9528.69	9451.15	283.53	77.54	Pass	3723.50	3851.33	50.28	-127.825	**WARNING**
8/15/2023 11:00:00 AM	9457.60	9451.15	283.53	6.45	Pass	3634.00	3851.33	50.28	-217.325	**DOEF**
Detector 9										
8/14/2023 1:20:00 PM	10904.81	10846.68	325.40	58.14	Pass	4226.50	4390.08	73.38	-163.575	**WARNING**
8/15/2023 11:00:00 AM	10838.23	10846.68	325.40	-8.44	Pass	4230.50	4390.08	73.38	-159.575	**WARNING**
Detector 10										
8/14/2023 1:21:00 PM	10416.38	10386.65	311.60	29.73	Pass	3976.00	4154.40	60.48	-178.400	**WARNING**
8/15/2023 11:01:00 AM	10311.73	10386.65	311.60	-74.92	Pass	3955.00	4154.40	60.48	-199.400	**DOEF**

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Detector 11										
8/14/2023 1:21:00 PM	11425.81	11316.08	339.48	109.73	Pass	4303.50	4591.48	60.25	-287.975	**DOEF**
8/15/2023 11:01:00 AM	11328.67	11316.08	339.48	12.60	Pass	4280.00	4591.48	60.25	-311.475	**DOEF**
Detector 12										
8/14/2023 1:21:00 PM	14039.30	14250.38	427.51	-211.08	Pass	6552.50	6540.40	105.21	12.100	Pass
8/15/2023 11:02:00 AM	14084.95	14250.38	427.51	-165.43	Pass	6524.00	6540.40	105.21	-16.400	Pass
Detector 13										
8/14/2023 1:22:00 PM	15469.53	15581.68	467.45	-112.14	Pass	4833.50	4978.43	68.62	-144.925	**WARNING**
8/15/2023 11:02:00 AM	15336.85	15581.68	467.45	-244.83	Pass	4898.50	4978.43	68.62	-79.925	Pass
Detector 14										
8/14/2023 1:22:00 PM	11377.72	11508.73	345.26	-131.01	Pass	5356.50	5412.75	104.76	-56.250	Pass
8/15/2023 11:01:00 AM	11265.05	11508.73	345.26	-243.67	Pass	5438.00	5412.75	104.76	25.250	Pass
Detector 16										
8/14/2023 1:25:00 PM	9806.72	9639.28	289.18	167.44	Pass	3693.00	3817.55	37.67	-124.550	**DOEF**
8/15/2023 11:06:00 AM	9675.51	9639.28	289.18	36.23	Pass	3710.50	3817.55	37.67	-107.050	**WARNING**
Detector 17										
8/14/2023 1:25:00 PM	11250.47	11061.48	331.84	188.99	Pass	4176.00	4226.70	53.61	-50.700	Pass
8/15/2023 11:06:00 AM	11018.07	11061.48	331.84	-43.40	Pass	4077.00	4226.70	53.61	-149.700	**WARNING**
Detector 19										
8/14/2023 1:25:00 PM	11300.06	11467.10	344.01	-167.04	Pass	4395.50	4448.70	59.17	-53.200	Pass
8/15/2023 11:06:00 AM	11489.47	11467.10	344.01	22.37	Pass	4486.00	4448.70	59.17	37.300	Pass
Detector 20										
8/14/2023 1:26:00 PM	14520.21	14347.83	430.43	172.38	Pass	6574.50	6614.45	91.13	-39.950	Pass
8/15/2023 11:07:00 AM	14263.78	14347.83	430.43	-84.04	Pass	6471.00	6614.45	91.13	-143.450	Pass
Detector 22										
8/14/2023 1:26:00 PM	11649.73	11742.60	352.28	-92.87	Pass	5416.50	5466.15	85.68	-49.650	Pass
8/15/2023 11:07:00 AM	11719.92	11742.60	352.28	-22.68	Pass	5250.00	5466.15	85.68	-216.150	**WARNING**
Detector 23										
8/14/2023 1:26:00 PM	12236.35	12061.73	361.85	174.63	Pass	5759.00	5992.08	108.01	-233.075	**WARNING**
8/15/2023 11:07:00 AM	12130.20	12061.73	361.85	68.48	Pass	5773.50	5992.08	108.01	-218.575	**WARNING**

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Check Type = Beta										
Detector 0										
8/14/2023 1:32:00 PM	49362.27	50552.05	1516.56	-1189.78	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 PM	49610.99	50552.05	1516.56	-941.06	Pass	NA	NA	NA	NA	NA
Detector 1										
8/14/2023 1:33:00 PM	48268.66	47641.23	1429.24	627.44	Pass	NA	NA	NA	NA	NA
8/15/2023 11:12:00 AM	55628.19	47641.23	1429.24	7986.97	FAIL	NA	NA	NA	NA	NA
8/15/2023 11:19:00 AM	48268.41	47641.23	1429.24	627.19	Pass	NA	NA	NA	NA	NA
Detector 2										
8/14/2023 1:33:00 PM	49244.90	49734.44	1492.03	-489.54	Pass	NA	NA	NA	NA	NA
8/15/2023 11:12:00 AM	51156.32	49734.44	1492.03	1421.88	Pass	NA	NA	NA	NA	NA
8/15/2023 11:19:00 AM	49271.09	49734.44	1492.03	-463.35	Pass	NA	NA	NA	NA	NA
Detector 3										
8/14/2023 1:33:00 PM	59324.21	60167.98	1805.04	-843.76	Pass	NA	NA	NA	NA	NA
8/15/2023 11:12:00 AM	44902.73	60167.98	1805.04	-15265.25	FAIL	NA	NA	NA	NA	NA
8/15/2023 11:19:00 AM	59006.95	60167.98	1805.04	-1161.02	Pass	NA	NA	NA	NA	NA
Detector 4										
8/14/2023 1:34:00 PM	47370.37	47227.93	1416.84	142.45	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 PM	47750.70	47227.93	1416.84	522.78	Pass	NA	NA	NA	NA	NA
Detector 5										
8/14/2023 1:34:00 PM	54948.21	55004.03	1650.12	-55.81	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 PM	54932.91	55004.03	1650.12	-71.11	Pass	NA	NA	NA	NA	NA
Detector 6										
8/14/2023 1:34:00 PM	50990.61	52072.68	1562.18	-1082.06	Pass	NA	NA	NA	NA	NA
8/15/2023 1:01:00 PM	51242.58	52072.68	1562.18	-830.10	Pass	NA	NA	NA	NA	NA
Detector 7										
8/14/2023 1:34:00 PM	43906.45	44302.58	1329.08	-396.13	Pass	NA	NA	NA	NA	NA
8/15/2023 1:01:00 PM	43975.49	44302.58	1329.08	-327.09	Pass	NA	NA	NA	NA	NA
Detector 8										
8/14/2023 1:38:00 PM	49362.67	49959.33	1498.78	-596.66	Pass	NA	NA	NA	NA	NA
8/15/2023 11:25:00 AM	49283.92	49959.33	1498.78	-675.41	Pass	NA	NA	NA	NA	NA
Detector 9										
8/14/2023 1:38:00 PM	48175.47	47696.08	1430.88	479.39	Pass	NA	NA	NA	NA	NA
8/15/2023 11:25:00 AM	47793.82	47696.08	1430.88	97.75	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Detector 10										
8/14/2023 1:38:00 PM	49589.36	50136.65	1504.10	-547.29	Pass	NA	NA	NA	NA	NA
8/15/2023 11:26:00 AM	48924.51	50136.65	1504.10	-1212.14	Pass	NA	NA	NA	NA	NA
Detector 11										
8/14/2023 1:39:00 PM	59594.77	59951.55	1798.55	-356.78	Pass	NA	NA	NA	NA	NA
8/15/2023 11:26:00 AM	59467.95	59951.55	1798.55	-483.60	Pass	NA	NA	NA	NA	NA
Detector 12										
8/14/2023 1:39:00 PM	48539.33	49257.90	1477.74	-718.57	Pass	NA	NA	NA	NA	NA
8/15/2023 11:26:00 AM	48999.48	49257.90	1477.74	-258.42	Pass	NA	NA	NA	NA	NA
Detector 13										
8/14/2023 1:39:00 PM	55349.35	55607.20	1668.22	-257.85	Pass	NA	NA	NA	NA	NA
8/15/2023 11:26:00 AM	54968.77	55607.20	1668.22	-638.43	Pass	NA	NA	NA	NA	NA
Detector 14										
8/14/2023 1:39:00 PM	49637.54	50580.03	1517.40	-942.48	Pass	NA	NA	NA	NA	NA
8/15/2023 11:27:00 AM	49377.81	50580.03	1517.40	-1202.22	Pass	NA	NA	NA	NA	NA
Detector 16										
8/14/2023 1:42:00 PM	49268.29	49653.23	1489.60	-384.94	Pass	NA	NA	NA	NA	NA
8/15/2023 11:30:00 AM	49367.34	49653.23	1489.60	-285.88	Pass	NA	NA	NA	NA	NA
Detector 17										
8/14/2023 1:43:00 PM	48110.27	48166.13	1444.98	-55.86	Pass	NA	NA	NA	NA	NA
8/15/2023 11:30:00 AM	47876.00	48166.13	1444.98	-290.12	Pass	NA	NA	NA	NA	NA
Detector 19										
8/14/2023 1:43:00 PM	60057.70	59167.80	1775.03	889.90	Pass	NA	NA	NA	NA	NA
8/15/2023 11:31:00 AM	60050.77	59167.80	1775.03	882.97	Pass	NA	NA	NA	NA	NA
Detector 20										
8/14/2023 1:44:00 PM	49462.99	49987.80	1499.63	-524.81	Pass	NA	NA	NA	NA	NA
8/15/2023 11:31:00 AM	49440.20	49987.80	1499.63	-547.60	Pass	NA	NA	NA	NA	NA
Detector 22										
8/14/2023 1:44:00 PM	50945.07	52477.75	1574.33	-1532.68	Pass	NA	NA	NA	NA	NA
8/15/2023 11:31:00 AM	51380.58	52477.75	1574.33	-1097.17	Pass	NA	NA	NA	NA	NA
Detector 23										
8/14/2023 1:45:00 PM	44845.26	46160.75	1384.82	-1315.49	Pass	NA	NA	NA	NA	NA
8/15/2023 11:32:00 AM	45030.68	46160.75	1384.82	-1130.07	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Check Type = BKG										
Detector 0										
8/14/2023 1:02:00 PM	0.13	0.19	0.02	-0.06	Pass	0.34	0.54	0.10	-0.201	Pass
8/15/2023 12:51:00 PM	0.12	0.19	0.02	-0.07	FAIL	0.52	0.54	0.10	-0.021	Pass
Detector 1										
8/14/2023 1:02:00 PM	0.08	0.23	0.03	-0.16	FAIL	0.21	0.47	0.07	-0.269	FAIL
8/15/2023 10:12:00 AM	0.06	0.23	0.03	-0.17	FAIL	0.41	0.47	0.07	-0.068	Pass
Detector 2										
8/14/2023 1:03:00 PM	0.09	0.21	0.06	-0.13	Pass	0.54	0.54	0.11	-0.009	Pass
8/15/2023 10:12:00 AM	0.12	0.21	0.06	-0.10	Pass	0.34	0.54	0.11	-0.204	Pass
Detector 3										
8/14/2023 1:03:00 PM	0.11	0.24	0.04	-0.13	FAIL	0.38	0.52	0.09	-0.144	Pass
8/15/2023 10:13:00 AM	0.12	0.24	0.04	-0.12	Pass	0.44	0.52	0.09	-0.084	Pass
Detector 4										
8/14/2023 1:03:00 PM	0.14	0.23	0.04	-0.09	Pass	0.32	0.45	0.07	-0.135	Pass
8/15/2023 12:52:00 PM	0.21	0.23	0.04	-0.02	Pass	0.40	0.45	0.07	-0.055	Pass
Detector 5										
8/14/2023 1:04:00 PM	0.15	0.22	0.03	-0.07	Pass	0.42	0.44	0.08	-0.029	Pass
8/15/2023 12:52:00 PM	0.18	0.22	0.03	-0.05	Pass	0.42	0.44	0.08	-0.029	Pass
Detector 6										
8/14/2023 1:08:00 PM	0.14	0.25	0.04	-0.11	Pass	0.38	0.46	0.07	-0.088	Pass
8/15/2023 12:52:00 PM	0.16	0.25	0.04	-0.09	Pass	0.32	0.46	0.07	-0.143	Pass
Detector 7										
8/14/2023 1:04:00 PM	0.18	0.30	0.06	-0.12	Pass	0.35	0.54	0.09	-0.194	Pass
8/15/2023 12:53:00 PM	0.18	0.30	0.06	-0.12	Pass	0.43	0.54	0.09	-0.114	Pass
Detector 8										
8/14/2023 1:04:00 PM	0.07	0.21	0.06	-0.14	Pass	0.45	0.51	0.10	-0.060	Pass
8/15/2023 10:13:00 AM	0.08	0.21	0.06	-0.14	Pass	0.17	0.51	0.10	-0.340	FAIL
Detector 9										
8/14/2023 1:04:00 PM	0.10	0.18	0.05	-0.08	Pass	0.45	0.41	0.07	0.044	Pass
8/15/2023 10:13:00 AM	0.07	0.18	0.05	-0.12	Pass	0.36	0.41	0.07	-0.047	Pass
Detector 10										
8/14/2023 1:04:00 PM	0.07	0.20	0.05	-0.13	Pass	0.40	0.42	0.10	-0.020	Pass
8/15/2023 10:14:00 AM	0.07	0.20	0.05	-0.14	Pass	0.25	0.42	0.10	-0.170	Pass

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Detector 11										
8/14/2023 1:05:00 PM	0.12	0.19	0.04	-0.07	Pass	0.36	0.50	0.09	-0.143	Pass
8/15/2023 10:14:00 AM	0.07	0.19	0.04	-0.12	FAIL	0.39	0.50	0.09	-0.113	Pass
Detector 12										
8/14/2023 1:05:00 PM	0.24	0.28	0.05	-0.04	Pass	0.21	0.51	0.09	-0.296	FAIL
8/15/2023 10:14:00 AM	0.13	0.28	0.05	-0.15	FAIL	0.46	0.51	0.09	-0.051	Pass
Detector 13										
8/14/2023 1:05:00 PM	0.11	0.21	0.05	-0.11	Pass	0.31	0.43	0.09	-0.121	Pass
8/15/2023 10:16:00 AM	0.12	0.21	0.05	-0.09	Pass	0.41	0.43	0.09	-0.016	Pass
Detector 14										
8/14/2023 1:06:00 PM	0.13	0.22	0.05	-0.09	Pass	0.30	0.41	0.09	-0.113	Pass
8/15/2023 10:16:00 AM	0.14	0.22	0.05	-0.09	Pass	0.28	0.41	0.09	-0.138	Pass
Detector 15										
8/15/2023 10:16:00 AM	0.13	0.23	0.05	-0.10	Pass	0.30	0.49	0.08	-0.190	Pass
Detector 16										
8/14/2023 1:06:00 PM	0.12	0.18	0.05	-0.06	Pass	0.99	0.56	0.34	0.427	Pass
8/15/2023 10:16:00 AM	0.10	0.18	0.05	-0.08	Pass	0.71	0.56	0.34	0.147	Pass
Detector 17										
8/14/2023 1:06:00 PM	0.11	0.22	0.04	-0.11	Pass	0.43	0.44	0.10	-0.009	Pass
8/15/2023 10:17:00 AM	0.17	0.22	0.04	-0.05	Pass	0.32	0.44	0.10	-0.124	Pass
Detector 18										
8/14/2023 1:07:00 PM	1.09	1.16	0.12	-0.08	Pass	1.04	1.31	0.19	-0.278	Pass
8/15/2023 10:18:00 AM	0.92	1.16	0.12	-0.24	Pass	1.11	1.31	0.19	-0.208	Pass
Detector 19										
8/14/2023 1:07:00 PM	0.23	0.37	0.06	-0.14	Pass	0.53	0.63	0.12	-0.098	Pass
8/15/2023 10:15:00 AM	0.22	0.37	0.06	-0.15	Pass	0.53	0.63	0.12	-0.103	Pass
Detector 20										
8/14/2023 1:07:00 PM	0.03	0.25	0.04	-0.22	FAIL	0.28	0.48	0.11	-0.203	Pass
8/15/2023 10:15:00 AM	0.01	0.25	0.04	-0.24	FAIL	0.29	0.48	0.11	-0.193	Pass
Detector 21										
8/14/2023 1:07:00 PM	0.04	0.24	0.04	-0.21	FAIL	0.10	0.37	0.07	-0.268	FAIL
8/15/2023 10:15:00 AM	0.01	0.24	0.04	-0.23	FAIL	0.10	0.37	0.07	-0.273	FAIL

Gas Proportional Counter Daily Quality Control Checks

Instrument: Blue

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Detector 22										
8/14/2023 1:08:00 PM	0.17	0.28	0.05	-0.11	Pass	0.25	0.42	0.09	-0.167	Pass
8/15/2023 10:15:00 AM	0.20	0.28	0.05	-0.08	Pass	0.29	0.42	0.09	-0.132	Pass
Detector 23										
8/14/2023 1:08:00 PM	0.39	0.48	0.06	-0.09	Pass	0.74	0.77	0.13	-0.031	Pass
8/15/2023 10:16:00 AM	0.46	0.48	0.06	-0.02	Pass	0.68	0.77	0.13	-0.086	Pass

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

Gas Proportional Counter Daily Quality Control Checks

Instrument: Orange

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Check Type = Alpha										
Detector 0										
8/14/2023 1:43:00 PM	9794.22	10277.20	308.32	-482.98	FAIL	3420.50	3597.60	54.45	-177.100	DOEF
8/15/2023 12:59:00 AM	9897.08	10277.20	308.32	-380.12	FAIL	3449.50	3597.60	54.45	-148.100	WARNING
Detector 1										
8/14/2023 1:43:00 PM	10947.24	11473.33	344.20	-526.09	FAIL	4098.00	4331.20	68.54	-233.200	DOEF
8/15/2023 12:59:00 AM	11022.01	11473.33	344.20	-451.31	FAIL	4064.00	4331.20	68.54	-267.200	DOEF
Detector 2										
8/14/2023 1:44:00 PM	10535.48	11257.50	337.73	-722.02	FAIL	3972.50	4094.70	69.24	-122.200	Pass
8/15/2023 12:59:00 AM	10386.07	11257.50	337.73	-871.43	FAIL	3809.50	4094.70	69.24	-285.200	DOEF
Detector 3										
8/14/2023 1:45:00 PM	11192.03	11779.10	353.37	-587.07	FAIL	4580.50	4423.38	66.03	157.125	WARNING
8/15/2023 12:59:00 AM	11148.95	11779.10	353.37	-630.15	FAIL	4578.00	4423.38	66.03	154.625	WARNING
Detector 4										
8/14/2023 1:45:00 PM	14473.17	14794.15	443.82	-320.98	Pass	6340.00	6401.25	95.24	-61.250	Pass
8/15/2023 12:59:00 AM	14461.70	14794.15	443.82	-332.45	Pass	6368.50	6401.25	95.24	-32.750	Pass
Detector 5										
8/15/2023 12:59:00 AM	15108.69	15011.80	450.35	96.89	Pass	5365.00	6014.78	68.39	-649.775	DOEF
Detector 6										
8/14/2023 1:45:00 PM	11866.57	12797.33	383.92	-930.76	FAIL	4974.50	5402.30	82.99	-427.800	DOEF
8/15/2023 12:59:00 AM	11928.81	12797.33	383.92	-868.51	FAIL	4981.50	5402.30	82.99	-420.800	DOEF
Detector 7										
8/14/2023 1:46:00 PM	12550.73	13309.73	399.29	-758.99	FAIL	5018.50	5272.40	65.64	-253.900	DOEF
8/15/2023 12:59:00 AM	12754.92	13309.73	399.29	-554.81	FAIL	5030.50	5272.40	65.64	-241.900	DOEF
Detector 8										
8/14/2023 1:50:00 PM	9831.85	10335.73	310.07	-503.88	FAIL	3615.00	3852.45	48.76	-237.450	DOEF
8/15/2023 1:07:00 AM	9637.79	10335.73	310.07	-697.94	FAIL	3574.50	3852.45	48.76	-277.950	DOEF
Detector 9										
8/14/2023 1:51:00 PM	11160.46	11676.73	350.30	-516.27	FAIL	4096.50	4282.35	52.85	-185.850	DOEF
8/15/2023 1:08:00 AM	11333.04	11676.73	350.30	-343.69	Pass	4037.00	4282.35	52.85	-245.350	DOEF
Detector 11										
8/14/2023 1:51:00 PM	11589.23	12112.38	363.37	-523.15	FAIL	4073.50	4358.93	60.77	-285.425	DOEF
8/15/2023 1:08:00 AM	11632.91	12112.38	363.37	-479.46	FAIL	4075.50	4358.93	60.77	-283.425	DOEF

Gas Proportional Counter Daily Quality Control Checks

Instrument: Orange

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Detector 12										
8/14/2023 1:51:00 PM	15259.02	15517.88	465.54	-258.86	Pass	5511.00	5581.38	55.65	-70.375	Pass
8/15/2023 1:08:00 AM	15138.73	15517.88	465.54	-379.14	Pass	5408.50	5581.38	55.65	-172.875	**DOEF**
Detector 13										
8/14/2023 1:52:00 PM	15525.51	15884.83	476.54	-359.31	Pass	5175.00	5346.90	66.33	-171.900	**WARNING**
8/15/2023 1:08:00 AM	15493.98	15884.83	476.54	-390.84	Pass	5056.00	5346.90	66.33	-290.900	**DOEF**
Detector 14										
8/14/2023 1:53:00 PM	12652.75	13508.25	405.25	-855.50	**FAIL**	4522.50	4788.33	59.74	-265.825	**DOEF**
8/15/2023 1:08:00 AM	12656.32	13508.25	405.25	-851.93	**FAIL**	4490.50	4788.33	59.74	-297.825	**DOEF**
Detector 15										
8/14/2023 1:53:00 PM	12911.07	13855.23	415.66	-944.15	**FAIL**	4607.50	4728.98	105.00	-121.475	Pass
8/15/2023 1:09:00 AM	12928.68	13855.23	415.66	-926.54	**FAIL**	4661.50	4728.98	105.00	-67.475	Pass
Detector 20										
8/14/2023 1:57:00 PM	15393.47	15595.13	467.85	-201.66	Pass	5369.50	5412.58	61.33	-43.075	Pass
8/15/2023 12:41:00 AM	15428.14	15595.13	467.85	-166.98	Pass	5292.50	5412.58	61.33	-120.075	Pass
Detector 21										
8/14/2023 1:57:00 PM	15378.92	15748.85	472.47	-369.93	Pass	5248.00	5428.88	52.55	-180.875	**DOEF**
8/15/2023 12:41:00 AM	15333.34	15748.85	472.47	-415.51	Pass	5120.00	5428.88	52.55	-308.875	**DOEF**
Detector 22										
8/14/2023 1:57:00 PM	12222.38	13242.35	397.27	-1019.97	**FAIL**	4589.00	4980.40	60.42	-391.400	**DOEF**
8/15/2023 12:41:00 AM	12319.74	13242.35	397.27	-922.61	**FAIL**	4600.00	4980.40	60.42	-380.400	**DOEF**
Detector 23										
8/14/2023 1:57:00 PM	12843.35	13617.98	408.54	-774.62	**FAIL**	4823.00	5092.00	64.25	-269.000	**DOEF**
8/15/2023 12:42:00 AM	12749.11	13617.98	408.54	-868.86	**FAIL**	4761.50	5092.00	64.25	-330.500	**DOEF**

Gas Proportional Counter Daily Quality Control Checks

Instrument: Orange

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Check Type = Beta										
Detector 0										
8/14/2023 1:48:00 PM	48843.96	49935.03	1498.05	-1091.06	Pass	NA	NA	NA	NA	NA
8/15/2023 1:04:00 AM	48642.47	49935.03	1498.05	-1292.56	Pass	NA	NA	NA	NA	NA
Detector 1										
8/14/2023 1:50:00 PM	47053.18	48521.48	1455.64	-1468.30	FAIL	NA	NA	NA	NA	NA
8/15/2023 1:04:00 AM	46997.94	48521.48	1455.64	-1523.54	FAIL	NA	NA	NA	NA	NA
Detector 2										
8/14/2023 1:50:00 PM	48712.43	49918.95	1497.57	-1206.52	Pass	NA	NA	NA	NA	NA
8/15/2023 1:04:00 AM	48430.76	49918.95	1497.57	-1488.19	Pass	NA	NA	NA	NA	NA
Detector 3										
8/14/2023 1:50:00 PM	57317.99	59069.20	1772.08	-1751.21	Pass	NA	NA	NA	NA	NA
8/15/2023 1:06:00 AM	57259.43	59069.20	1772.08	-1809.77	FAIL	NA	NA	NA	NA	NA
Detector 4										
8/14/2023 1:50:00 PM	48132.37	48513.93	1455.42	-381.55	Pass	NA	NA	NA	NA	NA
8/15/2023 1:06:00 AM	48327.81	48513.93	1455.42	-186.12	Pass	NA	NA	NA	NA	NA
Detector 5										
8/15/2023 1:07:00 AM	54716.62	54077.08	1622.31	639.54	Pass	NA	NA	NA	NA	NA
Detector 6										
8/14/2023 1:50:00 PM	49437.08	49158.55	1474.76	278.53	Pass	NA	NA	NA	NA	NA
8/15/2023 1:07:00 AM	49417.01	49158.55	1474.76	258.46	Pass	NA	NA	NA	NA	NA
Detector 7										
8/14/2023 1:50:00 PM	44742.72	45414.23	1362.43	-671.51	Pass	NA	NA	NA	NA	NA
8/15/2023 1:07:00 AM	44218.29	45414.23	1362.43	-1195.93	Pass	NA	NA	NA	NA	NA
Detector 8										
8/14/2023 1:58:00 PM	49446.71	49452.15	1483.56	-5.44	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 AM	49171.07	49452.15	1483.56	-281.08	Pass	NA	NA	NA	NA	NA
Detector 9										
8/14/2023 1:58:00 PM	48247.71	48747.90	1462.44	-500.19	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 AM	48179.17	48747.90	1462.44	-568.73	Pass	NA	NA	NA	NA	NA
Detector 11										
8/14/2023 1:59:00 PM	59329.51	59142.43	1774.27	187.09	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 AM	58989.14	59142.43	1774.27	-153.29	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Orange

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Detector 12										
8/14/2023 1:59:00 PM	48689.71	49073.15	1472.19	-383.44	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 AM	48763.78	49073.15	1472.19	-309.37	Pass	NA	NA	NA	NA	NA
Detector 13										
8/14/2023 1:59:00 PM	55439.81	55204.43	1656.13	235.39	Pass	NA	NA	NA	NA	NA
8/15/2023 1:01:00 AM	55080.82	55204.43	1656.13	-123.61	Pass	NA	NA	NA	NA	NA
Detector 14										
8/14/2023 1:59:00 PM	50748.65	51681.73	1550.45	-933.07	Pass	NA	NA	NA	NA	NA
8/15/2023 1:01:00 AM	50890.88	51681.73	1550.45	-790.84	Pass	NA	NA	NA	NA	NA
Detector 15										
8/14/2023 2:01:00 PM	44980.51	44769.68	1343.09	210.84	Pass	NA	NA	NA	NA	NA
8/15/2023 1:00:00 AM	44710.91	44769.68	1343.09	-58.76	Pass	NA	NA	NA	NA	NA
Detector 20										
8/14/2023 2:05:00 PM	48039.35	48680.95	1460.43	-641.60	Pass	NA	NA	NA	NA	NA
8/15/2023 12:48:00 AM	48375.96	48680.95	1460.43	-304.99	Pass	NA	NA	NA	NA	NA
Detector 21										
8/14/2023 2:05:00 PM	54816.76	55234.63	1657.04	-417.86	Pass	NA	NA	NA	NA	NA
8/15/2023 12:48:00 AM	54916.22	55234.63	1657.04	-318.41	Pass	NA	NA	NA	NA	NA
Detector 22										
8/14/2023 2:05:00 PM	50888.31	52617.68	1578.53	-1729.36	**FAIL**	NA	NA	NA	NA	NA
8/15/2023 12:48:00 AM	50648.36	52617.68	1578.53	-1969.31	**FAIL**	NA	NA	NA	NA	NA
Detector 23										
8/14/2023 2:05:00 PM	44379.39	45356.30	1360.69	-976.91	Pass	NA	NA	NA	NA	NA
8/15/2023 12:48:00 AM	44512.63	45356.30	1360.69	-843.67	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Orange

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Check Type = BKG										
Detector 0										
8/14/2023 1:07:00 PM	0.09	0.18	0.04	-0.10	Pass	0.49	0.40	0.07	0.082	Pass
8/15/2023 4:39:00 AM	0.05	0.18	0.04	-0.14	FAIL	0.33	0.40	0.07	-0.078	Pass
Detector 1										
8/14/2023 1:07:00 PM	0.09	0.18	0.04	-0.09	Pass	0.27	0.31	0.05	-0.043	Pass
8/15/2023 4:39:00 AM	0.12	0.18	0.04	-0.07	Pass	0.24	0.31	0.05	-0.078	Pass
Detector 2										
8/14/2023 1:07:00 PM	0.05	0.16	0.04	-0.11	Pass	0.27	0.32	0.04	-0.056	Pass
8/15/2023 4:40:00 AM	0.08	0.16	0.04	-0.08	Pass	0.24	0.32	0.04	-0.081	Pass
Detector 3										
8/14/2023 1:08:00 PM	0.17	0.36	0.05	-0.19	FAIL	0.28	0.49	0.08	-0.214	Pass
8/15/2023 4:40:00 AM	0.20	0.36	0.05	-0.16	FAIL	0.31	0.49	0.08	-0.184	Pass
Detector 4										
8/14/2023 1:08:00 PM	0.08	0.20	0.03	-0.12	FAIL	0.29	0.35	0.05	-0.070	Pass
8/15/2023 4:42:00 AM	0.13	0.20	0.03	-0.07	Pass	0.35	0.35	0.05	-0.005	Pass
Detector 5										
8/15/2023 4:43:00 AM	0.10	0.19	0.04	-0.09	Pass	0.19	0.35	0.07	-0.161	Pass
Detector 6										
8/14/2023 1:08:00 PM	0.05	0.20	0.04	-0.15	FAIL	0.41	0.33	0.05	0.083	Pass
8/15/2023 4:43:00 AM	0.12	0.20	0.04	-0.08	Pass	0.37	0.33	0.05	0.043	Pass
Detector 7										
8/14/2023 1:08:00 PM	0.13	0.20	0.05	-0.07	Pass	0.36	0.44	0.10	-0.076	Pass
8/15/2023 4:43:00 AM	0.08	0.20	0.05	-0.13	Pass	0.28	0.44	0.10	-0.156	Pass
Detector 8										
8/14/2023 1:08:00 PM	0.07	0.16	0.03	-0.09	Pass	0.42	0.29	0.17	0.129	Pass
8/15/2023 4:34:00 AM	0.12	0.16	0.03	-0.04	Pass	0.41	0.29	0.17	0.124	Pass
Detector 9										
8/14/2023 1:08:00 PM	0.10	0.15	0.04	-0.06	Pass	0.33	0.29	0.17	0.034	Pass
8/15/2023 4:35:00 AM	0.12	0.15	0.04	-0.04	Pass	0.30	0.29	0.17	0.004	Pass
Detector 11										
8/14/2023 1:08:00 PM	0.10	0.21	0.04	-0.12	Pass	0.42	0.44	0.26	-0.018	Pass
8/15/2023 4:36:00 AM	0.10	0.21	0.04	-0.11	Pass	0.52	0.44	0.26	0.078	Pass

eurofins | Environment Testing TestAmerica

Gas Proportional Counter Daily Quality Control Checks

Instrument: Orange

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Detector 12										
8/14/2023 1:08:00 PM	0.08	0.20	0.05	-0.12	Pass	0.30	0.38	0.12	-0.088	Pass
8/15/2023 4:37:00 AM	0.15	0.20	0.05	-0.05	Pass	0.39	0.38	0.12	0.002	Pass
Detector 13										
8/14/2023 1:09:00 PM	0.04	0.19	0.03	-0.15	FAIL	0.30	0.39	0.13	-0.086	Pass
8/15/2023 4:37:00 AM	0.08	0.19	0.03	-0.11	FAIL	0.26	0.39	0.13	-0.126	Pass
Detector 14										
8/14/2023 1:09:00 PM	0.12	0.20	0.03	-0.08	Pass	0.34	0.37	0.14	-0.029	Pass
8/15/2023 4:37:00 AM	0.16	0.20	0.03	-0.04	Pass	0.25	0.37	0.14	-0.119	Pass
Detector 15										
8/14/2023 1:09:00 PM	0.07	0.18	0.03	-0.12	FAIL	0.31	0.35	0.09	-0.049	Pass
8/15/2023 4:39:00 AM	0.10	0.18	0.03	-0.08	Pass	0.49	0.35	0.09	0.136	Pass
Detector 20										
8/14/2023 1:09:00 PM	0.10	0.25	0.04	-0.16	FAIL	0.22	0.52	0.13	-0.299	Pass
8/15/2023 4:34:00 AM	0.09	0.25	0.04	-0.17	FAIL	0.23	0.52	0.13	-0.294	Pass
Detector 21										
8/14/2023 1:10:00 PM	0.06	0.18	0.04	-0.12	Pass	0.24	0.41	0.10	-0.171	Pass
8/15/2023 4:34:00 AM	0.08	0.18	0.04	-0.10	Pass	0.33	0.41	0.10	-0.081	Pass
Detector 22										
8/14/2023 1:10:00 PM	0.09	0.20	0.04	-0.11	Pass	0.22	0.50	0.13	-0.284	Pass
8/15/2023 4:34:00 AM	0.07	0.20	0.04	-0.13	FAIL	0.29	0.50	0.13	-0.209	Pass
Detector 23										
8/14/2023 1:10:00 PM	0.13	0.20	0.04	-0.08	Pass	0.37	0.50	0.12	-0.140	Pass
8/15/2023 4:34:00 AM	0.07	0.20	0.04	-0.14	FAIL	0.28	0.50	0.12	-0.225	Pass

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Check Type = Alpha										
Detector 0										
8/22/2023 12:07:00 AM	9610.76	9785.18	293.56	-174.42	Pass	3394.50	3364.35	39.95	30.150	Pass
8/23/2023 12:12:00 AM	9786.15	9785.18	293.56	0.98	Pass	3402.00	3364.35	39.95	37.650	Pass
Detector 1										
8/22/2023 12:07:00 AM	11135.81	11182.10	335.46	-46.29	Pass	3961.00	3961.88	58.91	-0.875	Pass
8/23/2023 12:12:00 AM	10920.93	11182.10	335.46	-261.17	Pass	3947.50	3961.88	58.91	-14.375	Pass
Detector 2										
8/22/2023 12:07:00 AM	10421.38	10547.78	316.43	-126.40	Pass	3932.50	3862.43	54.26	70.075	Pass
8/23/2023 12:12:00 AM	10272.62	10547.78	316.43	-275.15	Pass	3989.50	3862.43	54.26	127.075	**WARNING**
Detector 3										
8/22/2023 12:07:00 AM	11534.11	11644.80	349.34	-110.69	Pass	4031.00	4157.70	57.23	-126.700	**WARNING**
8/23/2023 12:12:00 AM	11435.46	11644.80	349.34	-209.34	Pass	4222.00	4157.70	57.23	64.300	Pass
Detector 4										
8/22/2023 12:07:00 AM	15133.82	15407.73	462.23	-273.91	Pass	4967.00	4850.53	67.02	116.475	Pass
8/23/2023 12:12:00 AM	15375.87	15407.73	462.23	-31.85	Pass	4995.50	4850.53	67.02	144.975	**WARNING**
Detector 5										
8/22/2023 12:07:00 AM	14790.13	15246.68	457.40	-456.55	Pass	4955.50	4784.45	54.21	171.050	**DOEF**
8/23/2023 12:12:00 AM	14750.11	15246.68	457.40	-496.56	**FAIL**	4940.50	4784.45	54.21	156.050	**WARNING**
Detector 6										
8/22/2023 12:07:00 AM	12193.93	12512.03	375.36	-318.10	Pass	4474.50	4250.58	61.83	223.925	**DOEF**
8/23/2023 12:12:00 AM	12141.38	12512.03	375.36	-370.65	Pass	4312.50	4250.58	61.83	61.925	Pass
Detector 7										
8/22/2023 12:07:00 AM	12907.36	13104.10	393.12	-196.74	Pass	4725.50	4544.05	59.72	181.450	**DOEF**
8/23/2023 12:12:00 AM	12831.76	13104.10	393.12	-272.34	Pass	4654.50	4544.05	59.72	110.450	Pass
Detector 8										
8/22/2023 12:14:00 AM	8460.43	8616.85	258.51	-156.42	Pass	4317.00	4337.84	112.88	-20.840	Pass
8/23/2023 12:19:00 AM	8429.91	8616.85	258.51	-186.94	Pass	4602.00	4337.84	112.88	264.160	**WARNING**
Detector 9										
8/22/2023 12:14:00 AM	11376.77	11482.23	344.47	-105.45	Pass	3655.00	3691.35	48.64	-36.350	Pass
8/23/2023 12:19:00 AM	11254.58	11482.23	344.47	-227.65	Pass	3672.00	3691.35	48.64	-19.350	Pass
Detector 10										
8/22/2023 12:14:00 AM	10681.38	10892.15	326.76	-210.77	Pass	3507.50	3537.60	35.64	-30.100	Pass
8/23/2023 12:19:00 AM	10946.46	10892.15	326.76	54.31	Pass	3522.00	3537.60	35.64	-15.600	Pass

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Detector 11										
8/22/2023 12:14:00 AM	11736.49	11798.93	353.97	-62.43	Pass	3849.50	3873.03	45.81	-23.525	Pass
8/23/2023 12:19:00 AM	11776.62	11798.93	353.97	-22.30	Pass	3807.50	3873.03	45.81	-65.525	Pass
Detector 12										
8/22/2023 12:14:00 AM	14571.17	14376.38	431.29	194.79	Pass	5456.00	5778.53	78.33	-322.525	**DOEF**
8/23/2023 12:20:00 AM	14590.77	14376.38	431.29	214.39	Pass	5715.50	5778.53	78.33	-63.025	Pass
Detector 13										
8/22/2023 12:14:00 AM	14974.97	15112.78	453.38	-137.80	Pass	4738.00	4872.78	66.66	-134.775	**WARNING**
8/23/2023 12:20:00 AM	15011.11	15112.78	453.38	-101.66	Pass	4876.00	4872.78	66.66	3.225	Pass
Detector 14										
8/22/2023 12:14:00 AM	12487.50	12445.30	373.36	42.20	Pass	4264.00	4336.03	47.90	-72.025	Pass
8/23/2023 12:20:00 AM	12200.98	12445.30	373.36	-244.32	Pass	4299.00	4336.03	47.90	-37.025	Pass
Detector 15										
8/22/2023 2:08:00 PM	12759.54	12888.03	386.64	-128.48	Pass	4329.50	4413.40	31.79	-83.900	**WARNING**
8/23/2023 12:20:00 AM	12721.52	12888.03	386.64	-166.51	Pass	4386.00	4413.40	31.79	-27.400	Pass
Detector 16										
8/22/2023 12:11:00 AM	9612.22	9814.13	294.42	-201.90	Pass	3486.00	3388.58	61.49	97.425	Pass
8/23/2023 12:16:00 AM	9603.25	9814.13	294.42	-210.88	Pass	3452.50	3388.58	61.49	63.925	Pass
Detector 17										
8/22/2023 12:11:00 AM	11014.53	11253.23	337.60	-238.70	Pass	4044.50	3958.00	41.22	86.500	**WARNING**
8/23/2023 12:16:00 AM	11082.71	11253.23	337.60	-170.51	Pass	4091.50	3958.00	41.22	133.500	**DOEF**
Detector 18										
8/22/2023 12:11:00 AM	10439.88	10555.95	316.68	-116.07	Pass	3960.50	3948.08	59.81	12.425	Pass
8/23/2023 6:50:00 AM	10390.83	10555.95	316.68	-165.12	Pass	4059.50	3948.08	59.81	111.425	Pass
Detector 19										
8/22/2023 12:11:00 AM	11455.41	11591.85	347.76	-136.44	Pass	4195.50	4218.30	50.23	-22.800	Pass
8/23/2023 12:16:00 AM	11466.48	11591.85	347.76	-125.37	Pass	4150.50	4218.30	50.23	-67.800	Pass
Detector 20										
8/22/2023 12:11:00 AM	15143.79	15329.28	459.88	-185.49	Pass	5187.00	5170.15	64.69	16.852	Pass
8/23/2023 12:16:00 AM	14992.05	15329.28	459.88	-337.23	Pass	5118.00	5170.15	64.69	-52.148	Pass
Detector 21										
8/22/2023 12:11:00 AM	15104.21	15305.28	459.16	-201.07	Pass	4987.50	5199.90	72.13	-212.400	**WARNING**
8/23/2023 12:16:00 AM	14952.47	15305.28	459.16	-352.81	Pass	5150.00	5199.90	72.13	-49.900	Pass

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	A>>B XT CPM	A>>B XT Mean	A>>B XT +/- limit	A>>B XT Deviation	A>>B XT Flag
Detector 22										
8/22/2023 7:17:00 AM	12319.14	12418.15	372.54	-99.01	Pass	4337.00	4433.95	55.09	-96.950	Pass
8/23/2023 12:16:00 AM	12195.44	12418.15	372.54	-222.71	Pass	4404.50	4433.95	55.09	-29.450	Pass
Detector 23										
8/22/2023 12:11:00 AM	12796.09	12827.98	384.84	-31.88	Pass	4683.00	4667.03	71.68	15.975	Pass
8/23/2023 12:16:00 AM	12796.15	12827.98	384.84	-31.83	Pass	4669.50	4667.03	71.68	2.475	Pass

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Check Type = Beta										
Detector 0										
8/22/2023 12:11:00 AM	46955.15	46977.48	1409.32	-22.32	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	46694.35	46977.48	1409.32	-283.12	Pass	NA	NA	NA	NA	NA
Detector 1										
8/22/2023 12:11:00 AM	45064.23	45880.28	1376.41	-816.05	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	45402.58	45880.28	1376.41	-477.70	Pass	NA	NA	NA	NA	NA
Detector 2										
8/22/2023 12:11:00 AM	46023.17	47375.98	1421.28	-1352.81	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	46278.02	47375.98	1421.28	-1097.96	Pass	NA	NA	NA	NA	NA
Detector 3										
8/22/2023 12:11:00 AM	56627.51	56474.80	1694.24	152.71	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	56092.41	56474.80	1694.24	-382.39	Pass	NA	NA	NA	NA	NA
Detector 4										
8/22/2023 12:11:00 AM	48599.31	48963.30	1468.90	-363.99	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	48072.88	48963.30	1468.90	-890.42	Pass	NA	NA	NA	NA	NA
Detector 5										
8/22/2023 12:11:00 AM	51638.12	52229.20	1566.88	-591.08	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	51445.79	52229.20	1566.88	-783.41	Pass	NA	NA	NA	NA	NA
Detector 6										
8/22/2023 12:11:00 AM	47367.91	48723.95	1461.72	-1356.04	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	47362.24	48723.95	1461.72	-1361.71	Pass	NA	NA	NA	NA	NA
Detector 7										
8/22/2023 12:11:00 AM	42797.46	43315.00	1299.45	-517.54	Pass	NA	NA	NA	NA	NA
8/23/2023 12:17:00 AM	42709.02	43315.00	1299.45	-605.98	Pass	NA	NA	NA	NA	NA
Detector 8										
8/22/2023 12:07:00 AM	42063.92	39314.88	1179.45	2749.04	**FAIL**	NA	NA	NA	NA	NA
8/23/2023 12:12:00 AM	41702.57	39314.88	1179.45	2387.69	**FAIL**	NA	NA	NA	NA	NA
Detector 9										
8/22/2023 12:07:00 AM	45504.17	45154.48	1354.63	349.69	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	45698.86	45154.48	1354.63	544.39	Pass	NA	NA	NA	NA	NA
Detector 10										
8/22/2023 12:07:00 AM	47091.21	46629.73	1398.89	461.49	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	46936.48	46629.73	1398.89	306.75	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Detector 11										
8/22/2023 12:07:00 AM	56440.37	55931.08	1677.93	509.30	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	56556.82	55931.08	1677.93	625.74	Pass	NA	NA	NA	NA	NA
Detector 12										
8/22/2023 12:07:00 AM	47217.04	47429.53	1422.89	-212.48	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	46859.95	47429.53	1422.89	-569.58	Pass	NA	NA	NA	NA	NA
Detector 13										
8/22/2023 12:07:00 AM	51999.02	51931.68	1557.95	67.35	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	51814.41	51931.68	1557.95	-117.26	Pass	NA	NA	NA	NA	NA
Detector 14										
8/22/2023 12:07:00 AM	48405.38	48963.20	1468.90	-557.82	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	48173.79	48963.20	1468.90	-789.41	Pass	NA	NA	NA	NA	NA
Detector 15										
8/22/2023 2:12:00 PM	42907.29	43148.10	1294.44	-240.81	Pass	NA	NA	NA	NA	NA
8/23/2023 12:13:00 AM	42697.83	43148.10	1294.44	-450.27	Pass	NA	NA	NA	NA	NA
Detector 16										
8/22/2023 12:15:00 AM	46682.19	46968.15	1409.04	-285.96	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	47149.42	46968.15	1409.04	181.27	Pass	NA	NA	NA	NA	NA
Detector 17										
8/22/2023 12:15:00 AM	45440.89	46192.13	1385.76	-751.23	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	45518.68	46192.13	1385.76	-673.45	Pass	NA	NA	NA	NA	NA
Detector 18										
8/22/2023 12:15:00 AM	46650.26	46867.38	1406.02	-217.11	Pass	NA	NA	NA	NA	NA
8/23/2023 6:46:00 AM	46290.89	46867.38	1406.02	-576.48	Pass	NA	NA	NA	NA	NA
Detector 19										
8/22/2023 12:15:00 AM	56406.50	56633.50	1699.01	-227.00	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	56060.50	56633.50	1699.01	-573.00	Pass	NA	NA	NA	NA	NA
Detector 20										
8/22/2023 12:15:00 AM	48477.07	48917.15	1467.51	-440.08	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	48510.50	48917.15	1467.51	-406.65	Pass	NA	NA	NA	NA	NA
Detector 21										
8/22/2023 12:15:00 AM	52214.51	51775.10	1553.25	439.41	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	52122.29	51775.10	1553.25	347.19	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag	B>>A XT CPM	B>>A XT Mean	B>>A XT +/- limit	B>>A XT Deviation	B>>A XT Flag
Detector 22										
8/22/2023 7:10:00 AM	48073.22	48938.63	1468.16	-865.40	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	48108.84	48938.63	1468.16	-829.79	Pass	NA	NA	NA	NA	NA
Detector 23										
8/22/2023 12:15:00 AM	42399.09	43236.93	1297.11	-837.84	Pass	NA	NA	NA	NA	NA
8/23/2023 12:20:00 AM	42435.98	43236.93	1297.11	-800.95	Pass	NA	NA	NA	NA	NA

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Check Type = BKG										
Detector 0										
8/22/2023 3:38:00 AM	0.11	0.17	0.04	-0.06	Pass	0.41	0.47	0.08	-0.066	Pass
8/23/2023 3:43:00 AM	0.11	0.17	0.04	-0.06	Pass	0.49	0.47	0.08	0.015	Pass
Detector 1										
8/22/2023 3:38:00 AM	0.13	0.17	0.03	-0.04	Pass	0.30	0.41	0.06	-0.113	Pass
8/23/2023 3:43:00 AM	0.14	0.17	0.03	-0.04	Pass	0.35	0.41	0.06	-0.058	Pass
Detector 2										
8/22/2023 3:38:00 AM	0.06	0.19	0.03	-0.13	FAIL	0.37	0.41	0.08	-0.041	Pass
8/23/2023 3:43:00 AM	0.08	0.19	0.03	-0.11	FAIL	0.30	0.41	0.08	-0.111	Pass
Detector 3										
8/22/2023 3:38:00 AM	0.09	0.27	0.05	-0.19	FAIL	0.30	0.62	0.08	-0.324	FAIL
8/23/2023 3:43:00 AM	0.08	0.27	0.05	-0.20	FAIL	0.45	0.62	0.08	-0.174	Pass
Detector 4										
8/22/2023 3:38:00 AM	0.16	0.29	0.04	-0.13	FAIL	0.65	0.48	0.12	0.161	Pass
8/23/2023 3:43:00 AM	0.12	0.29	0.04	-0.17	FAIL	0.72	0.48	0.12	0.231	Pass
Detector 5										
8/22/2023 3:38:00 AM	0.13	0.22	0.05	-0.09	Pass	0.34	0.52	0.20	-0.180	Pass
8/23/2023 3:43:00 AM	0.16	0.22	0.05	-0.06	Pass	0.24	0.52	0.20	-0.280	Pass
Detector 6										
8/22/2023 3:39:00 AM	0.07	0.25	0.04	-0.18	FAIL	0.30	0.39	0.07	-0.093	Pass
8/23/2023 3:43:00 AM	0.10	0.25	0.04	-0.15	FAIL	0.22	0.39	0.07	-0.168	Pass
Detector 7										
8/22/2023 3:38:00 AM	0.09	0.27	0.04	-0.18	FAIL	0.47	0.57	0.09	-0.104	Pass
8/23/2023 3:43:00 AM	0.10	0.27	0.04	-0.17	FAIL	0.38	0.57	0.09	-0.189	Pass
Detector 8										
8/22/2023 3:38:00 AM	0.07	0.18	0.04	-0.12	Pass	0.49	0.40	0.09	0.086	Pass
8/23/2023 3:43:00 AM	0.09	0.18	0.04	-0.09	Pass	0.55	0.40	0.09	0.151	Pass
Detector 9										
8/22/2023 3:38:00 AM	0.14	0.18	0.03	-0.04	Pass	0.37	0.43	0.07	-0.066	Pass
8/23/2023 3:43:00 AM	0.10	0.18	0.03	-0.08	Pass	0.35	0.43	0.07	-0.086	Pass
Detector 10										
8/22/2023 3:38:00 AM	0.11	0.19	0.04	-0.08	Pass	0.44	0.51	0.10	-0.077	Pass
8/23/2023 3:43:00 AM	0.09	0.19	0.04	-0.11	Pass	0.45	0.51	0.10	-0.062	Pass

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Detector 11										
8/22/2023 3:38:00 AM	0.05	0.17	0.04	-0.12	FAIL	0.57	0.61	0.09	-0.038	Pass
8/23/2023 3:43:00 AM	0.05	0.17	0.04	-0.12	FAIL	0.53	0.61	0.09	-0.083	Pass
Detector 12										
8/22/2023 3:38:00 AM	0.08	0.16	0.03	-0.08	Pass	0.57	0.46	0.08	0.112	Pass
8/23/2023 3:43:00 AM	0.07	0.16	0.03	-0.09	FAIL	0.58	0.46	0.08	0.117	Pass
Detector 13										
8/22/2023 3:39:00 AM	0.10	0.17	0.04	-0.08	Pass	0.32	0.38	0.06	-0.065	Pass
8/23/2023 3:43:00 AM	0.10	0.17	0.04	-0.08	Pass	0.34	0.38	0.06	-0.040	Pass
Detector 14										
8/22/2023 3:39:00 AM	0.15	0.20	0.04	-0.05	Pass	0.32	0.50	0.07	-0.186	Pass
8/23/2023 3:43:00 AM	0.09	0.20	0.04	-0.12	Pass	0.45	0.50	0.07	-0.056	Pass
Detector 15										
8/22/2023 6:25:00 PM	0.12	0.17	0.03	-0.05	Pass	0.55	0.42	0.06	0.127	Pass
8/23/2023 3:43:00 AM	0.10	0.17	0.03	-0.07	Pass	0.39	0.42	0.06	-0.033	Pass
Detector 16										
8/22/2023 3:39:00 AM	0.08	0.14	0.03	-0.06	Pass	0.50	0.45	0.10	0.050	Pass
8/23/2023 3:43:00 AM	0.07	0.14	0.03	-0.07	Pass	0.33	0.45	0.10	-0.120	Pass
Detector 17										
8/22/2023 3:39:00 AM	0.09	0.14	0.02	-0.06	Pass	0.41	6.82	8.30	-6.416	Pass
8/23/2023 3:43:00 AM	0.08	0.14	0.02	-0.07	Pass	0.54	6.82	8.30	-6.286	Pass
Detector 18										
8/22/2023 3:39:00 AM	0.05	0.13	0.03	-0.08	Pass	0.31	0.37	0.08	-0.060	Pass
8/23/2023 4:15:00 AM	0.10	0.13	0.03	-0.03	Pass	0.42	0.37	0.08	0.055	Pass
Detector 19										
8/22/2023 3:39:00 AM	0.08	0.16	0.05	-0.08	Pass	0.43	0.44	0.08	-0.012	Pass
8/23/2023 3:43:00 AM	0.05	0.16	0.05	-0.11	Pass	0.33	0.44	0.08	-0.112	Pass
Detector 20										
8/22/2023 3:39:00 AM	0.13	0.15	0.03	-0.02	Pass	0.39	0.42	0.07	-0.030	Pass
8/23/2023 3:43:00 AM	0.06	0.15	0.03	-0.09	FAIL	0.42	0.42	0.07	0.005	Pass
Detector 21										
8/22/2023 3:39:00 AM	0.11	0.15	0.04	-0.04	Pass	0.16	0.32	0.05	-0.162	FAIL
8/23/2023 3:43:00 AM	0.13	0.15	0.04	-0.02	Pass	0.38	0.32	0.05	0.058	Pass

Gas Proportional Counter Daily Quality Control Checks

Instrument: Red

	AlphaBKG CPM	BKG Mean	BKG +/- limit	BKG Deviation	BKG Flag	BetaBKG CPM	BetaBKG Mean	BetaBKG +/- limit	BetaBKG Deviation	BetaBKG Flag
Detector 22										
8/22/2023 10:58:00 AM	0.11	0.17	0.04	-0.07	Pass	0.37	0.35	0.06	0.011	Pass
8/23/2023 3:43:00 AM	0.05	0.17	0.04	-0.13	FAIL	0.30	0.35	0.06	-0.060	Pass
Detector 23										
8/22/2023 3:39:00 AM	0.06	0.15	0.03	-0.09	FAIL	0.30	0.43	0.06	-0.140	Pass
8/23/2023 3:43:00 AM	0.06	0.15	0.03	-0.09	FAIL	0.38	0.43	0.06	-0.060	Pass

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

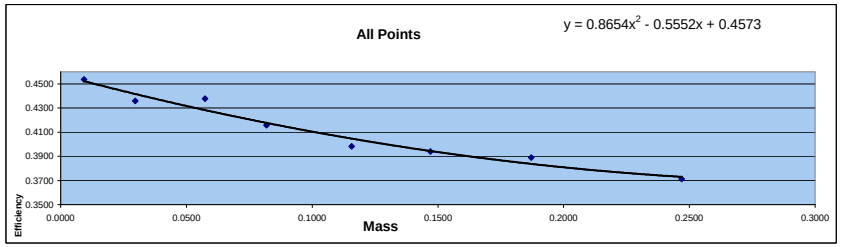
Alpha Beta Calibrations

Curve is for Gross Beta
Strontium 90
and
Total Strontium

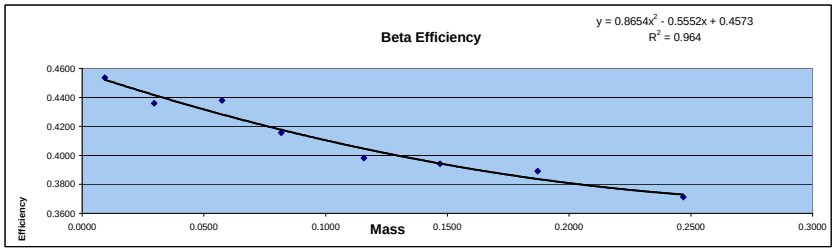
Blue 3

Detector ID	Std ID	Sample Wt	Count Date	Count Time	Beta Counts	DPM 37595.2171 DPM 37592.71382 CPM	Sr-90 Eff	Standard Aliquot
3	B1	0.0093	3/19/2017 23:56	5	85272	17054.400	0.4536	1mL
3	B2	0.0296	3/19/2017 23:27	5	81928	16385.600	0.4358	1mL
3	B3	0.0574	3/19/2017 23:09	5	82301	16460.200	0.4378	1mL
3	B4	0.0818	3/19/2017 14:32	5	78143	15628.600	0.4157	1mL
3	B5	0.1157	3/20/2017 0:59	5	74837	14967.400	0.3981	1mL
3	B6	0.1470	3/20/2017 0:38	5	74080	14816.000	0.3941	1mL
3	B7	0.1871	3/20/2017 0:22	5	73132	14626.400	0.3891	1mL
3	B8	0.2469	3/19/2017 14:40	5	69782	13956.400	0.3712	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4536	0.4522	0.31%
0.0296	0.4358	0.4416	-1.31%
0.0574	0.4378	0.4283	2.23%
0.0818	0.4157	0.4177	-0.47%
0.1157	0.3981	0.4046	-1.61%
0.1470	0.3941	0.3944	-0.07%
0.1871	0.3891	0.3837	1.40%
0.2469	0.3712	0.3730	-0.47%



Mass	Efficiency
0.0093	0.4536
0.0296	0.4358
0.0574	0.4378
0.0818	0.4157
0.1157	0.3981
0.1470	0.3941
0.1871	0.3891
0.2469	0.3712



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/17/2009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/19/2017
Elapsed Time:	2740.000 days
Half Life:	10409.625 days
Exponential Term:	0.833227329
Corrected Activity:	18797.60855 dpm/mL
Decay Activity (Sr/Y-90)	37595.2171 dpm

Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/17/2009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/20/2017
Elapsed Time:	2741.000 days
Half Life:	10409.625 days
Exponential Term:	0.833171849
Corrected Activity:	18796.35691 dpm/mL
Decay Activity (Sr/Y-90)	37592.71382 dpm

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta4

Repeat 5

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/19/2017 2:32:17 PM

Count Ended 3/19/2017 2:37:28 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	6	1.200	1.200
sd	0.000			0.000	2.449	0.490	0.490
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	78,143	15,628.600	15,628.600
sd	0.000			0.000	279.541	55.908	55.908

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta8

Repeat 5

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/19/2017 2:40:23 PM

Count Ended 3/19/2017 2:45:35 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	10	2.000	2.000
sd	0.000			0.000	3.162	0.632	0.632
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	69,782	13,956.400	13,956.400
sd	0.000			0.000	264.163	52.833	52.833

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta3 **Repeat** 7

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/19/2017 11:09:46 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/19/2017 11:14:58 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	17	3.400	3.400
sd	0.000			0.000	4.123	0.825	0.825
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	82,301	16,460.200	16,460.200
sd	0.000			0.000	286.882	57.376	57.376

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta2

Repeat 8

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/19/2017 11:27:43 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/19/2017 11:32:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	13	2.600	2.600
sd	0.000			0.000	3.606	0.721	0.721
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	81,928	16,385.600	16,385.600
sd	0.000			0.000	286.231	57.246	57.246

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta1

Repeat 9

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/19/2017 11:56:21 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/20/2017 12:01:34 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	12	2.400	2.400
sd	0.000			0.000	3.464	0.693	0.693
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	85,272	17,054.400	17,054.400
sd	0.000			0.000	292.014	58.403	58.403

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta7

Repeat 6

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/20/2017 12:22:41 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/20/2017 12:27:52 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	20	4.000	4.000
sd	0.000			0.000	4.472	0.894	0.894
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	73,132	14,626.400	14,626.400
sd	0.000			0.000	270.429	54.086	54.086

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta6

Repeat 7

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/20/2017 12:38:01 AM

Count Ended 3/20/2017 12:43:12 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	14	2.800	2.800
sd	0.000			0.000	3.742	0.748	0.748
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	74,080	14,816.000	14,816.000
sd	0.000			0.000	272.176	54.435	54.435

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-6322;Beta5

Repeat 8

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/20/2017 12:59:24 AM

Count Ended 3/20/2017 1:04:33 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	14	2.800	2.800
sd	0.000			0.000	3.742	0.748	0.748
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	74,837	14,967.400	14,967.400
sd	0.000			0.000	273.564	54.713	54.713

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

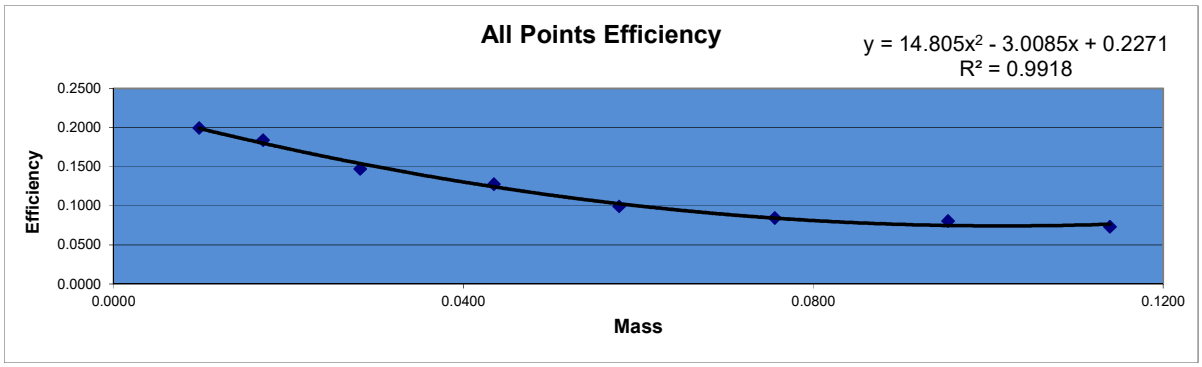
Curve is for Gross Alpha

Blue 3

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot (mL)	Mass
3	ICABT-1835503; A	6/1/2022 16:37	45	20248	449.956	2254.6	0.1996	1	0.0098
3	ICABT-1835503; B	6/1/2022 15:48	45	18652	414.489	2254.6	0.1838	1	0.0171
3	ICABT-1835503; C	6/1/2022 15:00	45	14920	331.556	2254.6	0.1471	1	0.0282
3	ICABT-1835503; D	6/1/2022 14:10	45	12965	288.111	2254.6	0.1278	1	0.0435
3	ICABT-1835503; E	6/1/2022 19:54	45	20105	446.778	4509.1	0.0991	2	0.0578
3	ICABT-1835503; F	6/1/2022 19:05	45	17103	380.067	4509.1	0.0843	2	0.0756
3	ICABT-1835503; G	6/1/2022 18:17	45	16364	363.644	4509.1	0.0806	2	0.0954
3	ICABT-1835503; H	6/1/2022 17:27	45	14833	329.622	4509.1	0.0731	2	0.1139

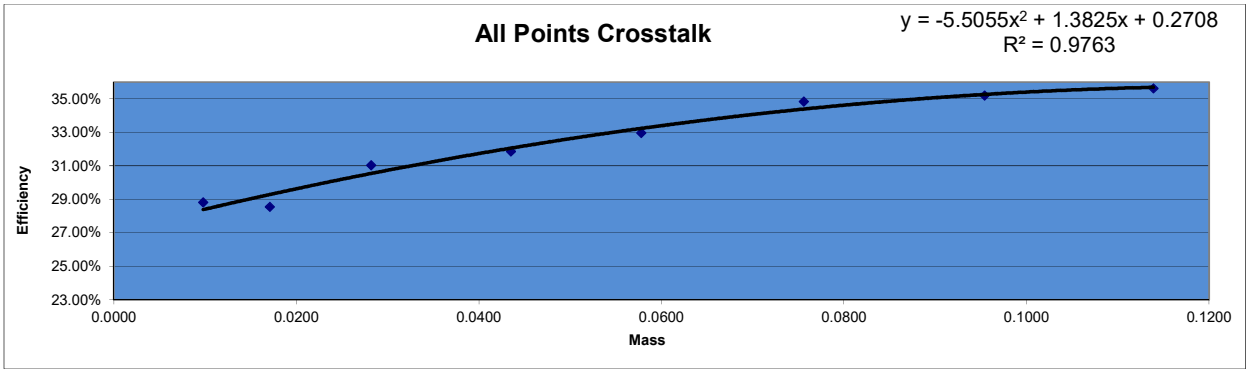
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0098	0.1996	0.1990	0.27%
0.0171	0.1838	0.1800	2.14%
0.0282	0.1471	0.1540	-4.53%
0.0435	0.1278	0.1242	2.85%
0.0578	0.0991	0.1027	-3.49%
0.0756	0.0843	0.0843	0.02%
0.0954	0.0806	0.0748	7.77%
0.1139	0.0731	0.0765	-4.44%

Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/2019
Activity (dpm) 2254.57



X^2 Coeff:	14.805
X Coeff:	-3.0085
Intercept:	0.2271

Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
ICABT-1835503; A	0.0098	45	20248	8196	449.96	182.13	28.81%	Min
ICABT-1835503; B	0.0171	45	18652	7451	414.49	165.58	28.54%	28.54%
ICABT-1835503; C	0.0282	45	14920	6712	331.56	149.16	31.03%	
ICABT-1835503; D	0.0435	45	12965	6058	288.11	134.62	31.85%	Max
ICABT-1835503; E	0.0578	45	20105	9886	446.78	219.69	32.96%	35.63%
ICABT-1835503; F	0.0756	45	17103	9138	380.07	203.07	34.82%	
ICABT-1835503; G	0.0954	45	16364	8885	363.64	197.44	35.19%	Mean
ICABT-1835503; H	0.1139	45	14833	8210	329.62	182.44	35.63%	32.35%



Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; D

Repeat 59

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 2:10:27 PM

Count Ended 6/1/2022 2:55:57 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	12,965	288.111	287.919
sd	0.014	113.864	2.530	2.530
Beta	0.462	6,058	134.622	134.160
sd	0.021	77.833	1.730	1.730

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; C

Repeat 60

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 3:00:56 PM

Count Ended 6/1/2022 3:46:19 PM

Sample Count Time 45.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	14,920	331.556	331.364
sd	0.014	122.147	2.714	2.714
Beta	0.462	6,712	149.156	148.694
sd	0.021	81.927	1.821	1.821

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; B

Repeat 61

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 3:48:56 PM

Count Ended 6/1/2022 4:34:09 PM

Sample Count Time 45.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	18,652	414.489	414.297
sd	0.014	136.572	3.035	3.035
Beta	0.462	7,451	165.578	165.116
sd	0.021	86.319	1.918	1.918

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; A

Repeat 62

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 4:37:31 PM

Count Ended 6/1/2022 5:22:40 PM

Sample Count Time 45.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	20,248	449.956	449.764
sd	0.014	142.295	3.162	3.162
Beta	0.462	8,196	182.133	181.671
sd	0.021	90.532	2.012	2.012

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; H

Repeat 63

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 5:27:46 PM

Count Ended 6/1/2022 6:13:28 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	14,833	329.622	329.430
sd	0.014	121.791	2.706	2.706
Beta	0.462	8,210	182.444	181.982
sd	0.021	90.609	2.014	2.014

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; G

Repeat 64

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 6:17:19 PM

Count Ended 6/1/2022 7:03:00 PM

Sample Count Time 45.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	16,364	363.644	363.452
sd	0.014	127.922	2.843	2.843
Beta	0.462	8,885	197.444	196.982
sd	0.021	94.260	2.095	2.095

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; F

Repeat 65

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 7:05:45 PM

Count Ended 6/1/2022 7:51:20 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	17,103	380.067	379.875
sd	0.014	130.778	2.906	2.906
Beta	0.462	9,138	203.067	202.605
sd	0.021	95.593	2.124	2.124

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICABT-1835503; E

Repeat 66

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/1/2022 7:54:41 PM

Count Ended 6/1/2022 8:40:06 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	20,105	446.778	446.586
sd	0.014	141.792	3.151	3.151
Beta	0.462	9,886	219.689	219.227
sd	0.021	99.428	2.210	2.210

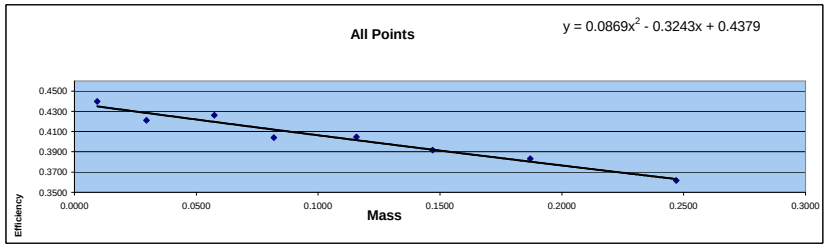
Curve is for Gross Beta
Strontium 90
and
Total Strontium

Blue 19

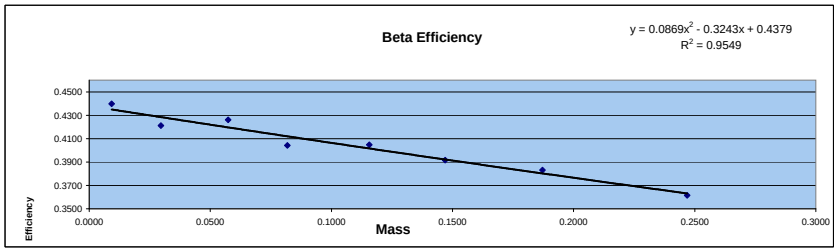
DPM
37452.79614
DPM
37450.30234
DPM
37442.82197

Detector ID	Std ID	Sample Wt	Count Date	Count Time	Beta Counts	CPM	Sr-90 Eff	Standard Aliquot
19	B1	0.0093	5/19/2017 11:21	5	82306	16461.2	0.4396	1mL
19	B2	0.0296	5/19/2017 11:33	5	78824	15764.8	0.4210	1mL
19	B3	0.0574	5/15/2017 22:01	5	79796	15959.2	0.4261	1mL
19	B4	0.0818	5/15/2017 14:53	5	75688	15137.6	0.4042	1mL
19	B5	0.1157	5/16/2017 12:58	5	75766	15153.2	0.4046	1mL
19	B6	0.1470	5/16/2017 15:01	5	73327	14665.4	0.3916	1mL
19	B7	0.1871	5/16/2017 14:27	5	71744	14348.8	0.3831	1mL
19	B8	0.2469	5/16/2017 13:17	5	67711	13542.2	0.3616	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4396	0.4349	1.09%
0.0296	0.4210	0.4284	-1.71%
0.0574	0.4261	0.4196	1.56%
0.0818	0.4042	0.4120	-1.89%
0.1157	0.4046	0.4015	0.77%
0.1470	0.3916	0.3921	-0.13%
0.1871	0.3831	0.3803	0.76%
0.2469	0.3616	0.3631	-0.42%



Mass	Efficiency
0.0093	0.4396
0.0296	0.4210
0.0574	0.4261
0.0818	0.4042
0.1157	0.4046
0.1470	0.3916
0.1871	0.3831
0.2469	0.3616



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/17/2009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	5/19/2017
Elapsed Time:	2801.000 days
Half Life:	10409.625 days
Exponential Term:	0.8298498
Corrected Activity:	18721.411 dpm/mL
Decay Activity (Sr/Y-90)	37442.822 dpm

Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/17/2009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	5/15/2017
Elapsed Time:	2797.000 days
Half Life:	10409.625 days
Exponential Term:	0.8300708
Corrected Activity:	18726.398 dpm/mL
Decay Activity (Sr/Y-90)	37452.796 dpm

Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/17/2009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	5/16/2017
Elapsed Time:	2798.000 days
Half Life:	10409.625 days
Exponential Term:	0.8300156
Corrected Activity:	18725.151 dpm/mL
Decay Activity (Sr/Y-90)	37450.302 dpm

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta4

Repeat 17

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/15/2017 2:53:14 PM

Count Ended 5/15/2017 2:58:25 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	4	0.800	0.776
sd	0.000			0.005	2.000	0.400	0.400
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	75,688	15,137.600	15,137.270
sd	0.000			0.018	275.115	55.023	55.023

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta3

Repeat 18

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/15/2017 10:01:36 PM

Count Ended 5/15/2017 10:06:46 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	3	0.600	0.576
sd	0.000			0.005	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	79,796	15,959.200	15,958.870
sd	0.000			0.018	282.482	56.496	56.496

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta5

Repeat 17

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/16/2017 12:58:42 PM

Count Ended 5/16/2017 1:03:58 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	6	1.200	1.176
sd	0.000			0.005	2.449	0.490	0.490
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	75,766	15,153.200	15,152.870
sd	0.000			0.018	275.256	55.051	55.051

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta8

Repeat 17

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/16/2017 1:17:53 PM

Count Ended 5/16/2017 1:23:01 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	3	0.600	0.576
sd	0.000			0.005	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	67,711	13,542.200	13,541.870
sd	0.000			0.018	260.213	52.043	52.043

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta7

Repeat 18

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/16/2017 2:27:57 PM

Count Ended 5/16/2017 2:33:05 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	5	1.000	0.976
sd	0.000			0.005	2.236	0.447	0.447
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	71,744	14,348.800	14,348.470
sd	0.000			0.018	267.851	53.570	53.570

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta6

Repeat 19

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/16/2017 3:01:39 PM

Count Ended 5/16/2017 3:06:49 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	3	0.600	0.576
sd	0.000			0.005	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	73,327	14,665.400	14,665.070
sd	0.000			0.018	270.790	54.158	54.158

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta5

Repeat 21

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/16/2017 3:09:11 PM

Count Ended 5/16/2017 3:14:22 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	3	0.600	0.576
sd	0.000			0.005	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	67,909	13,581.800	13,581.470
sd	0.000			0.018	260.594	52.119	52.119

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta1

Repeat 24

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/19/2017 11:21:20 AM

Count Ended 5/19/2017 11:26:43 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	3	0.600	0.576
sd	0.000			0.005	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	82,306	16,461.200	16,460.870
sd	0.000			0.018	286.890	57.378	57.378

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-6322;Beta2 **Repeat** 24

Carrier No. 0

Batch ID Beta_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/19/2017 11:33:17 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/19/2017 11:38:32 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	2	0.400	0.376
sd	0.000			0.005	1.414	0.283	0.283
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	78,824	15,764.800	15,764.470
sd	0.000			0.018	280.756	56.151	56.151

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

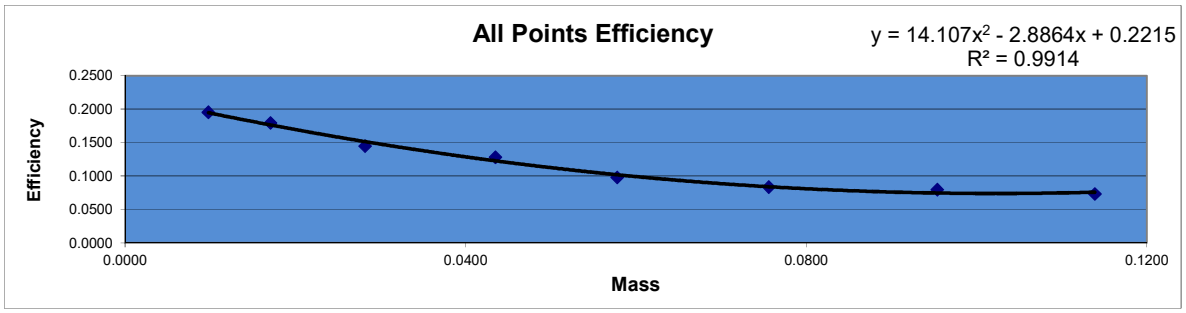
Curve is for Gross Alpha

Blue 19

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot (mL)	Mass
19	ICABT-1835503; A	6/2/2022 11:24	45	19816	440.356	2254.6	0.1953	1	0.0098
19	ICABT-1835503; B	6/2/2022 10:35	45	18183	404.067	2254.6	0.1792	1	0.0171
19	ICABT-1835503; C	6/2/2022 9:46	45	14661	325.800	2254.6	0.1445	1	0.0282
19	ICABT-1835503; D	6/2/2022 8:56	45	12986	288.578	2254.6	0.1280	1	0.0435
19	ICABT-1835503; E	6/2/2022 14:41	45	19887	441.933	4509.1	0.0980	2	0.0578
19	ICABT-1835503; F	6/2/2022 13:52	45	16899	375.533	4509.1	0.0833	2	0.0756
19	ICABT-1835503; G	6/2/2022 13:02	45	16160	359.111	4509.1	0.0796	2	0.0954
19	ICABT-1835503; H	6/2/2022 12:14	45	14826	329.467	4509.1	0.0731	2	0.1139

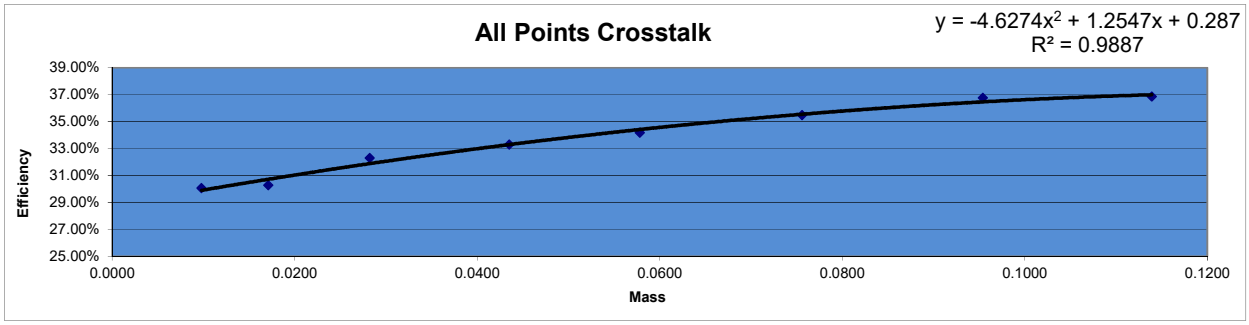
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0098	0.1953	0.1946	0.38%
0.0171	0.1792	0.1763	1.68%
0.0282	0.1445	0.1513	-4.50%
0.0435	0.1280	0.1226	4.37%
0.0578	0.0980	0.1018	-3.72%
0.0756	0.0833	0.0839	-0.75%
0.0954	0.0796	0.0745	6.86%
0.1139	0.0731	0.0758	-3.55%

Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/2019
Activity (dpm) 2254.57



X² Coeff:	14.107
X Coeff:	-2.8864
Intercept:	0.2215

Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
ICABT-1835503; A	0.0098	45	19816	8518	440.36	189.29	30.06%	Min
ICABT-1835503; B	0.0171	45	18183	7892	404.07	175.38	30.27%	30.06%
ICABT-1835503; C	0.0282	45	14661	6991	325.80	155.36	32.29%	
ICABT-1835503; D	0.0435	45	12986	6480	288.58	144.00	33.29%	Max
ICABT-1835503; E	0.0578	45	19887	10324	441.93	229.42	34.17%	36.86%
ICABT-1835503; F	0.0756	45	16899	9292	375.53	206.49	35.48%	
ICABT-1835503; G	0.0954	45	16160	9391	359.11	208.69	36.75%	Mean
ICABT-1835503; H	0.1139	45	14826	8655	329.47	192.33	36.86%	33.65%



Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; D

Repeat 75

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 8:56:58 AM

Count Ended 6/2/2022 9:42:46 AM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	12,986	288.578	288.305
sd	0.017	113.956	2.532	2.532
Beta	0.586	6,480	144.000	143.414
sd	0.024	80.498	1.789	1.789

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; C

Repeat 76

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 9:46:28 AM

Count Ended 6/2/2022 10:32:03 AM

Sample Count Time 45.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	14,661	325.800	325.527
sd	0.017	121.083	2.691	2.691
Beta	0.586	6,991	155.356	154.770
sd	0.024	83.612	1.858	1.858

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; B

Repeat 77

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 10:35:07 AM

Count Ended 6/2/2022 11:20:35 AM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	18,183	404.067	403.794
sd	0.017	134.844	2.997	2.997
Beta	0.586	7,892	175.378	174.792
sd	0.024	88.837	1.974	1.974

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; A

Repeat 78

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 11:24:37 AM

Count Ended 6/2/2022 12:09:59 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	19,816	440.356	440.083
sd	0.017	140.769	3.128	3.128
Beta	0.586	8,518	189.289	188.703
sd	0.024	92.293	2.051	2.051

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; H

Repeat 79

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 12:14:40 PM

Count Ended 6/2/2022 1:00:05 PM

Sample Count Time 45.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	14,826	329.467	329.194
sd	0.017	121.762	2.706	2.706
Beta	0.586	8,655	192.333	191.747
sd	0.024	93.032	2.067	2.068

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; G

Repeat 80

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 1:02:58 PM

Count Ended 6/2/2022 1:48:47 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	16,160	359.111	358.838
sd	0.017	127.122	2.825	2.825
Beta	0.586	9,391	208.689	208.103
sd	0.024	96.907	2.153	2.154

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; F

Repeat 81

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 1:52:47 PM

Count Ended 6/2/2022 2:38:22 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	16,899	375.533	375.260
sd	0.017	129.996	2.889	2.889
Beta	0.586	9,292	206.489	205.903
sd	0.024	96.395	2.142	2.142

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICABT-1835503; E

Repeat 82

Carrier No. 0

Batch ID 565419

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 2:41:55 PM

Count Ended 6/2/2022 3:27:14 PM

Sample Count Time 45.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

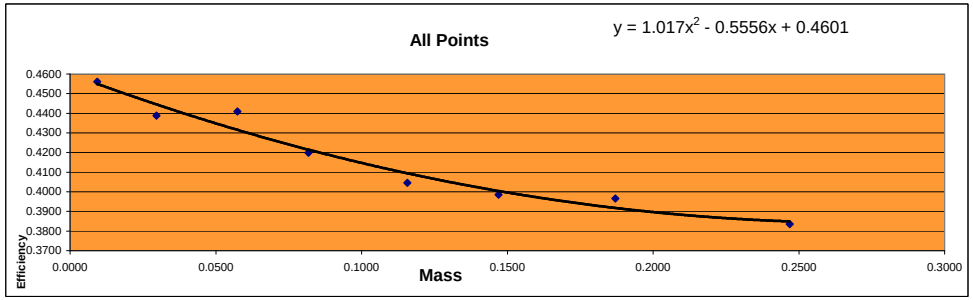
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	19,887	441.933	441.660
sd	0.017	141.021	3.134	3.134
Beta	0.586	10,324	229.422	228.836
sd	0.024	101.607	2.258	2.258

Curve is for Gross Beta
Strontium 90
and
Total Strontium

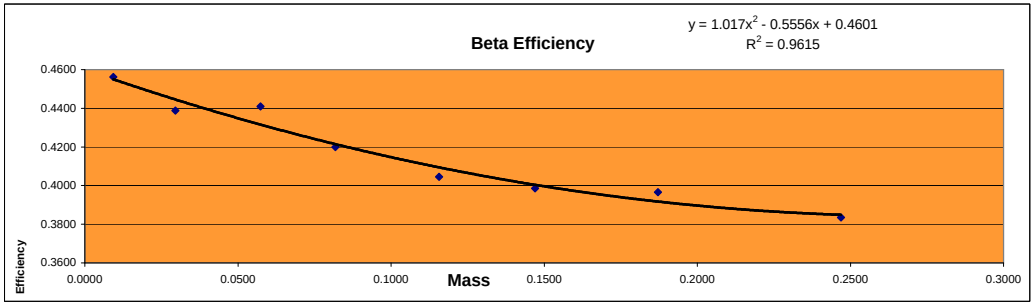
Orange 0

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
0	B1	1/23/2013 14:44	0.0093	5	94846	18969.200	0.4561	1mL
0	B2	1/23/2013 15:46	0.0296	5	91244	18248.800	0.4388	1mL
0	B3	1/23/2013 15:37	0.0574	5	91691	18338.200	0.4409	1mL
0	B4	1/23/2013 15:26	0.0818	5	87307	17461.400	0.4199	1mL
0	B5	1/23/2013 15:19	0.1157	5	84120	16824.000	0.4045	1mL
0	B6	1/23/2013 15:09	0.1470	5	82888	16577.600	0.3986	1mL
0	B7	1/23/2013 15:01	0.1871	5	82469	16493.800	0.3966	1mL
0	B8	1/23/2013 14:53	0.2469	5	79762	15952.400	0.3836	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4561	0.4550	0.24%
0.0296	0.4388	0.4445	-1.29%
0.0574	0.4409	0.4316	2.17%
0.0818	0.4199	0.4215	-0.38%
0.1157	0.4045	0.4094	-1.20%
0.1470	0.3986	0.4004	-0.45%
0.1871	0.3966	0.3917	1.24%
0.2469	0.3836	0.3849	-0.35%



Mass	Efficiency
0.0093	0.4561
0.0296	0.4388
0.0574	0.4409
0.0818	0.4199
0.1157	0.4045
0.1470	0.3986
0.1871	0.3966
0.2469	0.3836



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.92173026
Corrected Activity:	20794.2346 dpm/mL
Decay Activity (Sr/Y-90)	41588.4692 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B1

Repeat 40

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 2:44:52 PM

Count Ended 1/23/2013 2:50:03 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	396	79.200	79.122
sd	0.000			0.009	19.900	3.980	3.980
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	94,846	18,969.200	18,968.797
sd	0.000			0.020	307.971	61.594	61.594

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B8

Repeat 40

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 2:53:37 PM

Count Ended 1/23/2013 2:58:47 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	265	53.000	52.922
sd	0.000			0.009	16.279	3.256	3.256
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	79,762	15,952.400	15,951.997
sd	0.000			0.020	282.422	56.484	56.484

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B7

Repeat 41

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 3:01:10 PM

Count Ended 1/23/2013 3:06:18 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	306	61.200	61.122
sd	0.000			0.009	17.493	3.499	3.499
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	82,469	16,493.800	16,493.397
sd	0.000			0.020	287.174	57.435	57.435

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B6

Repeat 42

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:09:26 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:14:35 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	353	70.600	70.522
sd	0.000			0.009	18.788	3.758	3.758
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	82,888	16,577.600	16,577.197
sd	0.000			0.020	287.903	57.581	57.581

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B5

Repeat 43

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:19:14 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:24:23 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	341	68.200	68.122
sd	0.000			0.009	18.466	3.693	3.693
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	84,120	16,824.000	16,823.597
sd	0.000			0.020	290.034	58.007	58.007

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B4 **Repeat** 45

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:26:50 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:32:01 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	304	60.800	60.722
sd	0.000			0.009	17.436	3.487	3.487
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	87,307	17,461.400	17,460.997
sd	0.000			0.020	295.478	59.096	59.096

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B3

Repeat 46

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:37:05 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:42:15 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	362	72.400	72.322
sd	0.000			0.009	19.026	3.805	3.805
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	91,691	18,338.200	18,337.797
sd	0.000			0.020	302.805	60.561	60.561

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-6322;B2

Repeat 47

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 3:46:01 PM

Count Ended 1/23/2013 3:51:11 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	363	72.600	72.522
sd	0.000			0.009	19.053	3.811	3.811
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	91,244	18,248.800	18,248.397
sd	0.000			0.020	302.066	60.413	60.413

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

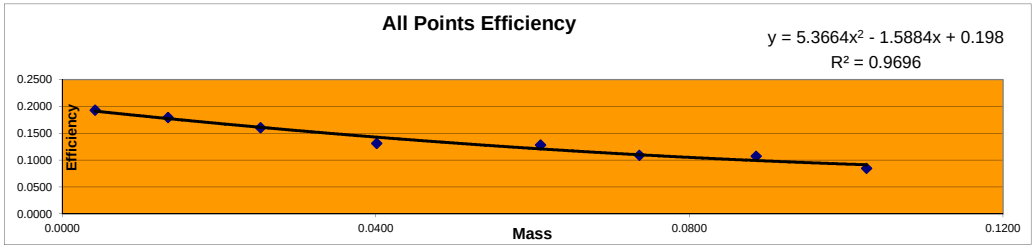
Error = .00 **x sd**

Curve is for Gross Alpha

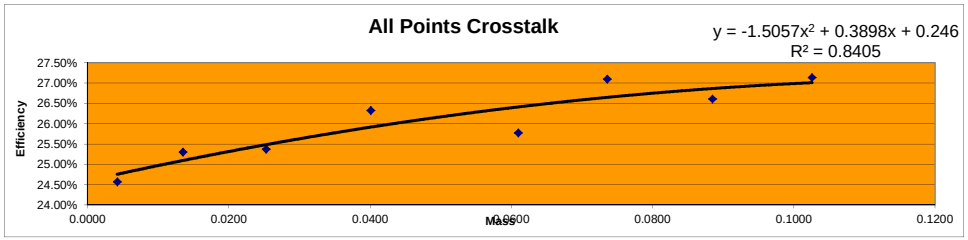
Orange **0**

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
0	ICABT-1835503; A	8/26/2020 8:22	25	21783	871.320	4509.1	0.1932	2mL	0.0042
0	ICABT-1835503; B	8/26/2020 13:32	25	20252	810.080	4509.1	0.1797	2mL	0.0135
0	ICABT-1835503; C	8/26/2020 13:05	25	18123	724.920	4509.1	0.1608	2mL	0.0253
0	ICABT-1835503; D	8/26/2020 12:03	25	14804	592.160	4509.1	0.1313	2mL	0.0401
0	ICABT-1835503; ED	8/27/2020 12:57	25	28922	1156.880	9018.3	0.1283	4mL	0.0610
0	ICABT-1835503; F	8/26/2020 10:55	25	24630	985.200	9018.3	0.1092	4mL	0.0736
0	ICABT-1835503; G	8/26/2020 10:26	25	24266	970.640	9018.3	0.1076	4mL	0.0885
0	ICABT-1835503; H	8/26/2020 9:58	25	19181	767.240	9018.3	0.0851	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1932	0.1914	0.95%
0.0135	0.1797	0.1775	1.19%
0.0253	0.1608	0.1612	-0.30%
0.0401	0.1313	0.1429	-8.12%
0.0610	0.1283	0.1211	5.95%
0.0736	0.1092	0.1102	-0.83%
0.0885	0.1076	0.0995	8.22%
0.1026	0.0851	0.0915	-7.04%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
0	ICABT-1835503; A	0.0042	25	21783	7095	871.32	283.80	24.57%	Min
0	ICABT-1835503; B	0.0135	25	20252	6860	810.08	274.40	25.30%	24.57%
0	ICABT-1835503; C	0.0253	25	18123	6162	724.92	246.48	25.37%	
0	ICABT-1835503; D	0.0401	25	14804	5290	592.16	211.60	26.33%	Max
0	ICABT-1835503; ED	0.0610	25	28922	10044	1156.88	401.76	25.78%	27.14%
0	ICABT-1835503; F	0.0736	25	24630	9154	985.20	366.16	27.10%	
0	ICABT-1835503; G	0.0885	25	24266	8797	970.64	351.88	26.61%	Mean
0	ICABT-1835503; H	0.1026	25	19181	7144	767.24	285.76	27.14%	26.02%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Page 208 of 578

8/24/2023 9:47 AM

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; A

Repeat 1

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 8:22:33 AM

Count Ended 8/26/2020 8:47:43 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	21,783	871.320	871.234
sd	0.009	147.591	5.904	5.904
Beta	0.450	7,095	283.800	283.350
sd	0.021	84.232	3.369	3.369

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; H

Repeat 2

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 9:58:26 AM

Count Ended 8/26/2020 10:23:34 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	19,181	767.240	767.154
sd	0.009	138.495	5.540	5.540
Beta	0.450	7,144	285.760	285.310
sd	0.021	84.522	3.381	3.381

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; G

Repeat 3

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 10:26:30 AM

Count Ended 8/26/2020 10:51:36 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	24,266	970.640	970.554
sd	0.009	155.775	6.231	6.231
Beta	0.450	8,797	351.880	351.430
sd	0.021	93.792	3.752	3.752

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; F

Repeat 4

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 10:55:49 AM

Count Ended 8/26/2020 11:20:58 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	24,630	985.200	985.114
sd	0.009	156.939	6.278	6.278
Beta	0.450	9,154	366.160	365.710
sd	0.021	95.677	3.827	3.827

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; D

Repeat 6

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 12:03:15 PM

Count Ended 8/26/2020 12:28:18 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	14,804	592.160	592.074
sd	0.009	121.672	4.867	4.867
Beta	0.450	5,290	211.600	211.150
sd	0.021	72.732	2.909	2.909

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; C

Repeat 7

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 1:05:06 PM

Count Ended 8/26/2020 1:30:16 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	18,123	724.920	724.834
sd	0.009	134.622	5.385	5.385
Beta	0.450	6,162	246.480	246.030
sd	0.021	78.498	3.140	3.140

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; B

Repeat 8

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 1:32:08 PM

Count Ended 8/26/2020 1:57:16 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	20,252	810.080	809.994
sd	0.009	142.310	5.692	5.692
Beta	0.450	6,860	274.400	273.950
sd	0.021	82.825	3.313	3.313

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICABT-1835503; ED

Repeat 15

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 12:57:27 PM

Count Ended 8/27/2020 1:22:36 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

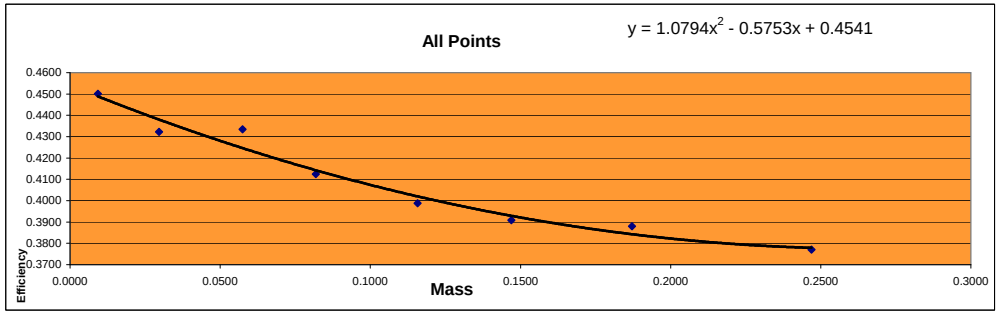
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	28,922	1,156.880	1,156.794
sd	0.009	170.065	6.803	6.803
Beta	0.450	10,044	401.760	401.310
sd	0.021	100.220	4.009	4.009

Curve is for Gross Beta
Strontium 90
and
Total Strontium

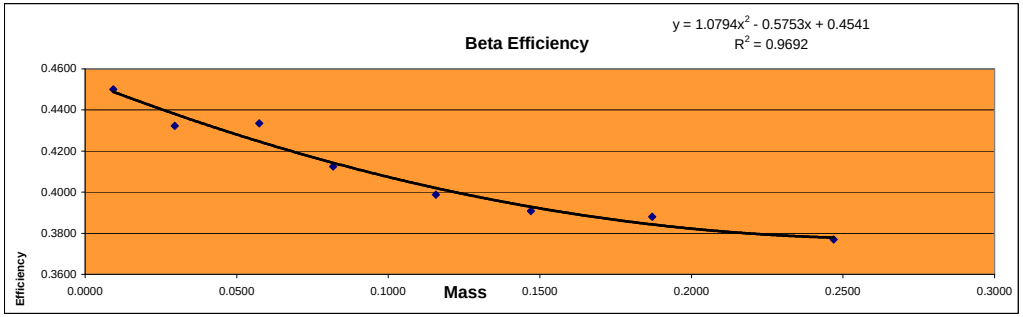
Orange 2

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
2	B1	1/23/2013 15:00	0.0093	5	93591	18718.200	0.4501	1mL
2	B2	1/23/2013 14:53	0.0296	5	89882	17976.400	0.4322	1mL
2	B3	1/23/2013 14:45	0.0574	5	90138	18027.600	0.4335	1mL
2	B4	1/23/2013 15:46	0.0818	5	85780	17156.000	0.4125	1mL
2	B5	1/23/2013 15:37	0.1157	5	82932	16586.400	0.3988	1mL
2	B6	1/23/2013 15:27	0.1470	5	81262	16252.400	0.3908	1mL
2	B7	1/23/2013 15:19	0.1871	5	80689	16137.800	0.3880	1mL
2	B8	1/23/2013 15:09	0.2469	5	78390	15678.000	0.3770	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4501	0.4488	0.28%
0.0296	0.4322	0.4380	-1.32%
0.0574	0.4335	0.4246	2.08%
0.0818	0.4125	0.4143	-0.42%
0.1157	0.3988	0.4020	-0.79%
0.1470	0.3908	0.3929	-0.53%
0.1871	0.3880	0.3842	0.99%
0.2469	0.3770	0.3779	-0.23%



Mass	Efficiency
0.0093	0.4501
0.0296	0.4322
0.0574	0.4335
0.0818	0.4125
0.1157	0.3988
0.1470	0.3908
0.1871	0.3880
0.2469	0.3770



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560	dpm/mL
Reference Date:	9/17/2009	
Count Date:	1/23/2013	
Elapsed Time:	1224.000	days
Half Life:	10409.625	days
Exponential Term:	0.921730256	
Corrected Activity:	20794.23458	dpm/mL
Decay Activity (Sr/Y-90)	41588.46916	dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B3

Repeat 40

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 2:45:01 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 2:50:10 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	39	7.800	7.730
sd	0.000			0.008	6.245	1.249	1.249
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	90,138	18,027.600	18,027.314
sd	0.000			0.017	300.230	60.046	60.046

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B2 **Repeat** 41

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 2:53:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 2:58:19 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	52	10.400	10.330
sd	0.000			0.008	7.211	1.442	1.442
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	89,882	17,976.400	17,976.114
sd	0.000			0.017	299.803	59.961	59.961

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B1 **Repeat** 42

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:00:45 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:05:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	43	8.600	8.530
sd	0.000			0.008	6.557	1.311	1.312
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	93,591	18,718.200	18,717.914
sd	0.000			0.017	305.926	61.185	61.185

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B8 **Repeat** 42

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:09:35 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:14:43 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	37	7.400	7.330
sd	0.000			0.008	6.083	1.217	1.217
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	78,390	15,678.000	15,677.714
sd	0.000			0.017	279.982	55.996	55.996

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B7

Repeat 43

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 3:19:22 PM

Count Ended 1/23/2013 3:24:30 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	41	8.200	8.130
sd	0.000			0.008	6.403	1.281	1.281
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	80,689	16,137.800	16,137.514
sd	0.000			0.017	284.058	56.812	56.812

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B6 **Repeat** 44

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:27:01 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:32:09 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	38	7.600	7.530
sd	0.000			0.008	6.164	1.233	1.233
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	81,262	16,252.400	16,252.114
sd	0.000			0.017	285.065	57.013	57.013

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B5

Repeat 45

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:37:16 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:42:24 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	53	10.600	10.530
sd	0.000			0.008	7.280	1.456	1.456
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	82,932	16,586.400	16,586.114
sd	0.000			0.017	287.979	57.596	57.596

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-6322;B4 **Repeat** 47

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 3:46:10 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 3:51:19 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	40	8.000	7.930
sd	0.000			0.008	6.325	1.265	1.265
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	85,780	17,156.000	17,155.714
sd	0.000			0.017	292.882	58.576	58.576

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

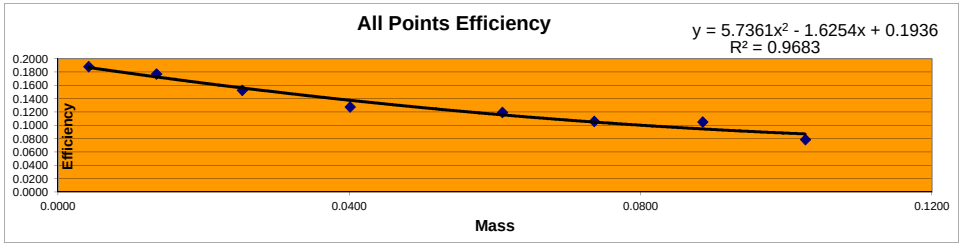
*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Curve is for Gross Alpha

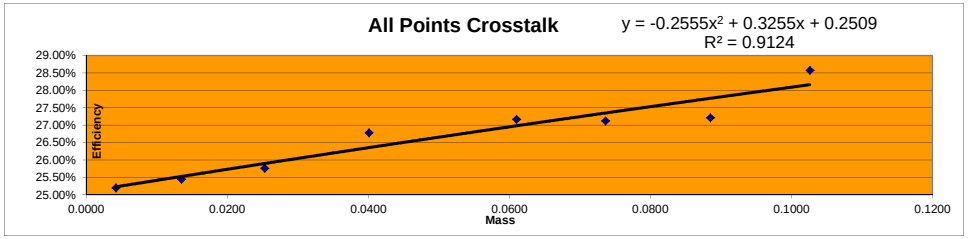
Orange 2

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
2	ICABT-1835503; A	8/26/2020 10:26	25	21216	848.640	4509.1	0.1882	2mL	0.0042
2	ICABT-1835503; B	8/26/2020 9:58	25	19964	798.560	4509.1	0.1771	2mL	0.0135
2	ICABT-1835503; C	8/26/2020 9:06	25	17239	689.560	4509.1	0.1529	2mL	0.0253
2	ICABT-1835503; D	8/26/2020 13:32	25	14407	576.280	4509.1	0.1278	2mL	0.0401
2	ICABT-1835503; ED	8/27/2020 14:04	25	26946	1077.840	9018.3	0.1195	4mL	0.0610
2	ICABT-1835503; F	8/26/2020 12:03	25	23952	958.080	9018.3	0.1062	4mL	0.0736
2	ICABT-1835503; G	8/26/2020 11:24	25	23689	947.560	9018.3	0.1051	4mL	0.0885
2	ICABT-1835503; H	8/26/2020 10:56	25	17841	713.640	9018.3	0.0791	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1882	0.1869	0.71%
0.0135	0.1771	0.1727	2.55%
0.0253	0.1529	0.1561	-2.06%
0.0401	0.1278	0.1376	-7.15%
0.0610	0.1195	0.1158	3.21%
0.0736	0.1062	0.1050	1.14%
0.0885	0.1051	0.0947	10.98%
0.1026	0.0791	0.0872	-9.27%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
2	ICABT-1835503; A	0.0042	25	21216	7147	848.64	285.88	25.20%	Min
2	ICABT-1835503; B	0.0135	25	19964	6815	798.56	272.60	25.45%	25.20%
2	ICABT-1835503; C	0.0253	25	17239	5981	689.56	239.24	25.76%	
2	ICABT-1835503; D	0.0401	25	14407	5270	576.28	210.80	26.78%	Max
2	ICABT-1835503; ED	0.0610	25	26946	10052	1077.84	402.08	27.17%	28.57%
2	ICABT-1835503; F	0.0736	25	23952	8914	958.08	356.56	27.12%	
2	ICABT-1835503; G	0.0885	25	23689	8856	947.56	354.24	27.21%	Mean
2	ICABT-1835503; H	0.1026	25	17841	7136	713.64	285.44	28.57%	26.66%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; C

Repeat 1

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 9:06:12 AM

Count Ended 8/26/2020 9:31:17 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	17,239	689.560	689.495
sd	0.008	131.297	5.252	5.252
Beta	0.327	5,981	239.240	238.913
sd	0.018	77.337	3.093	3.094

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; B

Repeat 2

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 9:58:51 AM

Count Ended 8/26/2020 10:23:57 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	19,964	798.560	798.495
sd	0.008	141.294	5.652	5.652
Beta	0.327	6,815	272.600	272.273
sd	0.018	82.553	3.302	3.302

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; A

Repeat 3

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 10:26:40 AM

Count Ended 8/26/2020 10:51:44 AM

Sample Count Time 25.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	21,216	848.640	848.575
sd	0.008	145.657	5.826	5.826
Beta	0.327	7,147	285.880	285.553
sd	0.018	84.540	3.382	3.382

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; H

Repeat 4

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 10:56:15 AM

Count Ended 8/26/2020 11:21:20 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	17,841	713.640	713.575
sd	0.008	133.570	5.343	5.343
Beta	0.327	7,136	285.440	285.113
sd	0.018	84.475	3.379	3.379

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; G

Repeat 5

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 11:24:01 AM

Count Ended 8/26/2020 11:49:08 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	23,689	947.560	947.495
sd	0.008	153.912	6.156	6.156
Beta	0.327	8,856	354.240	353.913
sd	0.018	94.106	3.764	3.764

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; F

Repeat 6

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 12:03:25 PM

Count Ended 8/26/2020 12:28:34 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	23,952	958.080	958.015
sd	0.008	154.764	6.191	6.191
Beta	0.327	8,914	356.560	356.233
sd	0.018	94.414	3.777	3.777

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; D

Repeat 8

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/26/2020 1:32:16 PM

Count Ended 8/26/2020 1:57:24 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	14,407	576.280	576.215
sd	0.008	120.029	4.801	4.801
Beta	0.327	5,270	210.800	210.473
sd	0.018	72.595	2.904	2.904

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICABT-1835503; ED

Repeat 17

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 2:04:18 PM

Count Ended 8/27/2020 2:29:24 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

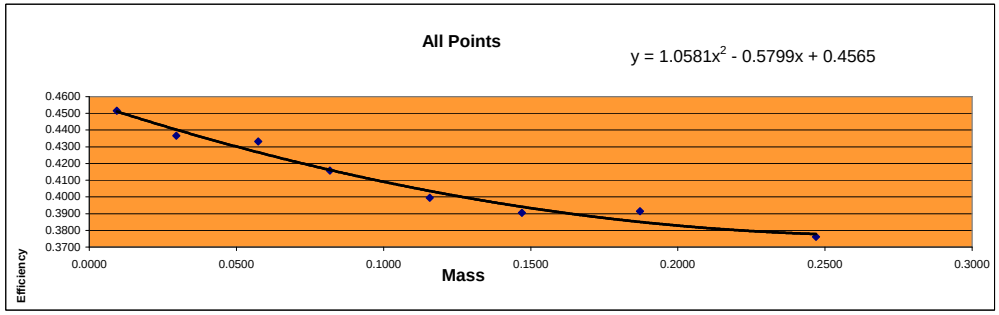
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	26,946	1,077.840	1,077.775
sd	0.008	164.152	6.566	6.566
Beta	0.327	10,052	402.080	401.753
sd	0.018	100.260	4.010	4.010

Curve is for Gross Beta
Strontium 90
and
Total Strontium

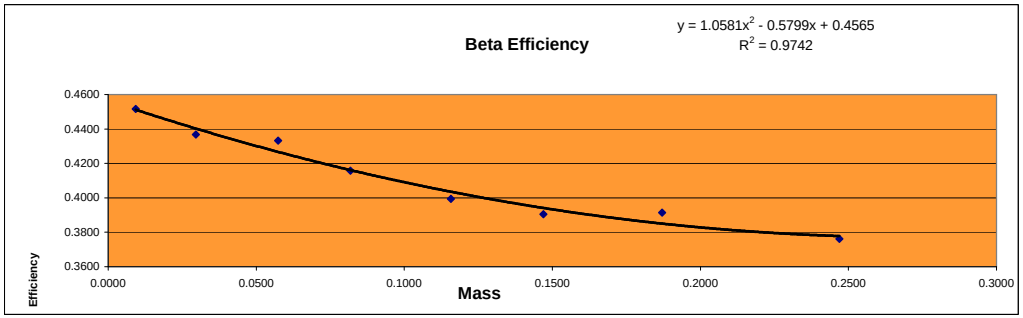
Orange 12

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
12	B1	1/23/2013 17:05	0.0093	5	93918	18783.600	0.4517	1mL
12	B2	1/23/2013 16:58	0.0296	5	90811	18162.200	0.4367	1mL
12	B3	1/23/2013 16:47	0.0574	5	90080	18016.000	0.4332	1mL
12	B4	1/23/2013 14:36	0.0818	5	86470	17294.000	0.4158	1mL
12	B5	1/23/2013 14:27	0.1157	5	83067	16613.400	0.3995	1mL
12	B6	1/23/2013 17:28	0.1470	5	81188	16237.600	0.3904	1mL
12	B7	1/23/2013 17:19	0.1871	5	81387	16277.400	0.3914	1mL
12	B8	1/23/2013 17:12	0.2469	5	78207	15641.400	0.3761	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4517	0.4512	0.10%
0.0296	0.4367	0.4403	-0.81%
0.0574	0.4332	0.4267	1.52%
0.0818	0.4158	0.4161	-0.07%
0.1157	0.3995	0.4036	-1.02%
0.1470	0.3904	0.3941	-0.93%
0.1871	0.3914	0.3850	1.65%
0.2469	0.3761	0.3778	-0.46%



Mass	Efficiency
0.0093	0.4517
0.0296	0.4367
0.0574	0.4332
0.0818	0.4158
0.1157	0.3995
0.1470	0.3904
0.1871	0.3914
0.2469	0.3761



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.921730256
Corrected Activity:	20794.23458 dpm/mL
Decay Activity (Sr/Y-90)	41588.46916 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B5

Repeat 37

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 2:27:59 PM

Count Ended 1/23/2013 2:33:08 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	13	2.600	2.536
sd	0.000			0.008	3.606	0.721	0.721
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	83,067	16,613.400	16,612.978
sd	0.000			0.021	288.213	57.643	57.643

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B4

Repeat 39

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 2:36:53 PM

Count Ended 1/23/2013 2:42:02 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	25	5.000	4.936
sd	0.000			0.008	5.000	1.000	1.000
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	86,470	17,294.000	17,293.578
sd	0.000			0.021	294.058	58.812	58.812

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B3

Repeat 48

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 4:47:04 PM

Count Ended 1/23/2013 4:52:13 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	27	5.400	5.336
sd	0.000			0.008	5.196	1.039	1.039
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	90,080	18,016.000	18,015.578
sd	0.000			0.021	300.133	60.027	60.027

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B2

Repeat 49

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 4:58:19 PM

Count Ended 1/23/2013 5:03:29 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	29	5.800	5.736
sd	0.000			0.008	5.385	1.077	1.077
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	90,811	18,162.200	18,161.778
sd	0.000			0.021	301.349	60.270	60.270

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B1

Repeat 50

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:05:25 PM

Count Ended 1/23/2013 5:10:36 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	35	7.000	6.936
sd	0.000			0.008	5.916	1.183	1.183
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	93,918	18,783.600	18,783.178
sd	0.000			0.021	306.460	61.292	61.292

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B8

Repeat 50

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:12:50 PM

Count Ended 1/23/2013 5:17:58 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	21	4.200	4.136
sd	0.000			0.008	4.583	0.917	0.917
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	78,207	15,641.400	15,640.978
sd	0.000			0.021	279.655	55.931	55.931

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B7

Repeat 51

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:19:33 PM

Count Ended 1/23/2013 5:24:43 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	17	3.400	3.336
sd	0.000			0.008	4.123	0.825	0.825
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	81,387	16,277.400	16,276.978
sd	0.000			0.021	285.284	57.057	57.057

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-6322;B6

Repeat 52

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:28:03 PM

Count Ended 1/23/2013 5:33:12 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	26	5.200	5.136
sd	0.000			0.008	5.099	1.020	1.020
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	81,188	16,237.600	16,237.178
sd	0.000			0.021	284.935	56.987	56.987

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

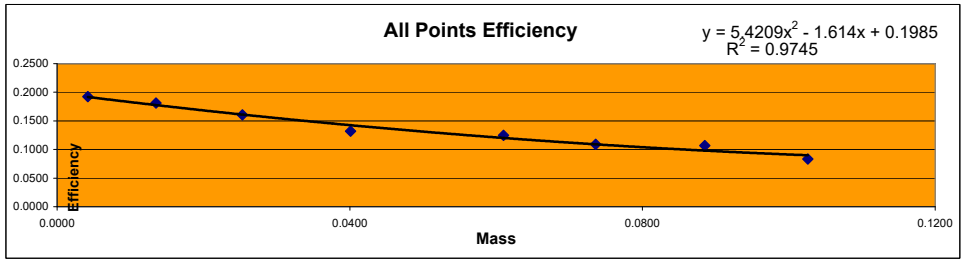
Error = .00 **x sd**

Curve is for Gross Alpha

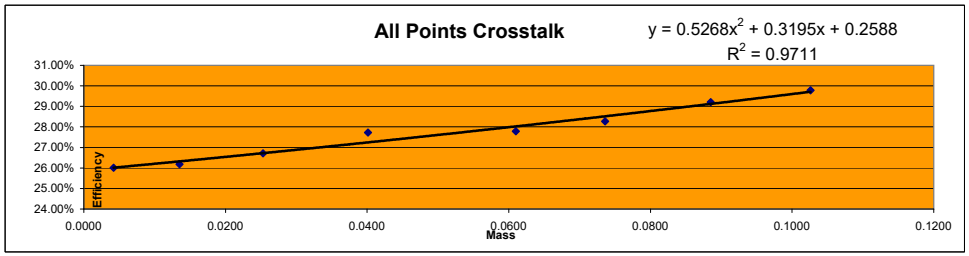
Orange 12

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
12	ICABT-1835503; A	8/27/2020 18:58	25	21663	866.520	4509.1	0.1922	2mL	0.0042
12	ICABT-1835503; B	8/27/2020 18:17	25	20457	818.280	4509.1	0.1815	2mL	0.0135
12	ICABT-1835503; C	8/27/2020 17:41	25	18096	723.840	4509.1	0.1605	2mL	0.0253
12	ICABT-1835503; D	8/27/2020 16:53	25	14897	595.880	4509.1	0.1322	2mL	0.0401
12	ICABT-1835503; ED	8/27/2020 15:35	25	28086	1123.440	9018.3	0.1246	4mL	0.0610
12	ICABT-1835503; F	8/27/2020 21:33	25	24570	982.800	9018.3	0.1090	4mL	0.0736
12	ICABT-1835503; G	8/27/2020 20:47	25	24112	964.480	9018.3	0.1069	4mL	0.0885
12	ICABT-1835503; H	8/27/2020 19:35	25	18787	751.480	9018.3	0.0833	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1922	0.1918	0.18%
0.0135	0.1815	0.1777	2.12%
0.0253	0.1605	0.1611	-0.38%
0.0401	0.1322	0.1425	-7.26%
0.0610	0.1246	0.1202	3.62%
0.0736	0.1090	0.1091	-0.09%
0.0885	0.1069	0.0981	9.00%
0.1026	0.0833	0.0900	-7.38%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
12	ICABT-1835503; A	0.0042	25	21663	7614	866.52	304.56	26.01%	Min
12	ICABT-1835503; B	0.0135	25	20457	7256	818.28	290.24	26.18%	26.01%
12	ICABT-1835503; C	0.0253	25	18096	6594	723.84	263.76	26.71%	
12	ICABT-1835503; D	0.0401	25	14897	5715	595.88	228.60	27.73%	Max
12	ICABT-1835503; ED	0.0610	25	28086	10812	1123.44	432.48	27.80%	29.78%
12	ICABT-1835503; F	0.0736	25	24570	9682	982.80	387.28	28.27%	
12	ICABT-1835503; G	0.0885	25	24112	9951	964.48	398.04	29.21%	Mean
12	ICABT-1835503; H	0.1026	25	18787	7969	751.48	318.76	29.78%	27.71%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; ED

Repeat 20

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:35:21 PM

Count Ended 8/27/2020 4:00:31 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	28,086	1,123.440	1,123.351
sd	0.009	167.589	6.704	6.704
Beta	0.444	10,812	432.480	432.036
sd	0.021	103.981	4.159	4.159

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; D

Repeat 10

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 4:53:09 PM

Count Ended 8/27/2020 5:18:20 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	14,897	595.880	595.791
sd	0.009	122.053	4.882	4.882
Beta	0.444	5,715	228.600	228.156
sd	0.021	75.598	3.024	3.024

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; C

Repeat 11

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 5:41:06 PM

Count Ended 8/27/2020 6:06:30 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	18,096	723.840	723.751
sd	0.009	134.521	5.381	5.381
Beta	0.444	6,594	263.760	263.316
sd	0.021	81.203	3.248	3.248

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; B

Repeat 12

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 6:17:11 PM

Count Ended 8/27/2020 6:42:16 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	20,457	818.280	818.191
sd	0.009	143.028	5.721	5.721
Beta	0.444	7,256	290.240	289.796
sd	0.021	85.182	3.407	3.407

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; A

Repeat 13

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 6:58:05 PM

Count Ended 8/27/2020 7:23:10 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	21,663	866.520	866.431
sd	0.009	147.184	5.887	5.887
Beta	0.444	7,614	304.560	304.116
sd	0.021	87.258	3.490	3.490

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; H

Repeat 14

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 7:35:42 PM

Count Ended 8/27/2020 8:00:49 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	18,787	751.480	751.391
sd	0.009	137.066	5.483	5.483
Beta	0.444	7,969	318.760	318.316
sd	0.021	89.269	3.571	3.571

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; G

Repeat 15

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 8:47:42 PM

Count Ended 8/27/2020 9:12:51 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	24,112	964.480	964.391
sd	0.009	155.280	6.211	6.211
Beta	0.444	9,951	398.040	397.596
sd	0.021	99.755	3.990	3.990

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICABT-1835503; F

Repeat 16

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 9:33:03 PM

Count Ended 8/27/2020 9:58:14 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

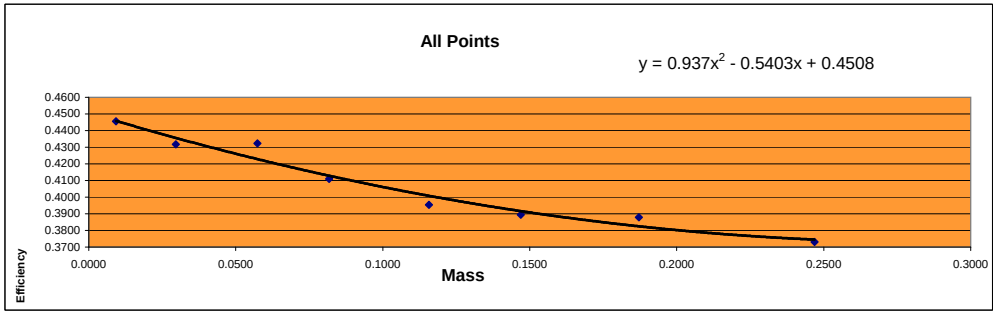
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	24,570	982.800	982.711
sd	0.009	156.748	6.270	6.270
Beta	0.444	9,682	387.280	386.836
sd	0.021	98.397	3.936	3.936

Curve is for Gross Beta
Strontium 90
and
Total Strontium

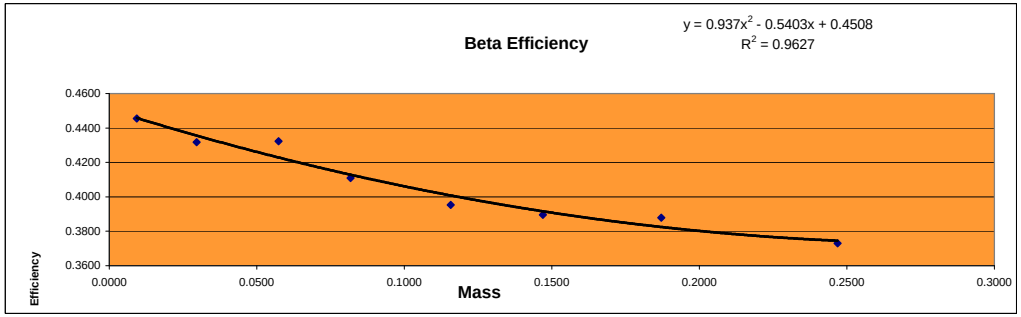
Orange 14

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
14	B1	1/23/2013 17:19	0.0093	5	92650	18530.000	0.4456	1mL
14	B2	1/23/2013 17:12	0.0296	5	89790	17958.000	0.4318	1mL
14	B3	1/23/2013 17:05	0.0574	5	89907	17981.400	0.4324	1mL
14	B4	1/23/2013 16:58	0.0818	5	85461	17092.200	0.4110	1mL
14	B5	1/23/2013 16:47	0.1157	5	82199	16439.800	0.3953	1mL
14	B6	1/23/2013 14:37	0.1470	5	80992	16198.400	0.3895	1mL
14	B7	1/23/2013 14:28	0.1871	5	80675	16135.000	0.3880	1mL
14	B8	1/23/2013 17:28	0.2469	5	77575	15515.000	0.3731	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4456	0.4459	-0.07%
0.0296	0.4318	0.4356	-0.88%
0.0574	0.4324	0.4229	2.24%
0.0818	0.4110	0.4129	-0.46%
0.1157	0.3953	0.4008	-1.38%
0.1470	0.3895	0.3916	-0.54%
0.1871	0.3880	0.3825	1.43%
0.2469	0.3731	0.3745	-0.39%



Mass	Efficiency
0.0093	0.4456
0.0296	0.4318
0.0574	0.4324
0.0818	0.4110
0.1157	0.3953
0.1470	0.3895
0.1871	0.3880
0.2469	0.3731



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.921730256
Corrected Activity:	20794.23458 dpm/mL
Decay Activity (Sr/Y-90)	41588.46916 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B7

Repeat 37

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 2:28:09 PM

Count Ended 1/23/2013 2:33:18 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	90	18.000	17.878
sd	0.000			0.011	9.487	1.897	1.897
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	80,675	16,135.000	16,134.592
sd	0.000			0.020	284.033	56.807	56.807

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B6

Repeat 38

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 2:37:14 PM

Count Ended 1/23/2013 2:42:23 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	100	20.000	19.878
sd	0.000			0.011	10.000	2.000	2.000
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	80,992	16,198.400	16,197.992
sd	0.000			0.020	284.591	56.918	56.918

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B5

Repeat 47

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 4:47:14 PM

Count Ended 1/23/2013 4:52:24 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	96	19.200	19.078
sd	0.000			0.011	9.798	1.960	1.960
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	82,199	16,439.800	16,439.392
sd	0.000			0.020	286.704	57.341	57.341

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B4

Repeat 49

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 4:58:31 PM

Count Ended 1/23/2013 5:03:41 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	96	19.200	19.078
sd	0.000			0.011	9.798	1.960	1.960
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	85,461	17,092.200	17,091.792
sd	0.000			0.020	292.337	58.467	58.467

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B3

Repeat 50

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:05:33 PM

Count Ended 1/23/2013 5:10:42 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	111	22.200	22.078
sd	0.000			0.011	10.536	2.107	2.107
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	89,907	17,981.400	17,980.992
sd	0.000			0.020	299.845	59.969	59.969

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B2

Repeat 51

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:12:18 PM

Count Ended 1/23/2013 5:17:28 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	113	22.600	22.478
sd	0.000			0.011	10.630	2.126	2.126
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	89,790	17,958.000	17,957.592
sd	0.000			0.020	299.650	59.930	59.930

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B1

Repeat 52

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:19:05 PM

Count Ended 1/23/2013 5:24:15 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	133	26.600	26.478
sd	0.000			0.011	11.533	2.307	2.307
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	92,650	18,530.000	18,529.592
sd	0.000			0.020	304.385	60.877	60.877

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-6322;B8

Repeat 52

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:28:12 PM

Count Ended 1/23/2013 5:33:20 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	102	20.400	20.278
sd	0.000			0.011	10.100	2.020	2.020
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	77,575	15,515.000	15,514.592
sd	0.000			0.020	278.523	55.705	55.705

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

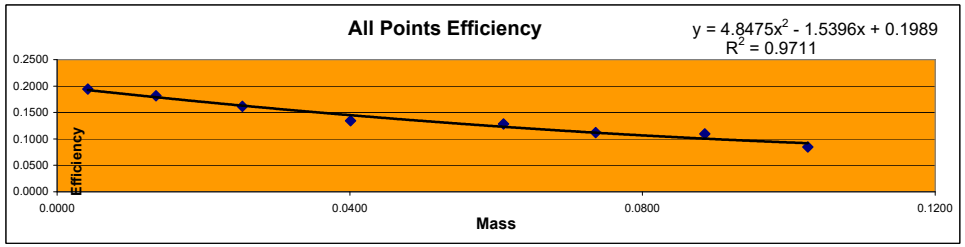
Error = .00 **x sd**

Curve is for Gross Alpha

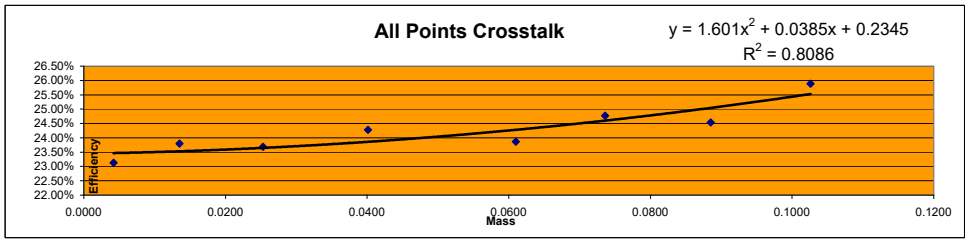
Orange 14

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
14	ICABT-1835503; A	8/27/2020 20:47	25	21882	875.280	4509.1	0.1941	2mL	0.0042
14	ICABT-1835503; B	8/27/2020 19:35	25	20501	820.040	4509.1	0.1819	2mL	0.0135
14	ICABT-1835503; C	8/27/2020 18:58	25	18225	729.000	4509.1	0.1617	2mL	0.0253
14	ICABT-1835503; D	8/27/2020 18:10	25	15115	604.600	4509.1	0.1341	2mL	0.0401
14	ICABT-1835503; ED	8/27/2020 17:41	25	28907	1156.280	9018.3	0.1282	4mL	0.0610
14	ICABT-1835503; F	8/27/2020 16:53	25	25313	1012.520	9018.3	0.1123	4mL	0.0736
14	ICABT-1835503; G	8/27/2020 15:35	25	24706	988.240	9018.3	0.1096	4mL	0.0885
14	ICABT-1835503; H	8/27/2020 21:33	25	19118	764.720	9018.3	0.0848	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1941	0.1925	0.83%
0.0135	0.1819	0.1790	1.60%
0.0253	0.1617	0.1631	-0.85%
0.0401	0.1341	0.1450	-7.50%
0.0610	0.1282	0.1230	4.22%
0.0736	0.1123	0.1118	0.38%
0.0885	0.1096	0.1006	8.91%
0.1026	0.0848	0.0920	-7.80%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
14	ICABT-1835503; A	0.0042	25	21882	6582	875.28	263.28	23.12%	Min
14	ICABT-1835503; B	0.0135	25	20501	6403	820.04	256.12	23.80%	23.12%
14	ICABT-1835503; C	0.0253	25	18225	5655	729.00	226.20	23.68%	
14	ICABT-1835503; D	0.0401	25	15115	4847	604.60	193.88	24.28%	Max
14	ICABT-1835503; ED	0.0610	25	28907	9063	1156.28	362.52	23.87%	25.89%
14	ICABT-1835503; F	0.0736	25	25313	8335	1012.52	333.40	24.77%	
14	ICABT-1835503; G	0.0885	25	24706	8033	988.24	321.32	24.54%	Mean
14	ICABT-1835503; H	0.1026	25	19118	6679	764.72	267.16	25.89%	24.24%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; G

Repeat 9

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:35:31 PM

Count Ended 8/27/2020 4:00:40 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	24,706	988.240	988.136
sd	0.010	157.181	6.287	6.287
Beta	0.387	8,033	321.320	320.933
sd	0.020	89.627	3.585	3.585

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; F

Repeat 10

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 4:53:18 PM

Count Ended 8/27/2020 5:18:29 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	25,313	1,012.520	1,012.416
sd	0.010	159.101	6.364	6.364
Beta	0.387	8,335	333.400	333.013
sd	0.020	91.296	3.652	3.652

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; ED

Repeat 22

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 5:41:14 PM

Count Ended 8/27/2020 6:06:23 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	28,907	1,156.280	1,156.176
sd	0.010	170.021	6.801	6.801
Beta	0.387	9,063	362.520	362.133
sd	0.020	95.200	3.808	3.808

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; D

Repeat 12

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 6:10:04 PM

Count Ended 8/27/2020 6:35:08 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	15,115	604.600	604.496
sd	0.010	122.943	4.918	4.918
Beta	0.387	4,847	193.880	193.493
sd	0.020	69.620	2.785	2.785

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; C

Repeat 13

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 6:58:15 PM

Count Ended 8/27/2020 7:23:25 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	18,225	729.000	728.896
sd	0.010	135.000	5.400	5.400
Beta	0.387	5,655	226.200	225.813
sd	0.020	75.200	3.008	3.008

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; B

Repeat 14

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 7:35:50 PM

Count Ended 8/27/2020 8:00:57 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	20,501	820.040	819.936
sd	0.010	143.182	5.727	5.727
Beta	0.387	6,403	256.120	255.733
sd	0.020	80.019	3.201	3.201

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; A

Repeat 15

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 8:47:49 PM

Count Ended 8/27/2020 9:12:59 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	21,882	875.280	875.176
sd	0.010	147.926	5.917	5.917
Beta	0.387	6,582	263.280	262.893
sd	0.020	81.130	3.245	3.245

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICABT-1835503; H

Repeat 16

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 9:33:09 PM

Count Ended 8/27/2020 9:58:15 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

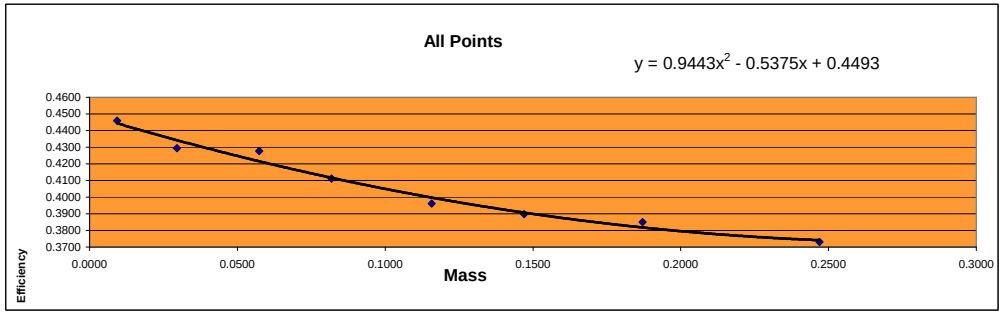
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	19,118	764.720	764.616
sd	0.010	138.268	5.531	5.531
Beta	0.387	6,679	267.160	266.773
sd	0.020	81.725	3.269	3.269

Curve is for Gross Beta
Strontium 90
and
Total Strontium

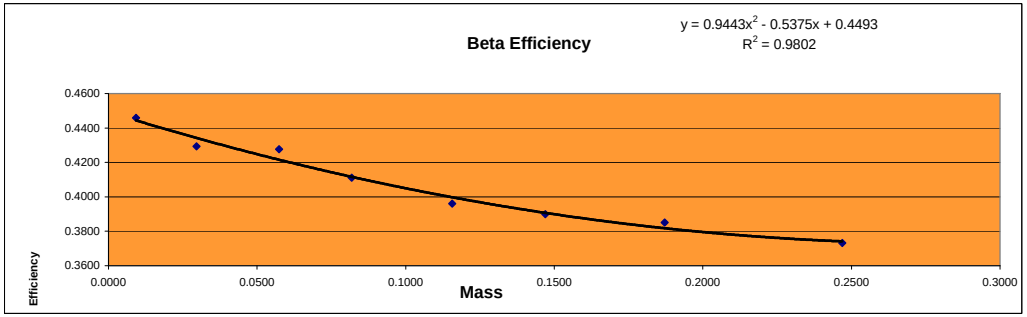
Orange 15

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
15	B1	1/23/2013 17:27	0.0093	5	92715	18543.000	0.4459	1mL
15	B2	1/23/2013 17:19	0.0296	5	89283	17856.600	0.4294	1mL
15	B3	1/23/2013 17:12	0.0574	5	88932	17786.400	0.4277	1mL
15	B4	1/23/2013 17:05	0.0818	5	85478	17095.600	0.4111	1mL
15	B5	1/23/2013 16:58	0.1157	5	82369	16473.800	0.3961	1mL
15	B6	1/23/2013 16:47	0.1470	5	81071	16214.200	0.3899	1mL
15	B7	1/23/2013 14:37	0.1871	5	80061	16012.200	0.3850	1mL
15	B8	1/23/2013 14:28	0.2469	5	77598	15519.600	0.3732	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4459	0.4444	0.33%
0.0296	0.4294	0.4342	-1.12%
0.0574	0.4277	0.4216	1.45%
0.0818	0.4111	0.4117	-0.14%
0.1157	0.3961	0.3998	-0.91%
0.1470	0.3899	0.3907	-0.21%
0.1871	0.3850	0.3818	0.84%
0.2469	0.3732	0.3742	-0.26%



Mass	Efficiency
0.0093	0.4459
0.0296	0.4294
0.0574	0.4277
0.0818	0.4111
0.1157	0.3961
0.1470	0.3899
0.1871	0.3850
0.2469	0.3732



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.921730256
Corrected Activity:	20794.23458 dpm/mL
Decay Activity (Sr/Y-90)	41588.46916 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B8

Repeat 37

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 2:28:14 PM

Count Ended 1/23/2013 2:33:22 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	76	15.200	15.098
sd	0.000			0.010	8.718	1.744	1.744
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	77,598	15,519.600	15,519.198
sd	0.000			0.020	278.564	55.713	55.713

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B7

Repeat 38

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 2:37:18 PM

Count Ended 1/23/2013 2:42:27 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	55	11.000	10.898
sd	0.000			0.010	7.416	1.483	1.483
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	80,061	16,012.200	16,011.798
sd	0.000			0.020	282.951	56.590	56.590

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B6

Repeat 47

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 4:47:19 PM

Count Ended 1/23/2013 4:52:27 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	57	11.400	11.298
sd	0.000			0.010	7.550	1.510	1.510
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	81,071	16,214.200	16,213.798
sd	0.000			0.020	284.730	56.946	56.946

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B5

Repeat 48

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 4:58:35 PM

Count Ended 1/23/2013 5:03:44 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	76	15.200	15.098
sd	0.000			0.010	8.718	1.744	1.744
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	82,369	16,473.800	16,473.398
sd	0.000			0.020	287.000	57.400	57.400

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B4

Repeat 50

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:05:37 PM

Count Ended 1/23/2013 5:10:48 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	70	14.000	13.898
sd	0.000			0.010	8.367	1.673	1.673
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	85,478	17,095.600	17,095.198
sd	0.000			0.020	292.366	58.473	58.473

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B3

Repeat 51

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:12:23 PM

Count Ended 1/23/2013 5:17:31 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	67	13.400	13.298
sd	0.000			0.010	8.185	1.637	1.637
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	88,932	17,786.400	17,785.998
sd	0.000			0.020	298.215	59.643	59.643

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B2

Repeat 52

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 5:19:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 5:24:18 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	72	14.400	14.298
sd	0.000			0.010	8.485	1.697	1.697
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	89,283	17,856.600	17,856.198
sd	0.000			0.020	298.803	59.761	59.761

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-6322;B1

Repeat 53

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 5:27:42 PM

Count Ended 1/23/2013 5:32:53 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	64	12.800	12.698
sd	0.000			0.010	8.000	1.600	1.600
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	92,715	18,543.000	18,542.598
sd	0.000			0.020	304.491	60.898	60.898

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

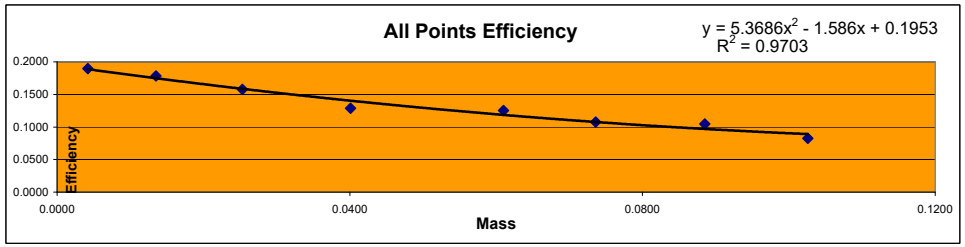
Error = .00 **x sd**

Curve is for Gross Alpha

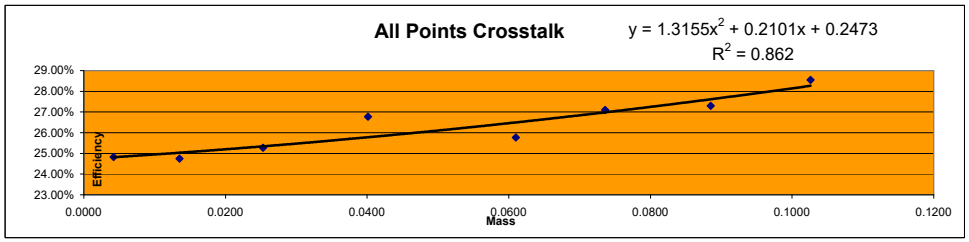
Orange 15

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
15	ICABT-1835503; A	8/27/2020 21:33	25	21387	855.480	4509.1	0.1897	2mL	0.0042
15	ICABT-1835503; B	8/27/2020 20:47	25	20124	804.960	4509.1	0.1785	2mL	0.0135
15	ICABT-1835503; C	8/27/2020 19:35	25	17780	711.200	4509.1	0.1577	2mL	0.0253
15	ICABT-1835503; D	8/27/2020 18:58	25	14509	580.360	4509.1	0.1287	2mL	0.0401
15	ICABT-1835503; ED	8/27/2020 18:10	25	28209	1128.360	9018.3	0.1251	4mL	0.0610
15	ICABT-1835503; F	8/27/2020 17:41	25	24254	970.160	9018.3	0.1076	4mL	0.0736
15	ICABT-1835503; G	8/27/2020 16:53	25	23637	945.480	9018.3	0.1048	4mL	0.0885
15	ICABT-1835503; H	8/27/2020 15:35	25	18665	746.600	9018.3	0.0828	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1897	0.1887	0.52%
0.0135	0.1785	0.1749	2.09%
0.0253	0.1577	0.1586	-0.56%
0.0401	0.1287	0.1403	-8.28%
0.0610	0.1251	0.1185	5.56%
0.0736	0.1076	0.1077	-0.07%
0.0885	0.1048	0.0970	8.10%
0.1026	0.0828	0.0891	-7.07%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
15	ICABT-1835503; A	0.0042	25	21387	7060	855.48	282.40	24.82%	Min
15	ICABT-1835503; B	0.0135	25	20124	6620	804.96	264.80	24.75%	24.75%
15	ICABT-1835503; C	0.0253	25	17780	6013	711.20	240.52	25.27%	
15	ICABT-1835503; D	0.0401	25	14509	5303	580.36	212.12	26.77%	Max
15	ICABT-1835503; ED	0.0610	25	28209	9794	1128.36	391.76	25.77%	28.56%
15	ICABT-1835503; F	0.0736	25	24254	9013	970.16	360.52	27.09%	
15	ICABT-1835503; G	0.0885	25	23637	8878	945.48	355.12	27.30%	Mean
15	ICABT-1835503; H	0.1026	25	18665	7461	746.60	298.44	28.56%	26.29%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; H

Repeat 9

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:35:37 PM

Count Ended 8/27/2020 4:00:47 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	18,665	746.600	746.478
sd	0.011	136.620	5.465	5.465
Beta	0.398	7,461	298.440	298.042
sd	0.020	86.377	3.455	3.455

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; G

Repeat 10

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 4:53:23 PM

Count Ended 8/27/2020 5:18:29 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	23,637	945.480	945.358
sd	0.011	153.743	6.150	6.150
Beta	0.398	8,878	355.120	354.722
sd	0.020	94.223	3.769	3.769

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; F

Repeat 11

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 5:41:18 PM

Count Ended 8/27/2020 6:06:24 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	24,254	970.160	970.038
sd	0.011	155.737	6.229	6.229
Beta	0.398	9,013	360.520	360.122
sd	0.020	94.937	3.797	3.798

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; ED

Repeat 23

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 6:10:10 PM

Count Ended 8/27/2020 6:35:16 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	28,209	1,128.360	1,128.238
sd	0.011	167.955	6.718	6.718
Beta	0.398	9,794	391.760	391.362
sd	0.020	98.965	3.959	3.959

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; D

Repeat 13

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 6:58:19 PM

Count Ended 8/27/2020 7:23:25 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	14,509	580.360	580.238
sd	0.011	120.453	4.818	4.818
Beta	0.398	5,303	212.120	211.722
sd	0.020	72.822	2.913	2.913

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; C

Repeat 14

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 7:35:56 PM

Count Ended 8/27/2020 8:01:05 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	17,780	711.200	711.078
sd	0.011	133.342	5.334	5.334
Beta	0.398	6,013	240.520	240.122
sd	0.020	77.544	3.102	3.102

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; B

Repeat 15

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 8:47:53 PM

Count Ended 8/27/2020 9:12:59 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	20,124	804.960	804.838
sd	0.011	141.859	5.674	5.674
Beta	0.398	6,620	264.800	264.402
sd	0.020	81.363	3.255	3.255

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICABT-1835503; A

Repeat 16

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 9:33:13 PM

Count Ended 8/27/2020 9:58:23 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

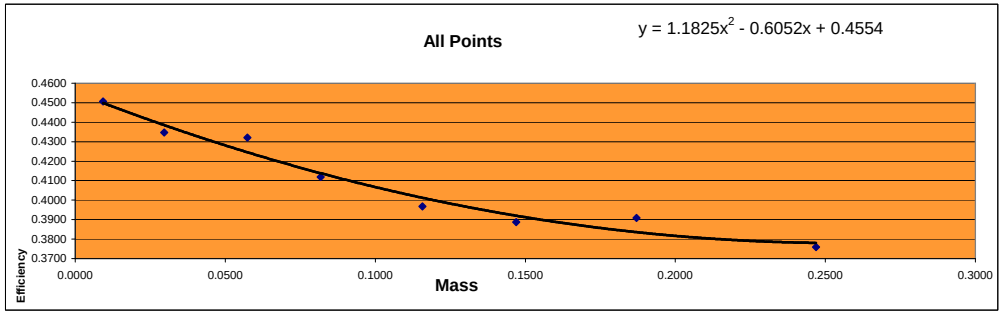
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	21,387	855.480	855.358
sd	0.011	146.243	5.850	5.850
Beta	0.398	7,060	282.400	282.002
sd	0.020	84.024	3.361	3.361

Curve is for Gross Beta
Strontium 90
and
Total Strontium

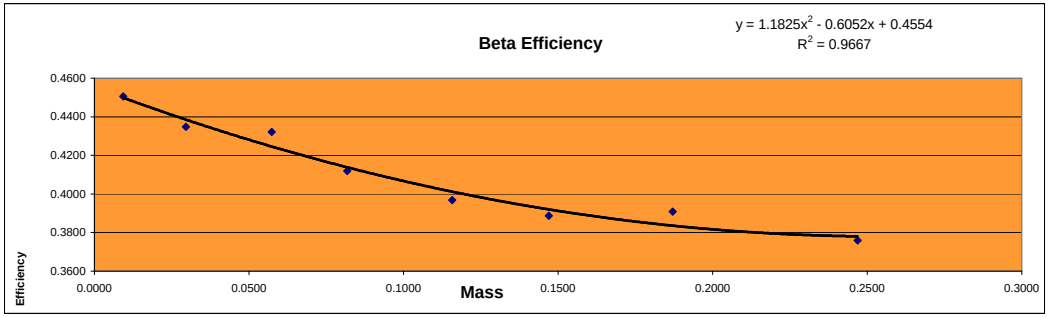
Orange 20

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
20	B1	1/23/2013 12:53	0.0093	5	93705	18741.000	0.4506	1mL
20	B2	1/23/2013 12:45	0.0296	5	90406	18081.200	0.4348	1mL
20	B3	1/23/2013 12:37	0.0574	5	89849	17969.800	0.4321	1mL
20	B4	1/23/2013 12:30	0.0818	5	85645	17129.000	0.4119	1mL
20	B5	1/23/2013 12:20	0.1157	5	82516	16503.200	0.3968	1mL
20	B6	1/23/2013 13:15	0.1470	5	80825	16165.000	0.3887	1mL
20	B7	1/23/2013 13:07	0.1871	5	81283	16256.600	0.3909	1mL
20	B8	1/23/2013 13:01	0.2469	5	78155	15631.000	0.3758	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4506	0.4499	0.17%
0.0296	0.4348	0.4385	-0.86%
0.0574	0.4321	0.4246	1.77%
0.0818	0.4119	0.4138	-0.47%
0.1157	0.3968	0.4012	-1.09%
0.1470	0.3887	0.3920	-0.84%
0.1871	0.3909	0.3836	1.91%
0.2469	0.3758	0.3781	-0.58%



Mass	Efficiency
0.0093	0.4506
0.0296	0.4348
0.0574	0.4321
0.0818	0.4119
0.1157	0.3968
0.1470	0.3887
0.1871	0.3909
0.2469	0.3758



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.921730256
Corrected Activity:	20794.23458 dpm/mL
Decay Activity (Sr/Y-90)	41588.46916 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B5

Repeat 29

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:20:34 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/23/2013 12:25:54 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	52	10.400	10.333
sd	0.000			0.008	7.211	1.442	1.442
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	82,516	16,503.200	16,502.931
sd	0.000			0.016	287.256	57.451	57.451

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B4

Repeat 31

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:30:04 PM

Count Ended 1/23/2013 12:35:13 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	50	10.000	9.933
sd	0.000			0.008	7.071	1.414	1.414
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	85,645	17,129.000	17,128.731
sd	0.000			0.016	292.652	58.530	58.530

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B3

Repeat 32

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:37:48 PM

Count Ended 1/23/2013 12:42:58 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	55	11.000	10.933
sd	0.000			0.008	7.416	1.483	1.483
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	89,849	17,969.800	17,969.531
sd	0.000			0.016	299.748	59.950	59.950

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B2

Repeat 33

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:45:44 PM

Count Ended 1/23/2013 12:50:54 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	47	9.400	9.333
sd	0.000			0.008	6.856	1.371	1.371
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	90,406	18,081.200	18,080.931
sd	0.000			0.016	300.676	60.135	60.135

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B1

Repeat 34

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:53:16 PM

Count Ended 1/23/2013 12:58:26 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	53	10.600	10.533
sd	0.000			0.008	7.280	1.456	1.456
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	93,705	18,741.000	18,740.731
sd	0.000			0.016	306.113	61.223	61.223

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B8

Repeat 34

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 1:01:01 PM

Count Ended 1/23/2013 1:06:09 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	42	8.400	8.333
sd	0.000			0.008	6.481	1.296	1.296
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	78,155	15,631.000	15,630.731
sd	0.000			0.016	279.562	55.912	55.912

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B7

Repeat 35

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 1:07:57 PM

Count Ended 1/23/2013 1:13:06 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	38	7.600	7.533
sd	0.000			0.008	6.164	1.233	1.233
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	81,283	16,256.600	16,256.331
sd	0.000			0.016	285.102	57.020	57.020

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-6322;B6

Repeat 36

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 1:15:07 PM

Count Ended 1/23/2013 1:20:15 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	58	11.600	11.533
sd	0.000			0.008	7.616	1.523	1.523
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	80,825	16,165.000	16,164.731
sd	0.000			0.016	284.297	56.859	56.859

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

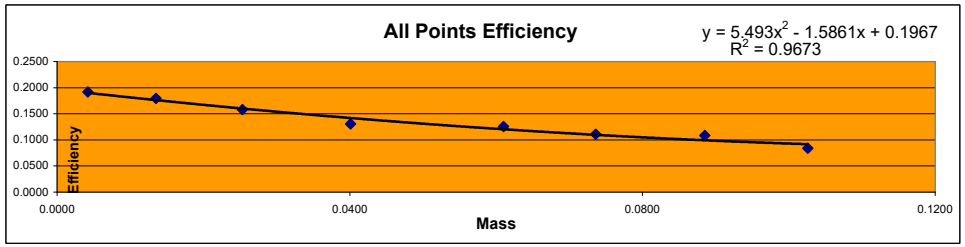
Error = .00 **x sd**

Curve is for Gross Alpha

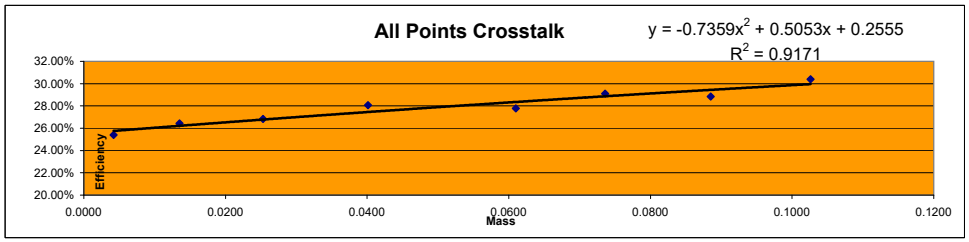
Orange 20

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
20	ICABT-1835503; A	8/28/2020 15:20	25	21645	865.800	4509.1	0.1920	2mL	0.0042
20	ICABT-1835503; B	8/28/2020 13:20	25	20221	808.840	4509.1	0.1794	2mL	0.0135
20	ICABT-1835503; C	8/28/2020 7:49	25	17844	713.760	4509.1	0.1583	2mL	0.0253
20	ICABT-1835503; D	8/27/2020 22:38	25	14709	588.360	4509.1	0.1305	2mL	0.0401
20	ICABT-1835503; ED	8/27/2020 22:09	25	28338	1133.520	9018.3	0.1257	4mL	0.0610
20	ICABT-1835503; F	8/30/2020 16:32	25	25005	1000.200	9018.3	0.1109	4mL	0.0736
20	ICABT-1835503; G	8/30/2020 16:06	25	24460	978.400	9018.3	0.1085	4mL	0.0885
20	ICABT-1835503; H	8/30/2020 15:14	25	18990	759.600	9018.3	0.0842	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1920	0.1901	0.99%
0.0135	0.1794	0.1763	1.75%
0.0253	0.1583	0.1601	-1.12%
0.0401	0.1305	0.1419	-8.07%
0.0610	0.1257	0.1204	4.41%
0.0736	0.1109	0.1097	1.08%
0.0885	0.1085	0.0994	9.20%
0.1026	0.0842	0.0918	-8.24%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
20	ICABT-1835503; A	0.0042	25	21645	7365	865.80	294.60	25.39%	Min
20	ICABT-1835503; B	0.0135	25	20221	7268	808.84	290.72	26.44%	25.39%
20	ICABT-1835503; C	0.0253	25	17844	6548	713.76	261.92	26.84%	
20	ICABT-1835503; D	0.0401	25	14709	5736	588.36	229.44	28.06%	Max
20	ICABT-1835503; ED	0.0610	25	28338	10893	1133.52	435.72	27.77%	30.39%
20	ICABT-1835503; F	0.0736	25	25005	10261	1000.20	410.44	29.10%	
20	ICABT-1835503; G	0.0885	25	24460	9915	978.40	396.60	28.84%	Mean
20	ICABT-1835503; H	0.1026	25	18990	8292	759.60	331.68	30.39%	27.85%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; ED

Repeat 28

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 10:09:54 PM

Count Ended 8/27/2020 10:35:01 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	28,338	1,133.520	1,133.324
sd	0.014	168.339	6.734	6.734
Beta	0.377	10,893	435.720	435.343
sd	0.019	104.370	4.175	4.175

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; D

Repeat 18

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 10:38:57 PM

Count Ended 8/27/2020 11:04:05 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	14,709	588.360	588.164
sd	0.014	121.281	4.851	4.851
Beta	0.377	5,736	229.440	229.063
sd	0.019	75.736	3.029	3.030

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; C

Repeat 19

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 7:49:17 AM

Count Ended 8/28/2020 8:14:23 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	17,844	713.760	713.564
sd	0.014	133.581	5.343	5.343
Beta	0.377	6,548	261.920	261.543
sd	0.019	80.920	3.237	3.237

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; B

Repeat 20

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 1:20:03 PM

Count Ended 8/28/2020 1:45:10 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	20,221	808.840	808.644
sd	0.014	142.201	5.688	5.688
Beta	0.377	7,268	290.720	290.343
sd	0.019	85.253	3.410	3.410

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; A

Repeat 21

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 3:20:47 PM

Count Ended 8/28/2020 3:45:57 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	21,645	865.800	865.604
sd	0.014	147.122	5.885	5.885
Beta	0.377	7,365	294.600	294.223
sd	0.019	85.820	3.433	3.433

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; H

Repeat 22

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 3:14:56 PM

Count Ended 8/30/2020 3:40:08 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	18,990	759.600	759.404
sd	0.014	137.804	5.512	5.512
Beta	0.377	8,292	331.680	331.303
sd	0.019	91.060	3.642	3.642

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; G

Repeat 23

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:06:06 PM

Count Ended 8/30/2020 4:31:17 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	24,460	978.400	978.204
sd	0.014	156.397	6.256	6.256
Beta	0.377	9,915	396.600	396.223
sd	0.019	99.574	3.983	3.983

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICABT-1835503; F

Repeat 24

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:32:55 PM

Count Ended 8/30/2020 4:58:02 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

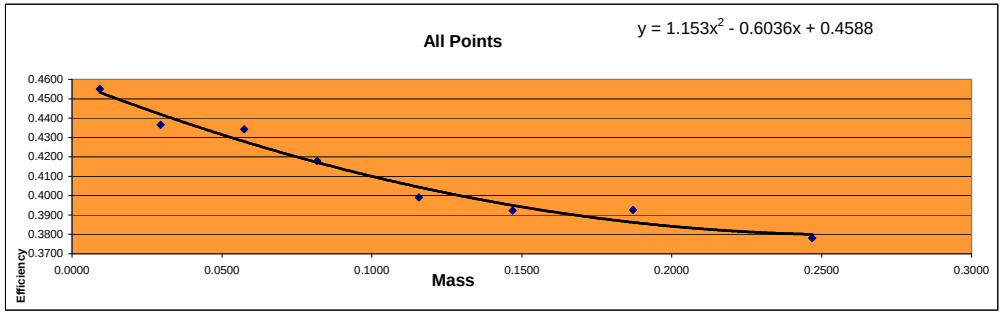
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	25,005	1,000.200	1,000.004
sd	0.014	158.130	6.325	6.325
Beta	0.377	10,261	410.440	410.063
sd	0.019	101.297	4.052	4.052

Curve is for Gross Beta
Strontium 90
and
Total Strontium

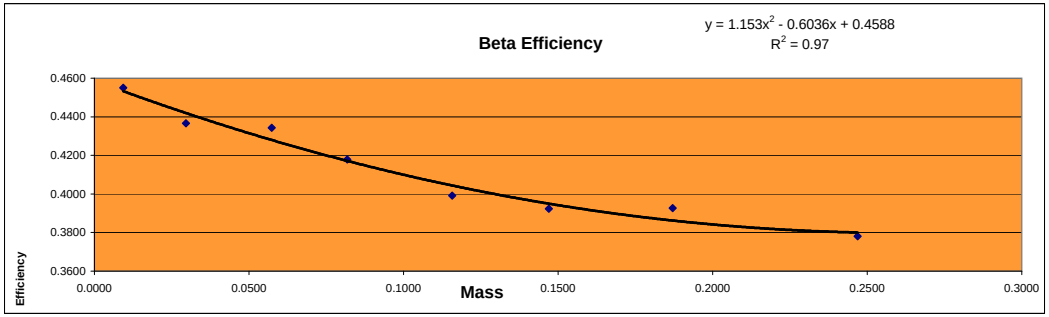
Orange 21

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
21	B1	1/23/2013 13:00	0.0093	5	94634	18926.800	0.4551	1mL
21	B2	1/23/2013 12:53	0.0296	5	90782	18156.400	0.4366	1mL
21	B3	1/23/2013 12:45	0.0574	5	90299	18059.800	0.4343	1mL
21	B4	1/23/2013 12:37	0.0818	5	86884	17376.800	0.4178	1mL
21	B5	1/23/2013 12:30	0.1157	5	82988	16597.600	0.3991	1mL
21	B6	1/23/2013 12:20	0.1470	5	81590	16318.000	0.3924	1mL
21	B7	1/23/2013 13:15	0.1871	5	81638	16327.600	0.3926	1mL
21	B8	1/23/2013 13:08	0.2469	5	78630	15726.000	0.3781	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4551	0.4533	0.40%
0.0296	0.4366	0.4419	-1.22%
0.0574	0.4343	0.4280	1.47%
0.0818	0.4178	0.4171	0.16%
0.1157	0.3991	0.4044	-1.31%
0.1470	0.3924	0.3950	-0.66%
0.1871	0.3926	0.3862	1.65%
0.2469	0.3781	0.3801	-0.51%



Mass	Efficiency
0.0093	0.4551
0.0296	0.4366
0.0574	0.4343
0.0818	0.4178
0.1157	0.3991
0.1470	0.3924
0.1871	0.3926
0.2469	0.3781



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.921730256
Corrected Activity:	20794.23458 dpm/mL
Decay Activity (Sr/Y-90)	41588.46916 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B6 **Repeat** 29

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:20:41 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:25:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	26	5.200	5.144
sd	0.000			0.007	5.099	1.020	1.020
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	81,590	16,318.000	16,317.747
sd	0.000			0.016	285.640	57.128	57.128

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B5 **Repeat** 30

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:30:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:35:17 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	31	6.200	6.144
sd	0.000			0.007	5.568	1.114	1.114
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	82,988	16,597.600	16,597.347
sd	0.000			0.016	288.076	57.615	57.615

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B4 **Repeat** 32

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:37:53 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:43:02 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	29	5.800	5.744
sd	0.000			0.007	5.385	1.077	1.077
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	86,884	17,376.800	17,376.547
sd	0.000			0.016	294.761	58.952	58.952

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B3

Repeat 33

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:45:51 PM

Count Ended 1/23/2013 12:51:00 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	31	6.200	6.144
sd	0.000			0.007	5.568	1.114	1.114
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	90,299	18,059.800	18,059.547
sd	0.000			0.016	300.498	60.100	60.100

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B2

Repeat 34

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:53:21 PM

Count Ended 1/23/2013 12:58:31 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	30	6.000	5.944
sd	0.000			0.007	5.477	1.095	1.095
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	90,782	18,156.400	18,156.147
sd	0.000			0.016	301.301	60.260	60.260

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B1

Repeat 35

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 1:00:08 PM

Count Ended 1/23/2013 1:05:19 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	37	7.400	7.344
sd	0.000			0.007	6.083	1.217	1.217
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	94,634	18,926.800	18,926.547
sd	0.000			0.016	307.626	61.525	61.525

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B8

Repeat 35

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 1:08:01 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 1:13:10 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	25	5.000	4.944
sd	0.000			0.007	5.000	1.000	1.000
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	78,630	15,726.000	15,725.747
sd	0.000			0.016	280.410	56.082	56.082

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-6322;B7

Repeat 36

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 1:15:13 PM

Count Ended 1/23/2013 1:20:22 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	32	6.400	6.344
sd	0.000			0.007	5.657	1.131	1.131
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	81,638	16,327.600	16,327.347
sd	0.000			0.016	285.724	57.145	57.145

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

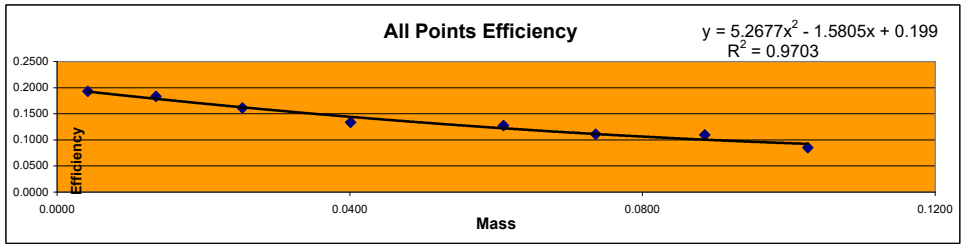
Error = .00 **x sd**

Curve is for Gross Alpha

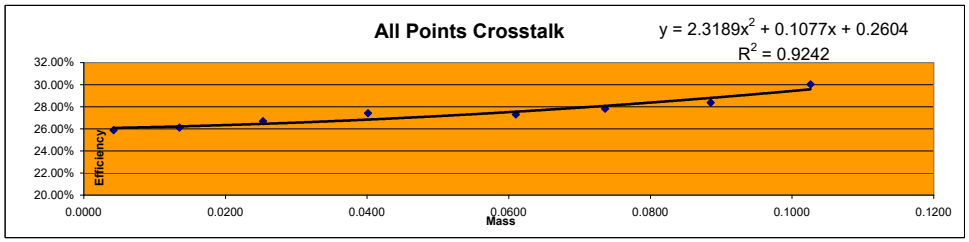
Orange 21

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
21	ICABT-1835503; A	8/30/2020 15:15	25	21743	869.720	4509.1	0.1929	2mL	0.0042
21	ICABT-1835503; B	8/28/2020 15:20	25	20650	826.000	4509.1	0.1832	2mL	0.0135
21	ICABT-1835503; C	8/28/2020 13:20	25	18167	726.680	4509.1	0.1612	2mL	0.0253
21	ICABT-1835503; D	8/28/2020 7:49	25	15026	601.040	4509.1	0.1333	2mL	0.0401
21	ICABT-1835503; ED	8/27/2020 22:39	25	28696	1147.840	9018.3	0.1273	4mL	0.0610
21	ICABT-1835503; F	8/27/2020 22:09	25	25067	1002.680	9018.3	0.1112	4mL	0.0736
21	ICABT-1835503; G	8/30/2020 16:33	25	24711	988.440	9018.3	0.1096	4mL	0.0885
21	ICABT-1835503; H	8/30/2020 16:06	25	19259	770.360	9018.3	0.0854	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1929	0.1925	0.22%
0.0135	0.1832	0.1786	2.55%
0.0253	0.1612	0.1624	-0.76%
0.0401	0.1333	0.1441	-7.49%
0.0610	0.1273	0.1222	4.16%
0.0736	0.1112	0.1112	-0.02%
0.0885	0.1096	0.1004	9.18%
0.1026	0.0854	0.0923	-7.44%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
21	ICABT-1835503; A	0.0042	25	21743	7588	869.72	303.52	25.87%	Min
21	ICABT-1835503; B	0.0135	25	20650	7297	826.00	291.88	26.11%	25.87%
21	ICABT-1835503; C	0.0253	25	18167	6617	726.68	264.68	26.70%	
21	ICABT-1835503; D	0.0401	25	15026	5676	601.04	227.04	27.42%	Max
21	ICABT-1835503; ED	0.0610	25	28696	10783	1147.84	431.32	27.31%	30.02%
21	ICABT-1835503; F	0.0736	25	25067	9665	1002.68	386.60	27.83%	
21	ICABT-1835503; G	0.0885	25	24711	9792	988.44	391.68	28.38%	Mean
21	ICABT-1835503; H	0.1026	25	19259	8260	770.36	330.40	30.02%	27.45%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; F

Repeat 17

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 10:09:58 PM

Count Ended 8/27/2020 10:35:08 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	25,067	1,002.680	1,002.508
sd	0.013	158.326	6.333	6.333
Beta	0.341	9,665	386.600	386.259
sd	0.018	98.311	3.932	3.932

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; ED

Repeat 29

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 10:39:01 PM

Count Ended 8/27/2020 11:04:14 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	28,696	1,147.840	1,147.668
sd	0.013	169.399	6.776	6.776
Beta	0.341	10,783	431.320	430.979
sd	0.018	103.841	4.154	4.154

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; D

Repeat 19

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 7:49:24 AM

Count Ended 8/28/2020 8:14:30 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	15,026	601.040	600.868
sd	0.013	122.581	4.903	4.903
Beta	0.341	5,676	227.040	226.699
sd	0.018	75.339	3.014	3.014

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; C

Repeat 20

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 1:20:09 PM

Count Ended 8/28/2020 1:45:19 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	18,167	726.680	726.508
sd	0.013	134.785	5.391	5.391
Beta	0.341	6,617	264.680	264.339
sd	0.018	81.345	3.254	3.254

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; B

Repeat 21

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 3:20:53 PM

Count Ended 8/28/2020 3:46:00 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	20,650	826.000	825.828
sd	0.013	143.701	5.748	5.748
Beta	0.341	7,297	291.880	291.539
sd	0.018	85.422	3.417	3.417

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; A

Repeat 22

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 3:15:03 PM

Count Ended 8/30/2020 3:40:08 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	21,743	869.720	869.548
sd	0.013	147.455	5.898	5.898
Beta	0.341	7,588	303.520	303.179
sd	0.018	87.109	3.484	3.484

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; H

Repeat 23

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:06:11 PM

Count Ended 8/30/2020 4:31:18 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	19,259	770.360	770.188
sd	0.013	138.777	5.551	5.551
Beta	0.341	8,260	330.400	330.059
sd	0.018	90.885	3.635	3.635

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICABT-1835503; G

Repeat 24

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:33:00 PM

Count Ended 8/30/2020 4:58:05 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

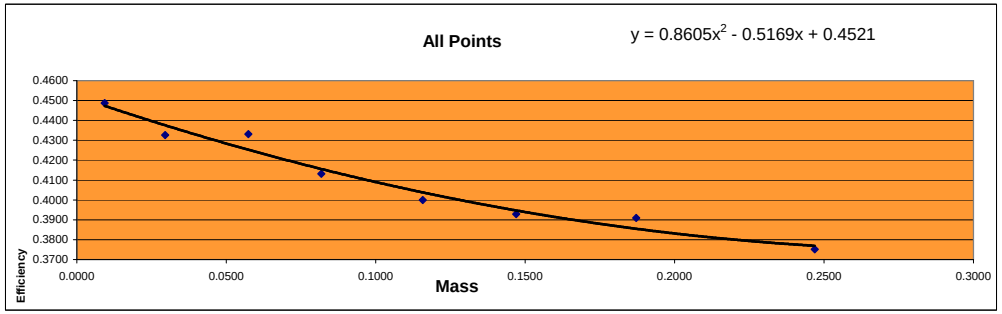
	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	24,711	988.440	988.268
sd	0.013	157.197	6.288	6.288
Beta	0.341	9,792	391.680	391.339
sd	0.018	98.955	3.958	3.958

Curve is for Gross Beta
Strontium 90
and
Total Strontium

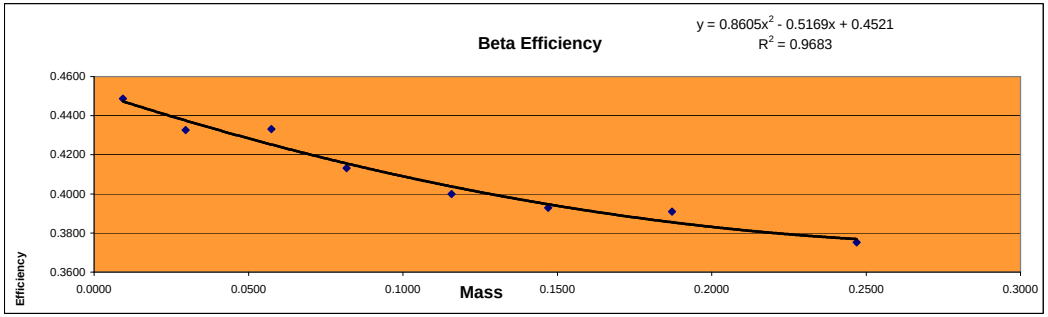
Orange 23

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41588.469 CPM	Sr-90 Eff	Standard Aliquot
23	B1	1/23/2013 13:14	0.0093	5	93320	18664.000	0.4488	1mL
23	B2	1/23/2013 13:07	0.0296	5	89959	17991.800	0.4326	1mL
23	B3	1/23/2013 13:00	0.0574	5	90060	18012.000	0.4331	1mL
23	B4	1/23/2013 12:53	0.0818	5	85913	17182.600	0.4132	1mL
23	B5	1/23/2013 12:46	0.1157	5	83172	16634.400	0.4000	1mL
23	B6	1/23/2013 12:38	0.1470	5	81701	16340.200	0.3929	1mL
23	B7	1/23/2013 12:30	0.1871	5	81277	16255.400	0.3909	1mL
23	B8	1/23/2013 12:20	0.2469	5	78026	15605.200	0.3752	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4488	0.4474	0.32%
0.0296	0.4326	0.4376	-1.13%
0.0574	0.4331	0.4253	1.84%
0.0818	0.4132	0.4156	-0.58%
0.1157	0.4000	0.4038	-0.95%
0.1470	0.3929	0.3947	-0.46%
0.1871	0.3909	0.3855	1.39%
0.2469	0.3752	0.3769	-0.45%



Mass	Efficiency
0.0093	0.4488
0.0296	0.4326
0.0574	0.4331
0.0818	0.4132
0.1157	0.4000
0.1470	0.3929
0.1871	0.3909
0.2469	0.3752



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	1/23/2013
Elapsed Time:	1224.000 days
Half Life:	10409.625 days
Exponential Term:	0.921730256
Corrected Activity:	20794.23458 dpm/mL
Decay Activity (Sr/Y-90)	41588.46916 dpm

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B8 **Repeat** 29

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:20:54 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:26:03 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	34	6.800	6.754
sd	0.000			0.007	5.831	1.166	1.166
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	78,026	15,605.200	15,604.870
sd	0.000			0.018	279.331	55.866	55.866

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B7

Repeat 30

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/23/2013 12:30:20 PM

Count Ended 1/23/2013 12:35:29 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	28	5.600	5.554
sd	0.000			0.007	5.292	1.058	1.058
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	81,277	16,255.400	16,255.070
sd	0.000			0.018	285.091	57.018	57.018

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B6 **Repeat** 31

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:38:03 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:43:11 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	34	6.800	6.754
sd	0.000			0.007	5.831	1.166	1.166
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	81,701	16,340.200	16,339.870
sd	0.000			0.018	285.834	57.167	57.167

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B5

Repeat 32

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:46:01 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:51:10 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	29	5.800	5.754
sd	0.000			0.007	5.385	1.077	1.077
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	83,172	16,634.400	16,634.070
sd	0.000			0.018	288.396	57.679	57.679

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B4 **Repeat** 34

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 12:53:30 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/23/2013 12:58:39 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	33	6.600	6.554
sd	0.000			0.007	5.745	1.149	1.149
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	85,913	17,182.600	17,182.270
sd	0.000			0.018	293.109	58.622	58.622

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B3

Repeat 35

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 1:00:20 PM

Count Ended 1/23/2013 1:05:30 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	40	8.000	7.954
sd	0.000			0.007	6.325	1.265	1.265
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	90,060	18,012.000	18,011.670
sd	0.000			0.018	300.100	60.020	60.020

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B2

Repeat 36

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/23/2013 1:07:31 PM

Count Ended 1/23/2013 1:12:42 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	28	5.600	5.554
sd	0.000			0.007	5.292	1.058	1.058
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	89,959	17,991.800	17,991.470
sd	0.000			0.018	299.932	59.986	59.986

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-6322;B1 **Repeat** 37

Carrier No. 0

Batch ID m122627

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***l*** **sd** 0 ***l***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 1/23/2013 1:14:46 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/23/2013 1:19:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	34	6.800	6.754
sd	0.000			0.007	5.831	1.166	1.166
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	93,320	18,664.000	18,663.670
sd	0.000			0.018	305.483	61.097	61.097

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

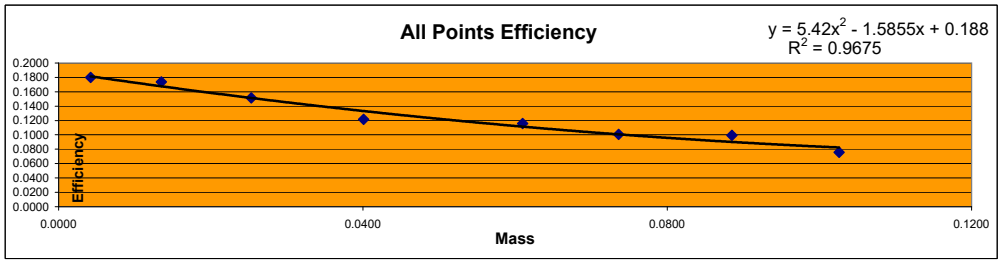
*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Curve is for Gross Alpha

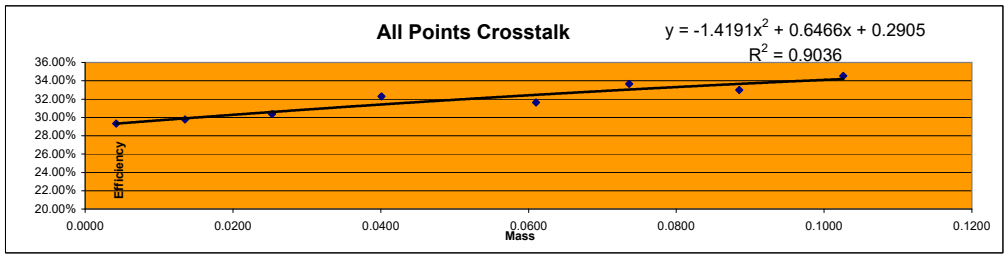
Orange **23**

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
23	ICABT-1835503; A	8/30/2020 16:33	25	20292	811.680	4509.1	0.1800	2mL	0.0042
23	ICABT-1835503; B	8/30/2020 16:06	25	19591	783.640	4509.1	0.1738	2mL	0.0135
23	ICABT-1835503; C	8/30/2020 15:15	25	17095	683.800	4509.1	0.1516	2mL	0.0253
23	ICABT-1835503; D	8/28/2020 15:21	25	13689	547.560	4509.1	0.1214	2mL	0.0401
23	ICABT-1835503; ED	8/28/2020 13:20	25	26122	1044.880	9018.3	0.1159	4mL	0.0610
23	ICABT-1835503; F	8/28/2020 7:49	25	22672	906.880	9018.3	0.1006	4mL	0.0736
23	ICABT-1835503; G	8/27/2020 22:39	25	22351	894.040	9018.3	0.0991	4mL	0.0885
23	ICABT-1835503; H	8/27/2020 22:10	25	17116	684.640	9018.3	0.0759	4mL	0.1026

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0042	0.1800	0.1814	-0.79%
0.0135	0.1738	0.1676	3.70%
0.0253	0.1516	0.1514	0.19%
0.0401	0.1214	0.1331	-8.79%
0.0610	0.1159	0.1115	3.96%
0.0736	0.1006	0.1007	-0.11%
0.0885	0.0991	0.0901	9.99%
0.1026	0.0759	0.0824	-7.85%



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
23	ICABT-1835503; A	0.0042	25	20292	8418	811.68	336.72	29.32%	Min
23	ICABT-1835503; B	0.0135	25	19591	8303	783.64	332.12	29.77%	29.32%
23	ICABT-1835503; C	0.0253	25	17095	7457	683.80	298.28	30.37%	
23	ICABT-1835503; D	0.0401	25	13689	6527	547.56	261.08	32.29%	Max
23	ICABT-1835503; ED	0.0610	25	26122	12096	1044.88	483.84	31.65%	34.53%
23	ICABT-1835503; F	0.0736	25	22672	11498	906.88	459.92	33.65%	
23	ICABT-1835503; G	0.0885	25	22351	11014	894.04	440.56	33.01%	Mean
23	ICABT-1835503; H	0.1026	25	17116	9029	684.64	361.16	34.53%	31.82%



Standard ID
Thorium-230
Th-230_00052
Container#: 1835503
Cert #: 114474 Ref. date 10/29/19
Activity 2254.57 dpm/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; H

Repeat 17

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 10:10:10 PM

Count Ended 8/27/2020 10:35:19 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	17,116	684.640	684.549
sd	0.010	130.828	5.233	5.233
Beta	0.392	9,029	361.160	360.768
sd	0.020	95.021	3.801	3.801

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; G

Repeat 18

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 10:39:08 PM

Count Ended 8/27/2020 11:04:15 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	22,351	894.040	893.949
sd	0.010	149.503	5.980	5.980
Beta	0.392	11,014	440.560	440.168
sd	0.020	104.948	4.198	4.198

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; F

Repeat 19

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 7:49:38 AM

Count Ended 8/28/2020 8:14:45 AM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	22,672	906.880	906.789
sd	0.010	150.572	6.023	6.023
Beta	0.392	11,498	459.920	459.528
sd	0.020	107.229	4.289	4.289

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; ED

Repeat 31

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 1:20:23 PM

Count Ended 8/28/2020 1:45:29 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	26,122	1,044.880	1,044.789
sd	0.010	161.623	6.465	6.465
Beta	0.392	12,096	483.840	483.448
sd	0.020	109.982	4.399	4.399

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; D

Repeat 21

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 3:21:06 PM

Count Ended 8/28/2020 3:46:13 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	13,689	547.560	547.469
sd	0.010	117.000	4.680	4.680
Beta	0.392	6,527	261.080	260.688
sd	0.020	80.790	3.232	3.232

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; C

Repeat 22

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 3:15:13 PM

Count Ended 8/30/2020 3:40:25 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	17,095	683.800	683.709
sd	0.010	130.748	5.230	5.230
Beta	0.392	7,457	298.280	297.888
sd	0.020	86.354	3.454	3.454

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; B

Repeat 23

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:06:20 PM

Count Ended 8/30/2020 4:31:26 PM

Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	19,591	783.640	783.549
sd	0.010	139.968	5.599	5.599
Beta	0.392	8,303	332.120	331.728
sd	0.020	91.121	3.645	3.645

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICABT-1835503; A

Repeat 24

Carrier No. 0

Batch ID 449828

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:33:09 PM

Count Ended 8/30/2020 4:58:18 PM

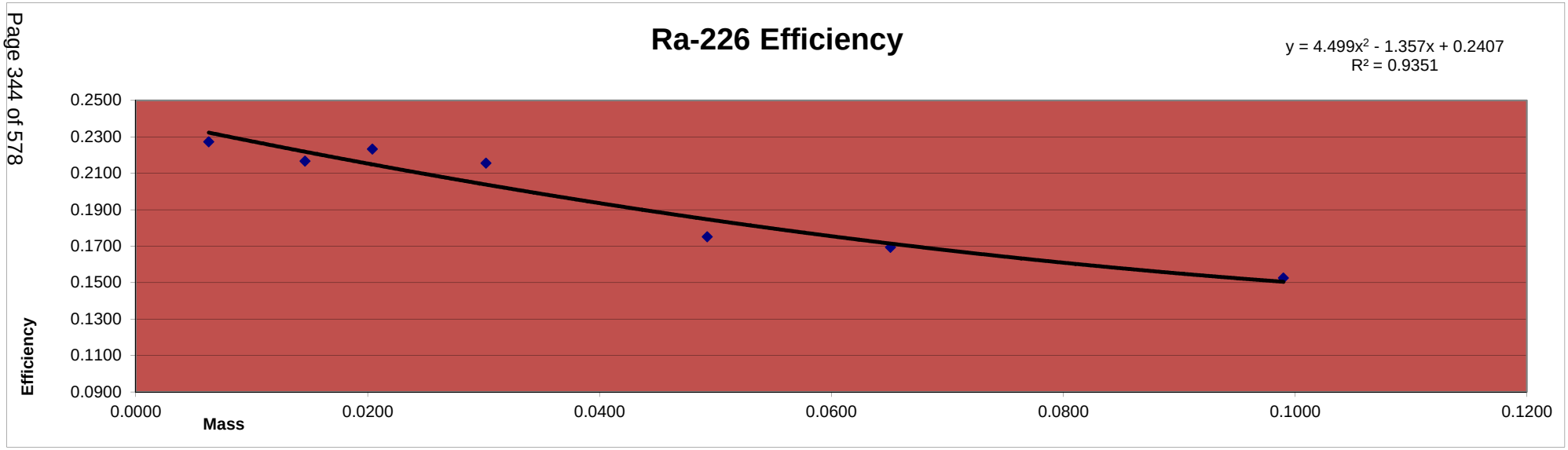
Sample Count Time 25.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	20,292	811.680	811.589
sd	0.010	142.450	5.698	5.698
Beta	0.392	8,418	336.720	336.328
sd	0.020	91.750	3.670	3.670

Ra-226 Calibrations

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
5	ICRa6-1063071;Ra2	0.0063	15.00	7/9/2019 18:08	46096	3073.0667	2/13/2017 13:30	4.0000	0.4487	1712.1293	7534.6	0.2272
5	ICRa6-1063071;Ra3	0.0146	15.00	7/9/2019 17:50	67917	4527.8000	2/13/2017 13:30	4.0000	0.6933	1632.7929	7534.6	0.2167
5	ICRa6-1063071;Ra4	0.0204	15.00	7/9/2019 17:31	73333	4888.8667	2/13/2017 13:30	4.0000	0.7265	1682.3354	7534.6	0.2233
5	ICRa6-1063071;Ra5	0.0302	15.00	7/9/2019 16:47	83836	5589.0667	2/13/2017 13:30	4.0000	0.8604	1623.9733	7534.6	0.2155
5	ICRa6-1063071;Ra6	0.0493	15.00	7/9/2019 16:28	74129	4941.9333	2/13/2017 13:30	4.0000	0.9364	1319.4393	7534.6	0.1751
5	ICRa6-1063071;Ra7	0.0651	15.00	7/9/2019 19:02	70978	4731.8667	2/13/2017 13:30	4.0000	0.9274	1275.6421	7534.6	0.1693
5	ICRa6-1063071;Ra8	0.0990	15.00	7/9/2019 18:45	64810	4320.6667	2/13/2017 13:30	4.0000	0.9402	1148.9057	7534.6	0.1525



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra6 **Repeat** 1

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 4:28:45 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 4:44:11 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	74,129	4,941.933	4,941.933
sd	0.000			0.000	272.266	18.151	18.151
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,267	6,351.133	6,351.133
sd	0.000			0.000	308.654	20.577	20.577

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra5 **Repeat** 2

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 4:47:07 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 5:02:34 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	83,836	5,589.067	5,589.067
sd	0.000			0.000	289.544	19.303	19.303
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,524	6,301.600	6,301.600
sd	0.000			0.000	307.448	20.497	20.497

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra4

Repeat 3

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/9/2019 5:31:10 PM

Count Ended 7/9/2019 5:46:34 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,333	4,888.867	4,888.867
sd	0.000			0.000	270.801	18.053	18.053
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	81,549	5,436.600	5,436.600
sd	0.000			0.000	285.568	19.038	19.038

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra3 **Repeat** 4

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 5:50:04 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 6:05:26 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	67,917	4,527.800	4,527.800
sd	0.000			0.000	260.609	17.374	17.374
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	74,182	4,945.467	4,945.467
sd	0.000			0.000	272.364	18.158	18.158

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra2

Repeat 5

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 6:08:54 PM

Count Ended 7/9/2019 6:24:11 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	46,096	3,073.067	3,073.067
sd	0.000			0.000	214.700	14.313	14.313
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	49,669	3,311.267	3,311.267
sd	0.000			0.000	222.865	14.858	14.858

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra8

Repeat 7

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/9/2019 6:45:07 PM

Count Ended 7/9/2019 7:00:31 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	64,810	4,320.667	4,320.667
sd	0.000			0.000	254.578	16.972	16.972
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	96,729	6,448.600	6,448.600
sd	0.000			0.000	311.013	20.734	20.734

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICRa6-1063071;Ra7

Repeat 8

Carrier No. 0

Batch ID ra226-ic

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 7:02:40 PM

Count Ended 7/9/2019 7:18:05 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	70,978	4,731.867	4,731.867
sd	0.000			0.000	266.417	17.761	17.761
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,495	6,299.667	6,299.667
sd	0.000			0.000	307.400	20.493	20.493

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

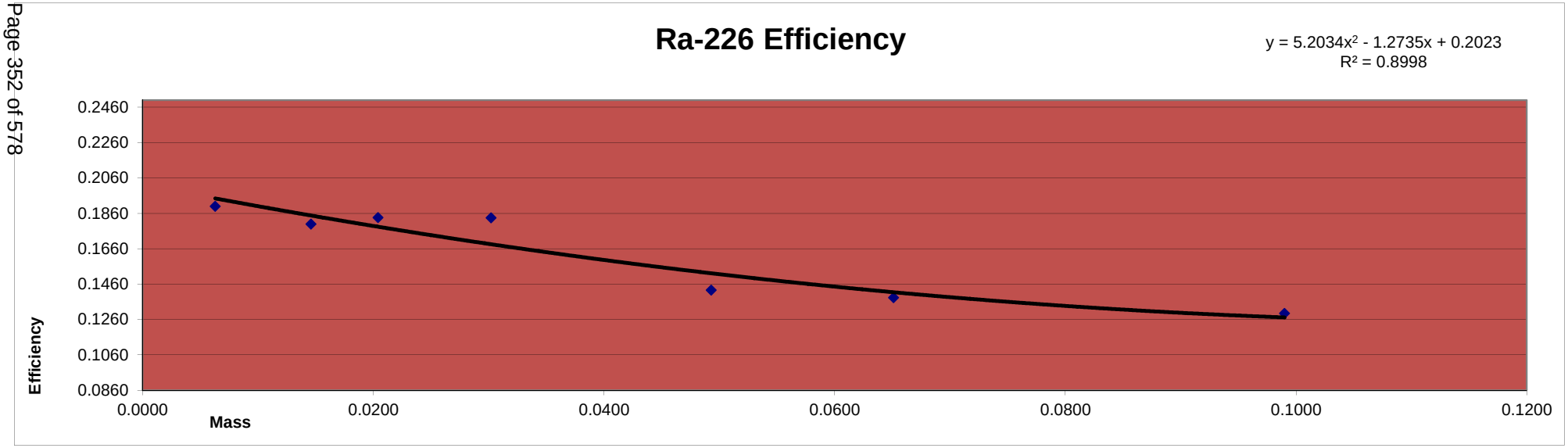
*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
8	ICRa6-1063071;Ra2	0.0063	15.00	7/10/2019 11:32	38517	2567.8000	2/13/2017 13:30	4.0000	0.4487	1430.6249	7534.6	0.1899
8	ICRa6-1063071;Ra3	0.0146	15.00	7/10/2019 11:14	56373	3758.2000	2/13/2017 13:30	4.0000	0.6933	1355.2635	7534.6	0.1799
8	ICRa6-1063071;Ra4	0.0204	15.00	7/10/2019 10:57	60273	4018.2000	2/13/2017 13:30	4.0000	0.7265	1382.7254	7534.6	0.1835
8	ICRa6-1063071;Ra5	0.0302	15.00	7/10/2019 10:23	71373	4758.2000	2/13/2017 13:30	4.0000	0.8604	1382.5546	7534.6	0.1835
8	ICRa6-1063071;Ra6	0.0493	15.00	7/10/2019 10:05	60350	4023.3333	2/13/2017 13:30	4.0000	0.9364	1074.1836	7534.6	0.1426
8	ICRa6-1063071;Ra7	0.0651	15.00	7/10/2019 9:47	57987	3865.8000	2/13/2017 13:30	4.0000	0.9274	1042.1632	7534.6	0.1383
8	ICRa6-1063071;Ra8	0.0990	15.00	7/10/2019 9:27	55020	3668.0000	2/13/2017 13:30	4.0000	0.9402	975.3555	7534.6	0.1295



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra8

Repeat 2

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:27:14 AM

Count Ended 7/10/2019 9:42:35 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	55,020	3,668.000	3,668.000
sd	0.000			0.000	234.563	15.638	15.638
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,760	6,384.000	6,384.000
sd	0.000			0.000	309.451	20.630	20.630

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra7

Repeat 3

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 9:47:05 AM

Count Ended 7/10/2019 10:02:28 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	57,987	3,865.800	3,865.800
sd	0.000			0.000	240.805	16.054	16.054
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,071	6,271.400	6,271.400
sd	0.000			0.000	306.710	20.447	20.447

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra6

Repeat 4

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:05:19 AM

Count Ended 7/10/2019 10:20:41 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	60,350	4,023.333	4,023.333
sd	0.000			0.000	245.662	16.377	16.377
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,165	6,344.333	6,344.333
sd	0.000			0.000	308.488	20.566	20.566

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra5 **Repeat** 5

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:23:10 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:38:35 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	71,373	4,758.200	4,758.200
sd	0.000			0.000	267.157	17.810	17.810
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,865	6,391.000	6,391.000
sd	0.000			0.000	309.621	20.641	20.641

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra4

Repeat 6

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:57:12 AM

Count Ended 7/10/2019 11:12:34 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	60,273	4,018.200	4,018.200
sd	0.000			0.000	245.506	16.367	16.367
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	82,525	5,501.667	5,501.667
sd	0.000			0.000	287.272	19.151	19.151

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra3 **Repeat** 7

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:14:43 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:30:04 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	56,373	3,758.200	3,758.200
sd	0.000			0.000	237.430	15.829	15.829
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	76,470	5,098.000	5,098.000
sd	0.000			0.000	276.532	18.435	18.435

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICRa6-1063071;Ra2

Repeat 8

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:32:33 AM

Count Ended 7/10/2019 11:47:47 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	38,517	2,567.800	2,567.800
sd	0.000			0.000	196.257	13.084	13.084
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	50,951	3,396.733	3,396.733
sd	0.000			0.000	225.723	15.048	15.048

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

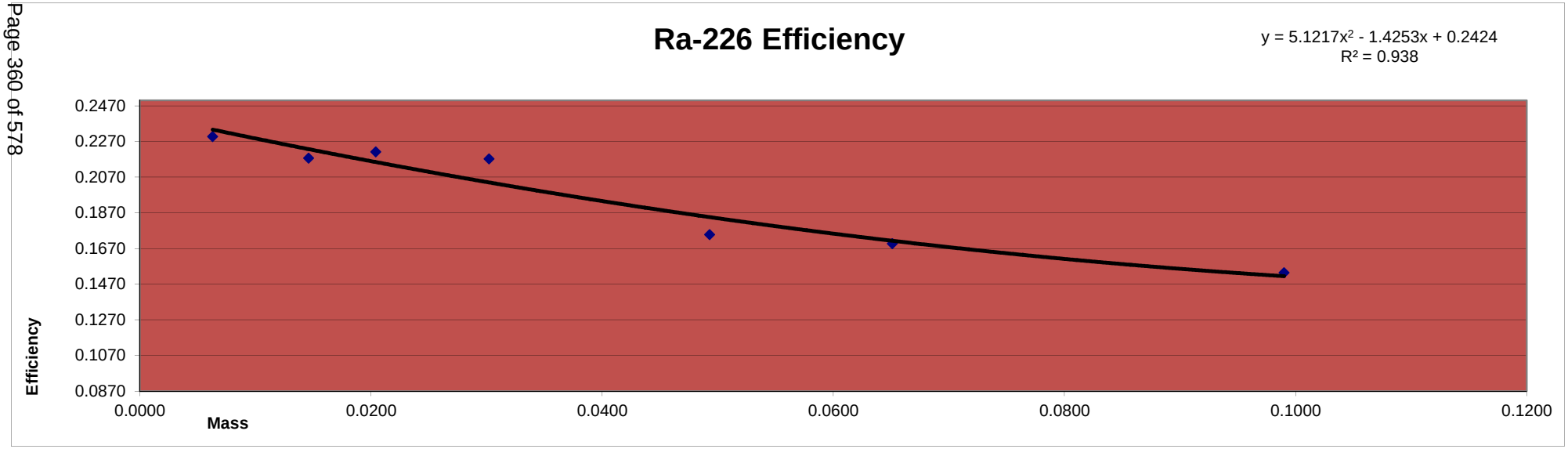
*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
9	ICRa6-1063071;Ra2	0.0063	15.00	7/9/2019 19:38	46572	3104.8000	2/13/2017 13:30	4.0000	0.4487	1729.8092	7534.6	0.2296
9	ICRa6-1063071;Ra3	0.0146	15.00	7/10/2019 11:32	68183	4545.5333	2/13/2017 13:30	4.0000	0.6933	1639.1878	7534.6	0.2176
9	ICRa6-1063071;Ra4	0.0204	15.00	7/10/2019 11:14	72615	4841.0000	2/13/2017 13:30	4.0000	0.7265	1665.8637	7534.6	0.2211
9	ICRa6-1063071;Ra5	0.0302	15.00	7/10/2019 10:57	84462	5630.8000	2/13/2017 13:30	4.0000	0.8604	1636.0995	7534.6	0.2171
9	ICRa6-1063071;Ra6	0.0493	15.00	7/10/2019 10:23	73985	4932.3333	2/13/2017 13:30	4.0000	0.9364	1316.8762	7534.6	0.1748
9	ICRa6-1063071;Ra7	0.0651	15.00	7/10/2019 10:05	71106	4740.4000	2/13/2017 13:30	4.0000	0.9274	1277.9425	7534.6	0.1696
9	ICRa6-1063071;Ra8	0.0990	15.00	7/10/2019 9:47	65156	4343.7333	2/13/2017 13:30	4.0000	0.9402	1155.0393	7534.6	0.1533



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

8/22/2023 9:47 AM

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra2 **Repeat** 1

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 7:38:25 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 7:53:41 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	46,572	3,104.800	3,104.800
sd	0.000			0.000	215.805	14.387	14.387
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	48,650	3,243.333	3,243.333
sd	0.000			0.000	220.567	14.704	14.704

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra8

Repeat 3

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 9:47:11 AM

Count Ended 7/10/2019 10:02:35 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	65,156	4,343.733	4,343.733
sd	0.000			0.000	255.257	17.017	17.017
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	96,026	6,401.733	6,401.733
sd	0.000			0.000	309.881	20.659	20.659

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra7

Repeat 4

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 10:05:26 AM

Count Ended 7/10/2019 10:20:51 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	71,106	4,740.400	4,740.400
sd	0.000			0.000	266.657	17.777	17.777
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	93,049	6,203.267	6,203.267
sd	0.000			0.000	305.039	20.336	20.336

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra6

Repeat 5

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:23:16 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:38:43 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,985	4,932.333	4,932.333
sd	0.000			0.000	272.002	18.133	18.133
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	93,949	6,263.267	6,263.267
sd	0.000			0.000	306.511	20.434	20.434

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra5

Repeat 6

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:57:21 AM

Count Ended 7/10/2019 11:12:47 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	84,462	5,630.800	5,630.800
sd	0.000			0.000	290.623	19.375	19.375
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	92,489	6,165.933	6,165.933
sd	0.000			0.000	304.120	20.275	20.275

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra4

Repeat 7

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 11:14:46 AM

Count Ended 7/10/2019 11:30:10 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	72,615	4,841.000	4,841.000
sd	0.000			0.000	269.472	17.965	17.965
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	80,264	5,350.933	5,350.933
sd	0.000			0.000	283.309	18.887	18.887

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICRa6-1063071;Ra3 **Repeat** 8

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:32:39 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:48:02 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

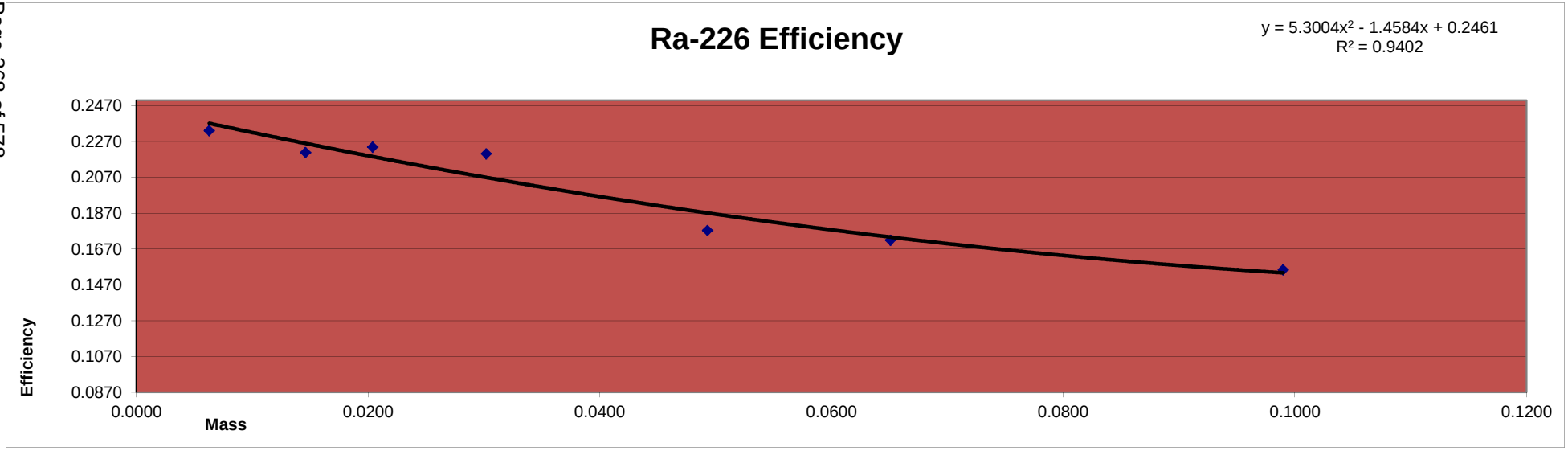
	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	68,183	4,545.533	4,545.533
sd	0.000			0.000	261.119	17.408	17.408
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	73,582	4,905.467	4,905.467
sd	0.000			0.000	271.260	18.084	18.084

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
10	ICRa6-1063071;Ra2	0.0063	15.00	7/10/2019 9:26	47309	3153.9333	2/13/2017 13:30	4.0000	0.4487	1757.1834	7534.6	0.2332
10	ICRa6-1063071;Ra3	0.0146	15.00	7/9/2019 19:38	69235	4615.6667	2/13/2017 13:30	4.0000	0.6933	1664.4789	7534.6	0.2209
10	ICRa6-1063071;Ra4	0.0204	15.00	7/10/2019 11:32	73545	4903.0000	2/13/2017 13:30	4.0000	0.7265	1687.1989	7534.6	0.2239
10	ICRa6-1063071;Ra5	0.0302	15.00	7/10/2019 11:14	85651	5710.0667	2/13/2017 13:30	4.0000	0.8604	1659.1314	7534.6	0.2202
10	ICRa6-1063071;Ra6	0.0493	15.00	7/10/2019 10:57	75090	5006.0000	2/13/2017 13:30	4.0000	0.9364	1336.5443	7534.6	0.1774
10	ICRa6-1063071;Ra7	0.0651	15.00	7/10/2019 10:23	72078	4805.2000	2/13/2017 13:30	4.0000	0.9274	1295.4117	7534.6	0.1719
10	ICRa6-1063071;Ra8	0.0990	15.00	7/10/2019 10:05	66098	4406.5333	2/13/2017 13:30	4.0000	0.9402	1171.7384	7534.6	0.1555



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra3 **Repeat** 1

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 7:38:30 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 7:53:51 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	69,235	4,615.667	4,615.667
sd	0.000			0.000	263.125	17.542	17.542
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	73,630	4,908.667	4,908.667
sd	0.000			0.000	271.348	18.090	18.090

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra2 **Repeat** 2

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:26:07 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 9:41:25 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	47,309	3,153.933	3,153.933
sd	0.000			0.000	217.506	14.500	14.500
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	49,097	3,273.133	3,273.133
sd	0.000			0.000	221.578	14.772	14.772

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra8

Repeat 4

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:05:31 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:20:56 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	66,098	4,406.533	4,406.533
sd	0.000			0.000	257.095	17.140	17.140
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,609	6,373.933	6,373.933
sd	0.000			0.000	309.207	20.614	20.614

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra7

Repeat 5

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:23:22 AM

Count Ended 7/10/2019 10:38:48 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	72,078	4,805.200	4,805.200
sd	0.000			0.000	268.473	17.898	17.898
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	93,024	6,201.600	6,201.600
sd	0.000			0.000	304.998	20.333	20.333

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra6 **Repeat** 6

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:57:28 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:12:54 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	75,090	5,006.000	5,006.000
sd	0.000			0.000	274.026	18.268	18.268
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,268	6,284.533	6,284.533
sd	0.000			0.000	307.031	20.469	20.469

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra5 **Repeat** 7

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:14:54 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:30:20 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	85,651	5,710.067	5,710.067
sd	0.000			0.000	292.662	19.511	19.511
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	92,949	6,196.600	6,196.600
sd	0.000			0.000	304.875	20.325	20.325

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICRa6-1063071;Ra4

Repeat 8

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:32:45 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:48:09 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

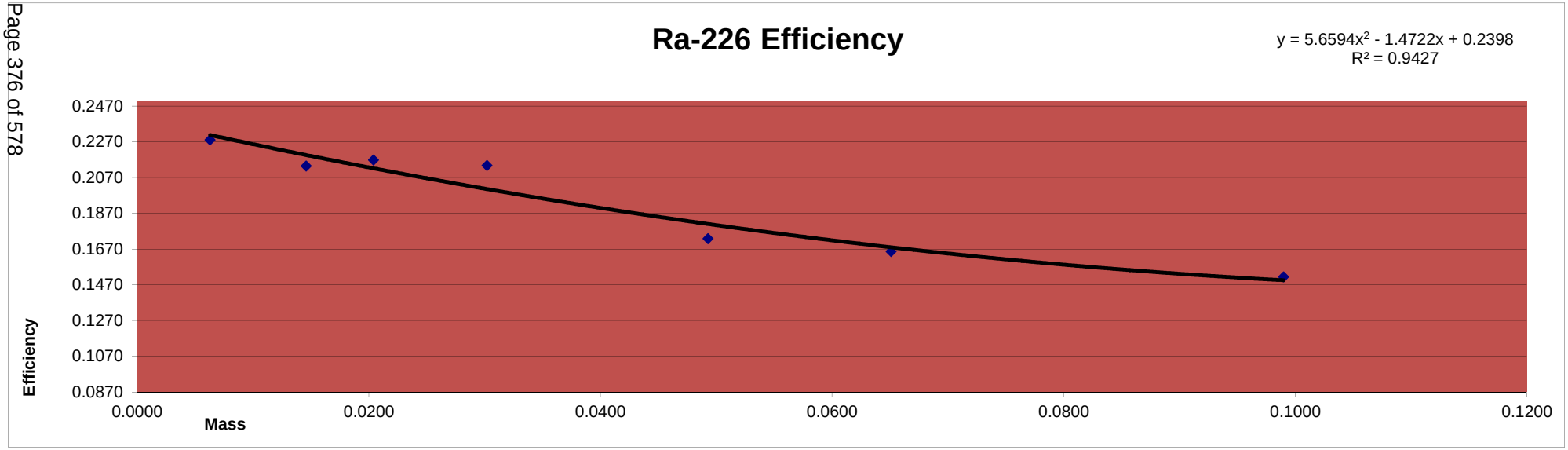
	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,545	4,903.000	4,903.000
sd	0.000			0.000	271.192	18.079	18.079
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	80,745	5,383.000	5,383.000
sd	0.000			0.000	284.157	18.944	18.944

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
12	ICRa6-1063071;Ra2	0.0063	15.00	7/10/2019 10:04	46251	3083.4000	2/13/2017 13:30	4.0000	0.4487	1717.8864	7534.6	0.2280
12	ICRa6-1063071;Ra3	0.0146	15.00	7/10/2019 9:46	66884	4458.9333	2/13/2017 13:30	4.0000	0.6933	1607.9585	7534.6	0.2134
12	ICRa6-1063071;Ra4	0.0204	15.00	7/10/2019 9:26	71187	4745.8000	2/13/2017 13:30	4.0000	0.7265	1633.1039	7534.6	0.2167
12	ICRa6-1063071;Ra5	0.0302	15.00	7/9/2019 19:38	83100	5540.0000	2/13/2017 13:30	4.0000	0.8604	1609.7164	7534.6	0.2136
12	ICRa6-1063071;Ra6	0.0493	15.00	7/10/2019 11:32	73114	4874.2667	2/13/2017 13:30	4.0000	0.9364	1301.3730	7534.6	0.1727
12	ICRa6-1063071;Ra7	0.0651	15.00	7/10/2019 11:15	69426	4628.4000	2/13/2017 13:30	4.0000	0.9274	1247.7490	7534.6	0.1656
12	ICRa6-1063071;Ra8	0.0990	15.00	7/10/2019 10:57	64324	4288.2667	2/13/2017 13:30	4.0000	0.9402	1140.2902	7534.6	0.1513



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra5

Repeat 1

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 7:38:39 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 7:54:05 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	83,100	5,540.000	5,540.000
sd	0.000			0.000	288.271	19.218	19.218
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,193	6,279.533	6,279.533
sd	0.000			0.000	306.909	20.461	20.461

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra4

Repeat 2

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:26:20 AM

Count Ended 7/10/2019 9:41:43 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	71,187	4,745.800	4,745.800
sd	0.000			0.000	266.809	17.787	17.787
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	81,436	5,429.067	5,429.067
sd	0.000			0.000	285.370	19.025	19.025

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra3 **Repeat** 3

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:46:34 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:01:56 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	66,884	4,458.933	4,458.933
sd	0.000			0.000	258.619	17.241	17.241
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	75,141	5,009.400	5,009.400
sd	0.000			0.000	274.119	18.275	18.275

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra2

Repeat 4

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:04:48 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:20:05 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	46,251	3,083.400	3,083.400
sd	0.000			0.000	215.060	14.337	14.337
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	50,421	3,361.400	3,361.400
sd	0.000			0.000	224.546	14.970	14.970

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra8

Repeat 6

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:57:42 AM

Count Ended 7/10/2019 11:13:06 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	64,324	4,288.267	4,288.267
sd	0.000			0.000	253.622	16.908	16.908
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	97,206	6,480.400	6,480.400
sd	0.000			0.000	311.779	20.785	20.785

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra7

Repeat 7

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:15:08 AM

Count Ended 7/10/2019 11:30:32 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	69,426	4,628.400	4,628.400
sd	0.000			0.000	263.488	17.566	17.566
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,031	6,268.733	6,268.733
sd	0.000			0.000	306.645	20.443	20.443

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICRa6-1063071;Ra6 **Repeat** 8

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:32:57 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:48:22 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

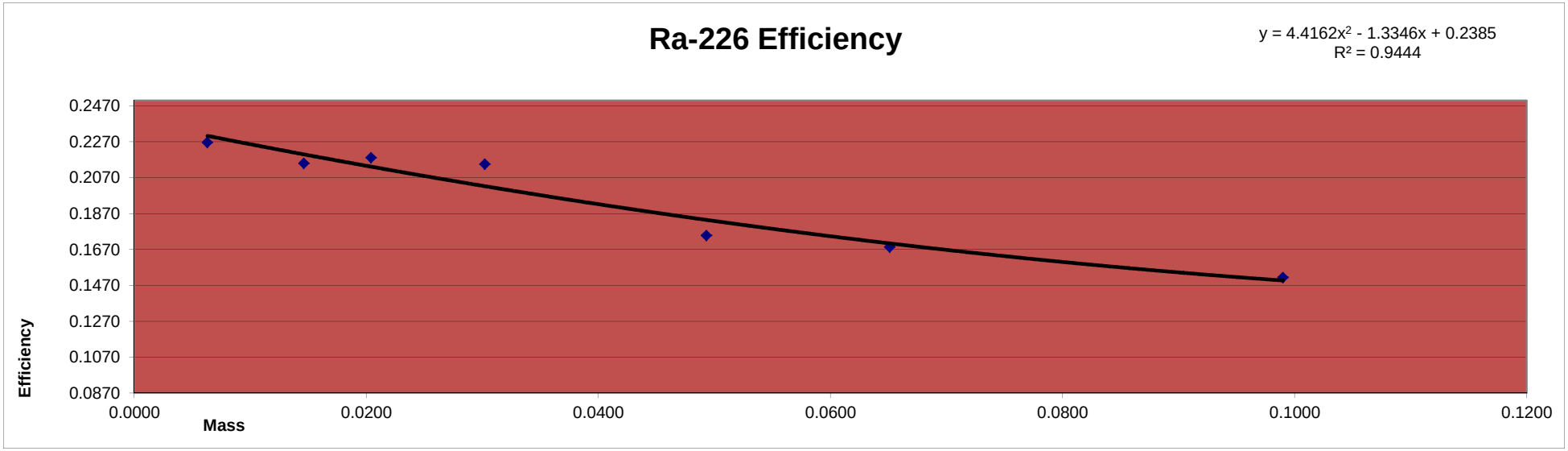
	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,114	4,874.267	4,874.267
sd	0.000			0.000	270.396	18.026	18.026
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,834	6,388.933	6,388.933
sd	0.000			0.000	309.571	20.638	20.638

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
13	ICRa6-1063071;Ra2	0.0063	15.00	7/10/2019 10:22	45994	3066.2667	2/13/2017 13:30	4.0000	0.4487	1708.3408	7534.6	0.2267
13	ICRa6-1063071;Ra3	0.0146	15.00	7/10/2019 10:04	67400	4493.3333	2/13/2017 13:30	4.0000	0.6933	1620.3637	7534.6	0.2151
13	ICRa6-1063071;Ra4	0.0204	15.00	7/10/2019 9:46	71661	4777.4000	2/13/2017 13:30	4.0000	0.7265	1643.9780	7534.6	0.2182
13	ICRa6-1063071;Ra5	0.0302	15.00	7/10/2019 9:26	83475	5565.0000	2/13/2017 13:30	4.0000	0.8604	1616.9805	7534.6	0.2146
13	ICRa6-1063071;Ra6	0.0493	15.00	7/9/2019 19:38	74005	4933.6667	2/13/2017 13:30	4.0000	0.9364	1317.2321	7534.6	0.1748
13	ICRa6-1063071;Ra7	0.0651	15.00	7/10/2019 11:33	70601	4706.7333	2/13/2017 13:30	4.0000	0.9274	1268.8665	7534.6	0.1684
13	ICRa6-1063071;Ra8	0.0990	15.00	7/10/2019 11:15	64373	4291.5333	2/13/2017 13:30	4.0000	0.9402	1141.1589	7534.6	0.1515



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra6 **Repeat** 1

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 7:38:44 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 7:54:11 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	74,005	4,933.667	4,933.667
sd	0.000			0.000	272.039	18.136	18.136
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,237	6,349.133	6,349.133
sd	0.000			0.000	308.605	20.574	20.574

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra5 **Repeat** 2

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:26:29 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 9:41:54 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	83,475	5,565.000	5,565.000
sd	0.000			0.000	288.920	19.261	19.261
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,394	6,292.933	6,292.933
sd	0.000			0.000	307.236	20.482	20.482

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra4

Repeat 3

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 9:46:41 AM

Count Ended 7/10/2019 10:02:04 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	71,661	4,777.400	4,777.400
sd	0.000			0.000	267.696	17.846	17.846
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	80,985	5,399.000	5,399.000
sd	0.000			0.000	284.579	18.972	18.972

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra3

Repeat 4

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:04:55 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:20:17 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	67,400	4,493.333	4,493.333
sd	0.000			0.000	259.615	17.308	17.308
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	74,481	4,965.400	4,965.400
sd	0.000			0.000	272.912	18.194	18.194

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra2

Repeat 5

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 10:22:45 AM

Count Ended 7/10/2019 10:38:01 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	45,994	3,066.267	3,066.267
sd	0.000			0.000	214.462	14.297	14.297
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	49,259	3,283.933	3,283.933
sd	0.000			0.000	221.944	14.796	14.796

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra8 **Repeat** 7

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:15:15 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:30:41 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	64,373	4,291.533	4,291.533
sd	0.000			0.000	253.718	16.915	16.915
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	97,501	6,500.067	6,500.067
sd	0.000			0.000	312.252	20.817	20.817

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICRa6-1063071;Ra7

Repeat 8

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:33:02 AM

Count Ended 7/10/2019 11:48:27 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	70,601	4,706.733	4,706.733
sd	0.000			0.000	265.708	17.714	17.714
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,264	6,284.267	6,284.267
sd	0.000			0.000	307.024	20.468	20.468

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

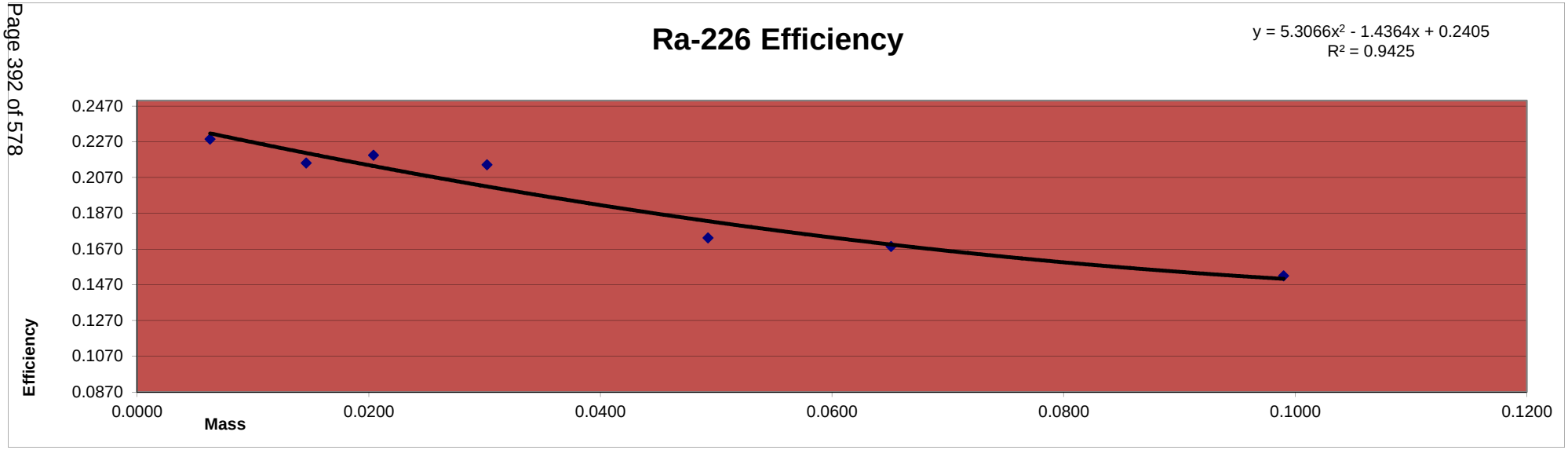
*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
14	ICRa6-1063071;Ra2	0.0063	15.00	7/10/2019 10:58	46314	3087.6000	2/13/2017 13:30	4.0000	0.4487	1720.2264	7534.6	0.2283
14	ICRa6-1063071;Ra3	0.0146	15.00	7/10/2019 10:22	67396	4493.0667	2/13/2017 13:30	4.0000	0.6933	1620.2675	7534.6	0.2150
14	ICRa6-1063071;Ra4	0.0204	15.00	7/10/2019 10:05	72031	4802.0667	2/13/2017 13:30	4.0000	0.7265	1652.4662	7534.6	0.2193
14	ICRa6-1063071;Ra5	0.0302	15.00	7/10/2019 9:46	83258	5550.5333	2/13/2017 13:30	4.0000	0.8604	1612.7770	7534.6	0.2140
14	ICRa6-1063071;Ra6	0.0493	15.00	7/10/2019 9:26	73296	4886.4000	2/13/2017 13:30	4.0000	0.9364	1304.6125	7534.6	0.1731
14	ICRa6-1063071;Ra7	0.0651	15.00	7/9/2019 19:38	70580	4705.3333	2/13/2017 13:30	4.0000	0.9274	1268.4891	7534.6	0.1684
14	ICRa6-1063071;Ra8	0.0990	15.00	7/10/2019 11:33	64569	4304.6000	2/13/2017 13:30	4.0000	0.9402	1144.6334	7534.6	0.1519



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

8/22/2023 9:47 AM

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra7

Repeat 1

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 7/9/2019 7:38:48 PM

Count Ended 7/9/2019 7:54:14 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	70,580	4,705.333	4,705.333
sd	0.000	265.669	17.711	17.711
Beta	0.000	94,421	6,294.733	6,294.733
sd	0.000	307.280	20.485	20.485

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra6 **Repeat** 2

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:26:42 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 9:42:07 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,296	4,886.400	4,886.400
sd	0.000			0.000	270.732	18.049	18.049
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,113	6,340.867	6,340.867
sd	0.000			0.000	308.404	20.560	20.560

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra5 **Repeat** 3

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:46:48 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:02:16 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	83,258	5,550.533	5,550.533
sd	0.000			0.000	288.545	19.236	19.236
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	94,109	6,273.933	6,273.933
sd	0.000			0.000	306.772	20.451	20.451

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra4

Repeat 4

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 10:05:04 AM

Count Ended 7/10/2019 10:20:29 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	72,031	4,802.067	4,802.067
sd	0.000			0.000	268.386	17.892	17.892
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	80,583	5,372.200	5,372.200
sd	0.000			0.000	283.871	18.925	18.925

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra3

Repeat 5

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 10:22:54 AM

Count Ended 7/10/2019 10:38:16 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	67,396	4,493.067	4,493.067
sd	0.000			0.000	259.607	17.307	17.307
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	74,575	4,971.667	4,971.667
sd	0.000			0.000	273.084	18.206	18.206

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra2

Repeat 6

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 10:58:00 AM

Count Ended 7/10/2019 11:13:17 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	46,314	3,087.600	3,087.600
sd	0.000			0.000	215.207	14.347	14.347
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	49,505	3,300.333	3,300.333
sd	0.000			0.000	222.497	14.833	14.833

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICRa6-1063071;Ra8 **Repeat** 8

Carrier No. 0

Batch ID Ra226 IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:33:08 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:48:32 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

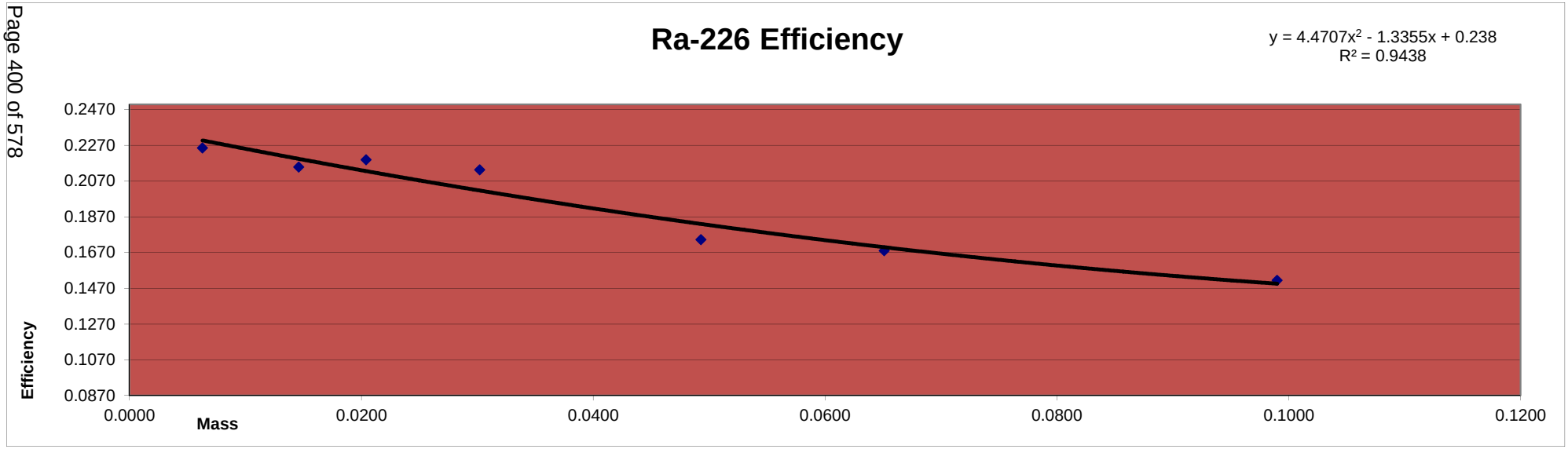
	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	64,569	4,304.600	4,304.600
sd	0.000			0.000	254.104	16.940	16.940
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	96,721	6,448.067	6,448.067
sd	0.000			0.000	311.000	20.733	20.733

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
16	ICRa6-1063071;Ra2	0.0063	15.00	7/9/2019 15:07	45743	3049.5333	2/13/2017 13:30	4.0000	0.4487	1699.0179	7534.6	0.2255
16	ICRa6-1063071;Ra3	0.0146	15.00	7/9/2019 14:48	67344	4489.6000	2/13/2017 13:30	4.0000	0.6933	1619.0174	7534.6	0.2149
16	ICRa6-1063071;Ra4	0.0204	15.00	7/9/2019 14:29	71881	4792.0667	2/13/2017 13:30	4.0000	0.7265	1649.0250	7534.6	0.2189
16	ICRa6-1063071;Ra5	0.0302	15.00	7/9/2019 14:09	82978	5531.8667	2/13/2017 13:30	4.0000	0.8604	1607.3532	7534.6	0.2133
16	ICRa6-1063071;Ra6	0.0493	15.00	7/9/2019 13:41	73750	4916.6667	2/13/2017 13:30	4.0000	0.9364	1312.6933	7534.6	0.1742
16	ICRa6-1063071;Ra7	0.0651	15.00	7/9/2019 13:22	70449	4696.6000	2/13/2017 13:30	4.0000	0.9274	1266.1347	7534.6	0.1680
16	ICRa6-1063071;Ra8	0.0990	15.00	7/9/2019 13:00	64357	4290.4667	2/13/2017 13:30	4.0000	0.9402	1140.8752	7534.6	0.1514



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

8/22/2023 9:47 AM

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra8

Repeat 2

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 1:00:30 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 1:15:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	64,357	4,290.467	4,290.467
sd	0.000			0.000	253.687	16.912	16.912
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	97,328	6,488.533	6,488.533
sd	0.000			0.000	311.974	20.798	20.798

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra7

Repeat 3

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 1:22:07 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 1:37:34 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	70,449	4,696.600	4,696.600
sd	0.000			0.000	265.422	17.695	17.695
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,214	6,347.600	6,347.600
sd	0.000			0.000	308.568	20.571	20.571

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra6

Repeat 4

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 1:41:47 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 1:57:12 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,750	4,916.667	4,916.667
sd	0.000			0.000	271.570	18.105	18.105
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	96,074	6,404.933	6,404.933
sd	0.000			0.000	309.958	20.664	20.664

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra5

Repeat 5

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 2:09:54 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 2:25:21 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	82,978	5,531.867	5,531.867
sd	0.000			0.000	288.059	19.204	19.204
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	93,924	6,261.600	6,261.600
sd	0.000			0.000	306.470	20.431	20.431

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra4

Repeat 6

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 2:29:30 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 2:44:53 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	71,881	4,792.067	4,792.067
sd	0.000			0.000	268.106	17.874	17.874
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	81,922	5,461.467	5,461.467
sd	0.000			0.000	286.220	19.081	19.081

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra3 **Repeat** 7

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 2:48:36 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 3:03:57 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	67,344	4,489.600	4,489.600
sd	0.000			0.000	259.507	17.300	17.300
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	74,876	4,991.733	4,991.733
sd	0.000			0.000	273.635	18.242	18.242

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICRa6-1063071;Ra2

Repeat 8

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 3:07:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 3:22:25 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

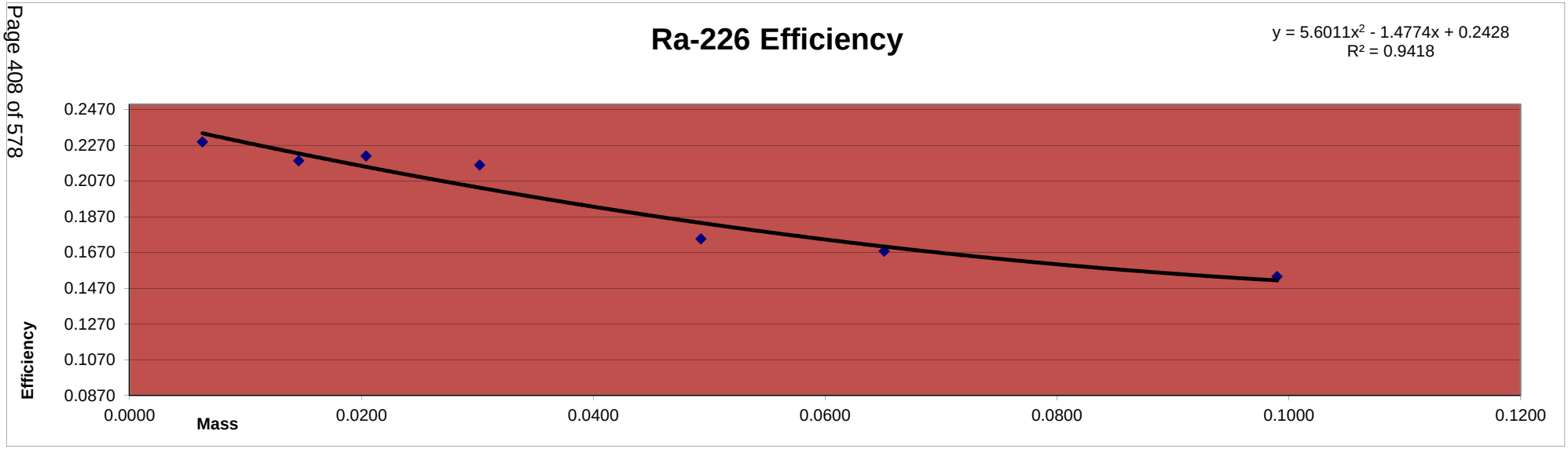
	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	45,743	3,049.533	3,049.533
sd	0.000			0.000	213.876	14.258	14.258
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	49,858	3,323.867	3,323.867
sd	0.000			0.000	223.289	14.886	14.886

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2019

Detector	Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
17	ICRa6-1063071;Ra2	0.0063	15.00	7/9/2019 12:41	46417	3094.4667	2/13/2017 13:30	4.0000	0.4487	1724.0521	7534.6	0.2288
17	ICRa6-1063071;Ra3	0.0146	15.00	7/9/2019 15:07	68436	4562.4000	2/13/2017 13:30	4.0000	0.6933	1645.2702	7534.6	0.2184
17	ICRa6-1063071;Ra4	0.0204	15.00	7/9/2019 14:48	72582	4838.8000	2/13/2017 13:30	4.0000	0.7265	1665.1067	7534.6	0.2210
17	ICRa6-1063071;Ra5	0.0302	15.00	7/9/2019 14:29	84007	5600.4667	2/13/2017 13:30	4.0000	0.8604	1627.2858	7534.6	0.2160
17	ICRa6-1063071;Ra6	0.0493	15.00	7/9/2019 14:10	73910	4927.3333	2/13/2017 13:30	4.0000	0.9364	1315.5412	7534.6	0.1746
17	ICRa6-1063071;Ra7	0.0651	15.00	7/9/2019 13:41	70314	4687.6000	2/13/2017 13:30	4.0000	0.9274	1263.7084	7534.6	0.1677
17	ICRa6-1063071;Ra8	0.0990	15.00	7/9/2019 13:22	65252	4350.1333	2/13/2017 13:30	4.0000	0.9402	1156.7412	7534.6	0.1535



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

8/22/2023 9:47 AM

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra2

Repeat 1

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 12:41:35 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 12:56:53 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	46,417	3,094.467	3,094.467
sd	0.000			0.000	215.446	14.363	14.363
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	50,296	3,353.067	3,353.067
sd	0.000			0.000	224.268	14.951	14.951

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra8 **Repeat** 3

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 1:22:21 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 1:37:46 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	65,252	4,350.133	4,350.133
sd	0.000			0.000	255.445	17.030	17.030
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	97,963	6,530.867	6,530.867
sd	0.000			0.000	312.990	20.866	20.866

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra7

Repeat 4

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 1:41:59 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 1:57:25 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	70,314	4,687.600	4,687.600
sd	0.000			0.000	265.168	17.678	17.678
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,711	6,380.733	6,380.733
sd	0.000			0.000	309.372	20.625	20.625

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra6 **Repeat** 5

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 2:10:04 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 2:25:31 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,910	4,927.333	4,927.333
sd	0.000			0.000	271.864	18.124	18.124
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	96,510	6,434.000	6,434.000
sd	0.000			0.000	310.661	20.711	20.711

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra5

Repeat 6

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 2:29:40 PM

Count Ended 7/9/2019 2:45:08 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	84,007	5,600.467	5,600.467
sd	0.000			0.000	289.840	19.323	19.323
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,035	6,335.667	6,335.667
sd	0.000			0.000	308.277	20.552	20.552

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra4

Repeat 7

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 2:48:44 PM

Count Ended 7/9/2019 3:04:09 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	72,582	4,838.800	4,838.800
sd	0.000			0.000	269.410	17.961	17.961
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	82,414	5,494.267	5,494.267
sd	0.000			0.000	287.078	19.139	19.139

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICRa6-1063071;Ra3 **Repeat** 8

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/9/2019 3:07:17 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/9/2019 3:22:41 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	68,436	4,562.400	4,562.400
sd	0.000			0.000	261.603	17.440	17.440
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	75,818	5,054.533	5,054.533
sd	0.000			0.000	275.351	18.357	18.357

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha Beta Calibration Verifications

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Blue - Beta ICV 2017				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
3	96.69%	94.93%	98.12%	96.58%

Beta Activity 1815.077 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/31/2017		(or date at which you wish to determine activity)
Elapsed Time:	1583.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.899957764		
Corrected Activity:	2014.735445	dpm	
Decay Activity (Sr/Y-90)	4029.47089	dpm	1815.077 pCi

Prep Batch: 239589

Detector	Beta 1	Activity	Units
3	Low Mass	1.755E+03	pCi/mL

Beta 2	Activity	Units
Medium Mass	1.723E+03	pCi/mL

Beta 3	Activity	Units
High Mass	1.781E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICVABT-51512;Beta3 **Repeat** 2

Carrier No. 0

Batch ID Beta_ICV

Count Method Gross Alpha Beta **Detector Volts** 1575

Sample Qty	0 ***Sample*** **sd**	0 ***Sample***	
Residual Wt	0 ***mg*** **sd**	0 ***mg***	

Count Began 3/31/2017 12:18:37 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/31/2017 12:23:40 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.028	70	14.000	14.000
sd	0.000			0.000	8.367	1.673	1.673
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.399	7,615	1,523.000	1,523.000
sd	0.000			0.000	87.264	17.453	17.453

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICVABT-51512;Beta2 **Repeat** 3

Carrier No. 0

Batch ID Beta_ICV

Count Method Gross Alpha Beta **Detector Volts** 1575

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/31/2017 12:27:41 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/31/2017 12:32:47 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.028	54	10.800	10.800
sd	0.000			0.000	7.348	1.470	1.470
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.399	7,770	1,554.000	1,554.000
sd	0.000			0.000	88.148	17.630	17.630

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICVABT-51512;Beta1 **Repeat** 4

Carrier No. 0

Batch ID Beta_ICV

Count Method Gross Alpha Beta **Detector Volts** 1575

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/31/2017 12:43:41 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/31/2017 12:48:46 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.028	96	19.200	19.200
sd	0.000			0.000	9.798	1.960	1.960
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.399	8,401	1,680.200	1,680.200
sd	0.000			0.000	91.657	18.331	18.331

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

ICV is for Gross Alpha

Blue - Alpha ICV

	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
3	86.76%	98.22%	102.49%	95.82%

Standard ID

Thorium-230
Th-230_00056 #1835527
Cert # 114475 Ref. date 10/29/19
Activity 1.031E+06 pCi/L

Prep Batch: 566222

	A1 = Low Mass	A2 = Medium Mass	A3 = High Mass
	0.0232	0.0537	0.0846
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
3	8.948E+05	1.013E+06	1.057E+06

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICVABT-1835527; C

Repeat 44

Carrier No. 0

Batch ID 566222

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 1:06:54 PM

Count Ended 6/2/2022 1:27:10 PM

Sample Count Time 20.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	7,379	368.950	368.758
sd	0.014	85.901	4.295	4.295
Beta	0.462	4,011	200.550	200.088
sd	0.021	63.332	3.167	3.167

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICVABT-1835527; B

Repeat 46

Carrier No. 0

Batch ID 566222

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 1:28:45 PM

Count Ended 6/2/2022 1:49:09 PM

Sample Count Time 20.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	9,743	487.150	486.958
sd	0.014	98.707	4.935	4.935
Beta	0.462	4,843	242.150	241.688
sd	0.021	69.592	3.480	3.480

Alpha/Beta Count Results

Sample Activity Report

Blue 0-3 - D

Addr: 3

Sample ID ICVABT-1835527; A

Repeat 47

Carrier No. 0

Batch ID 566222

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 1:54:18 PM

Count Ended 6/2/2022 2:14:26 PM

Sample Count Time 20.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.192	6,570	328.500	328.308
sd	0.014	81.056	4.053	4.053
Beta	0.462	3,007	150.350	149.888
sd	0.021	54.836	2.742	2.742

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Blue - Beta ICV 2017				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
19	95.62%	92.58%	95.34%	94.51%

Beta Activity 1808.201 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	5/27/2017		(or date at which you wish to determine activity)
Elapsed Time:	1640.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.896548477		
Corrected Activity:	2007.103076	dpm	
Decay Activity (Sr/Y-90)	4014.206153	dpm	1808.201 pCi

Prep Batch: 239589

Detector	Beta 1	Activity	Units
19	Low Mass	1.729E+03	pCi/mL

Beta 2	Activity	Units
Medium Mas	1.674E+03	pCi/mL

Beta 3	Activity	Units
High Mass	1.724E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICVABT-51512;B3

Repeat 2

Carrier No. 0

Batch ID 239589

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/27/2017 2:36:50 PM

Count Ended 5/27/2017 2:41:55 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	1	0.200	0.176
sd	0.000			0.005	1.000	0.200	0.200
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	7,312	1,462.400	1,462.070
sd	0.000			0.018	85.510	17.102	17.102

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICVABT-51512;B2

Repeat 3

Carrier No. 0

Batch ID 239589

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/27/2017 2:43:34 PM

Count Ended 5/27/2017 2:48:36 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	2	0.400	0.376
sd	0.000			0.005	1.414	0.283	0.283
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	7,486	1,497.200	1,496.870
sd	0.000			0.018	86.522	17.304	17.304

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICVABT-51512;B1

Repeat 4

Carrier No. 0

Batch ID 239589

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/27/2017 2:51:48 PM

Count Ended 5/27/2017 2:56:55 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.024	0	0.000	-0.024
sd	0.000			0.005	0.000	0.000	0.098
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	8,092	1,618.400	1,618.070
sd	0.000			0.018	89.956	17.991	17.991

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

ICV is for Gross Alpha

Blue - Alpha ICV

	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
19	87.44%	99.29%	103.26%	96.66%

Standard ID

Thorium-230
Th-230_00056 #1835527
Cert # 114475 Ref. date 10/29/19
Activity 1.031E+06 pCi/L

Prep Batch: 566222

	A1 = Low Mass	A2 = Medium Mass	A3 = High Mass
	0.0232	0.0537	0.0846
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
19	9.018E+05	1.024E+06	1.065E+06

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICVABT-1835527; C

Repeat 60

Carrier No. 0

Batch ID 566222

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 7:20:16 PM

Count Ended 6/2/2022 7:40:35 PM

Sample Count Time 20.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	7,405	370.250	369.977
sd	0.017	86.052	4.303	4.303
Beta	0.586	4,348	217.400	216.814
sd	0.024	65.939	3.297	3.297

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICVABT-1835527; B

Repeat 62

Carrier No. 0

Batch ID 566222

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 7:42:51 PM

Count Ended 6/2/2022 8:03:05 PM

Sample Count Time 20.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	9,754	487.700	487.427
sd	0.017	98.762	4.938	4.938
Beta	0.586	5,061	253.050	252.464
sd	0.024	71.141	3.557	3.557

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - D

Addr: 19

Sample ID ICVABT-1835527; A

Repeat 63

Carrier No. 0

Batch ID 566222

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 6/2/2022 8:04:18 PM

Count Ended 6/2/2022 8:24:31 PM

Sample Count Time 20.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.273	6,497	324.850	324.577
sd	0.017	80.604	4.030	4.030
Beta	0.586	3,032	151.600	151.014
sd	0.024	55.064	2.753	2.753

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
0	97.69%	98.94%	99.54%	98.72%

Beta Activity 2009.34 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Count Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICV-51512;Beta 1

Repeat 8

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 7:06:32 PM

Count Ended 1/24/2013 7:11:34 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	32	6.400	6.322
sd	0.000			0.009	5.657	1.131	1.131
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	9,465	1,893.000	1,892.597
sd	0.000			0.020	97.288	19.458	19.458

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICV-51512;Beta 3

Repeat 8

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 7:16:00 PM

Count Ended 1/24/2013 7:21:03 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	30	6.000	5.922
sd	0.000			0.009	5.477	1.095	1.095
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	8,720	1,744.000	1,743.597
sd	0.000			0.020	93.381	18.676	18.676

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICV-51512;Beta 2

Repeat 9

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 7:24:30 PM

Count Ended 1/24/2013 7:29:34 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.078	39	7.800	7.722
sd	0.000			0.009	6.245	1.249	1.249
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.403	9,066	1,813.200	1,812.797
sd	0.000			0.020	95.216	19.043	19.043

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	*1.000E+000mL*		*0.0314*	*g*	*Orange0*	*8/27/20 14:35*		*15.00*	*1000.00*	*1.00*	*1.00*		
	Gross Alpha	10063	86	0.00		6.709E+002	8.600E-002	0.1534	**1.970E+003**pCi/mL	1.140E+002	1.964E+001	1.324E+000	3.685E-001	113.9665
ICVABT-1835527; B	160-36042-A-1-BH	*1.000E+000mL*		*0.0588*	*g*	*Orange0*	*8/27/20 15:33*		*15.00*	*1000.00*	*1.00*	*1.00*		
	Gross Alpha	8778	86	0.00		5.852E+002	8.600E-002	0.1232	**2.140E+003**pCi/mL	1.241E+002	2.285E+001	1.649E+000	4.590E-001	124.1057
ICVABT-1835527; C	160-36042-A-1-BI	*1.000E+000mL*		*0.0961*	*g*	*Orange0*	*8/27/20 15:06*		*15.00*	*1000.00*	*1.00*	*1.00*		
	Gross Alpha	13865	86	0.00		9.243E+002	8.600E-002	0.0949	**4.386E+003**pCi/mL	2.528E+002	3.725E+001	2.140E+000	5.955E-001	252.7815

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
0	98.86%	107.39%	110.05%	105.43%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
0	1.97E+03	2.14E+03	4.39E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICVABT-1835527; A

Repeat 4

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 2:35:33 PM

Count Ended 8/27/2020 2:50:41 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	10,063	670.867	670.781
sd	0.009	100.315	6.688	6.688
Beta	0.450	3,684	245.600	245.150
sd	0.021	60.696	4.046	4.046

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICVABT-1835527; C

Repeat 5

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:06:03 PM

Count Ended 8/27/2020 3:21:10 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	13,865	924.333	924.247
sd	0.009	117.750	7.850	7.850
Beta	0.450	5,154	343.600	343.150
sd	0.021	71.791	4.786	4.786

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - A

Addr: 0

Sample ID ICVABT-1835527; B

Repeat 6

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:33:40 PM

Count Ended 8/27/2020 3:48:49 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	8,778	585.200	585.114
sd	0.009	93.691	6.246	6.246
Beta	0.450	3,227	215.133	214.683
sd	0.021	56.807	3.787	3.787

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013						
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery	Beta Activity	2009.34 pCi
2	97.49%	99.29%	100.73%	99.17%		

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICV-51512;Beta 2

Repeat 8

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/24/2013 7:06:37 PM

Count Ended 1/24/2013 7:11:39 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	5	1.000	0.930
sd	0.000			0.008	2.236	0.447	0.447
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	8,935	1,787.000	1,786.714
sd	0.000			0.017	94.525	18.905	18.905

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICV-51512;Beta 1 **Repeat** 9

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 7:16:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 7:21:10 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	6	1.200	1.130
sd	0.000			0.008	2.449	0.490	0.490
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	9,298	1,859.600	1,859.314
sd	0.000			0.017	96.426	19.285	19.285

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICV-51512;Beta 3 **Repeat** 9

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 7:24:39 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 7:29:42 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	5	1.000	0.930
sd	0.000			0.008	2.236	0.447	0.447
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.286	8,658	1,731.600	1,731.314
sd	0.000			0.017	93.048	18.610	18.610

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	*1.000E+000mL*		*0.0314*	*g*	*Orange2*	*8/27/20 15:34*		*15.00*	*1000.00*	*1.00*	*1.00*		
	Gross Alpha	9640	65	0.00		6.427E+002	6.500E-002	0.1482	**1.953E+003**pCi/mL	1.131E+002	1.989E+001	1.271E+000	3.316E-001	113.0807
ICVABT-1835527; B	160-36042-A-1-BH	*1.000E+000mL*		*0.0588*	*g*	*Orange2*	*8/27/20 15:06*		*15.00*	*1000.00*	*1.00*	*1.00*		
	Gross Alpha	8196	65	0.00		5.464E+002	6.500E-002	0.1179	**2.088E+003**pCi/mL	1.212E+002	2.307E+001	1.598E+000	4.170E-001	121.2344
ICVABT-1835527; C	160-36042-A-1-BI	*1.000E+000mL*		*0.0961*	*g*	*Orange2*	*8/27/20 14:35*		*15.00*	*1000.00*	*1.00*	*1.00*		
	Gross Alpha	13271	65	0.00		8.847E+002	6.500E-002	0.0904	**4.409E+003**pCi/mL	2.542E+002	3.828E+001	2.084E+000	5.438E-001	254.2390

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
2	98.01%	104.78%	110.63%	104.47%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
2	1.95E+03	2.09E+03	4.41E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICVABT-1835527; C

Repeat 4

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 2:35:57 PM

Count Ended 8/27/2020 2:51:02 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	13,271	884.733	884.668
sd	0.008	115.200	7.680	7.680
Beta	0.327	5,119	341.267	340.940
sd	0.018	71.547	4.770	4.770

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICVABT-1835527; B

Repeat 5

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:06:19 PM

Count Ended 8/27/2020 3:21:24 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	8,196	546.400	546.335
sd	0.008	90.532	6.035	6.035
Beta	0.327	3,092	206.133	205.806
sd	0.018	55.606	3.707	3.707

Alpha/Beta Count Results

Sample Activity Report

Orange 0-3 - C

Addr: 2

Sample ID ICVABT-1835527; A

Repeat 6

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/27/2020 3:34:02 PM

Count Ended 8/27/2020 3:49:05 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.065	9,640	642.667	642.602
sd	0.008	98.184	6.546	6.546
Beta	0.327	3,607	240.467	240.140
sd	0.018	60.058	4.004	4.004

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013						
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery	Beta Activity	2009.34 pCi
12	97.79%	99.78%	99.83%	99.14%		

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICV-51512;Beta 1 **Repeat** 13

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/24/2013 9:08:10 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/24/2013 9:13:14 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	1	0.200	0.136
sd	0.000			0.008	1.000	0.200	0.200
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	9,373	1,874.600	1,874.178
sd	0.000			0.021	96.814	19.363	19.363

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICV-51512;Beta 3

Repeat 15

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:22:58 PM

Count Ended 1/24/2013 9:28:00 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	2	0.400	0.336
sd	0.000			0.008	1.414	0.283	0.283
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	8,600	1,720.000	1,719.578
sd	0.000			0.021	92.736	18.547	18.547

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICV-51512;Beta 2

Repeat 16

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/24/2013 9:34:15 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/24/2013 9:39:19 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.064	3	0.600	0.536
sd	0.000			0.008	1.732	0.346	0.347
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	9,016	1,803.200	1,802.778
sd	0.000			0.021	94.953	18.991	18.991

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	1.000E+000mL		0.0314 g	Orange12	8/30/20 15:37		15.00	1000.00	1.00	1.00		
	Gross Alpha	10261	89	0.00	6.841E+002	8.900E-002	0.1532	**2.012E+003**pCi/mL	1.164E+002	1.986E+001	1.339E+000	3.754E-001	116.3651
ICVABT-1835527; B	160-36042-A-1-BH	1.000E+000mL		0.0588 g	Orange12	8/30/20 15:16		15.00	1000.00	1.00	1.00		
	Gross Alpha	8762	89	0.00	5.841E+002	8.900E-002	0.1223	**2.150E+003**pCi/mL	1.247E+002	2.298E+001	1.676E+000	4.700E-001	124.7099
ICVABT-1835527; C	160-36042-A-1-BI	1.000E+000mL		0.0961 g	Orange12	8/28/20 7:50		15.00	1000.00	1.00	1.00		
	Gross Alpha	13590	89	0.00	9.060E+002	8.900E-002	0.0935	**4.366E+003**pCi/mL	2.517E+002	3.746E+001	2.195E+000	6.153E-001	251.6842

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
12	100.97%	107.89%	109.55%	106.14%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
12	2.01E+03	2.15E+03	4.37E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICVABT-1835527; C

Repeat 11

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/28/2020 7:50:36 AM

Count Ended 8/28/2020 8:05:43 AM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	13,590	906.000	905.911
sd	0.009	116.576	7.772	7.772
Beta	0.444	5,499	366.600	366.156
sd	0.021	74.155	4.944	4.944

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICVABT-1835527; B

Repeat 12

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 3:16:59 PM

Count Ended 8/30/2020 3:32:04 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	8,762	584.133	584.044
sd	0.009	93.606	6.240	6.240
Beta	0.444	3,425	228.333	227.889
sd	0.021	58.523	3.902	3.902

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - A

Addr: 12

Sample ID ICVABT-1835527; A

Repeat 13

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 3:37:40 PM

Count Ended 8/30/2020 3:52:43 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	10,261	684.067	683.978
sd	0.009	101.297	6.753	6.753
Beta	0.444	3,916	261.067	260.623
sd	0.021	62.578	4.172	4.172

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
14	96.45%	99.24%	97.99%	97.89%

Beta Activity 2009.34 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICV-51512;Beta 3

Repeat 13

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:08:20 PM

Count Ended 1/24/2013 9:13:22 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	12	2.400	2.278
sd	0.000			0.011	3.464	0.693	0.693
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	8,386	1,677.200	1,676.792
sd	0.000			0.020	91.575	18.315	18.315

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICV-51512;Beta 2

Repeat 14

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:14:33 PM

Count Ended 1/24/2013 9:19:35 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	15	3.000	2.878
sd	0.000			0.011	3.873	0.775	0.775
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	8,905	1,781.000	1,780.592
sd	0.000			0.020	94.366	18.873	18.873

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICV-51512;Beta 1 **Repeat** 15

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:23:06 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 9:28:09 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.122	15	3.000	2.878
sd	0.000			0.011	3.873	0.775	0.775
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.408	9,156	1,831.200	1,830.792
sd	0.000			0.020	95.687	19.137	19.137

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	1.000E+000mL		0.0314 g	Orange14	8/30/20 16:29		15.00	1000.00	1.00	1.00		
	Gross Alpha	10367	104	0.00	6.911E+002	1.040E-001	0.1553	**2.004E+003**pCi/mL	1.159E+002	1.968E+001	1.380E+000	4.002E-001	115.9046
ICVABT-1835527; B	160-36042-A-1-BH	1.000E+000mL		0.0588 g	Orange14	8/30/20 16:07		15.00	1000.00	1.00	1.00		
	Gross Alpha	8979	104	0.00	5.986E+002	1.040E-001	0.1251	**2.154E+003**pCi/mL	1.249E+002	2.274E+001	1.713E+000	4.968E-001	124.8928
ICVABT-1835527; C	160-36042-A-1-BI	1.000E+000mL		0.0961 g	Orange14	8/30/20 15:37		15.00	1000.00	1.00	1.00		
	Gross Alpha	14364	104	0.00	9.576E+002	1.040E-001	0.0957	**4.506E+003**pCi/mL	2.596E+002	3.760E+001	2.240E+000	6.495E-001	259.5950

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
14	100.57%	108.09%	113.06%	107.24%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
14	2.00E+03	2.15E+03	4.51E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICVABT-1835527; C

Repeat 13

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 3:37:55 PM

Count Ended 8/30/2020 3:52:59 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	14,364	957.600	957.496
sd	0.010	119.850	7.990	7.990
Beta	0.387	4,973	331.533	331.146
sd	0.020	70.520	4.701	4.701

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICVABT-1835527; B

Repeat 14

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:07:37 PM

Count Ended 8/30/2020 4:22:42 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	8,979	598.600	598.496
sd	0.010	94.758	6.317	6.317
Beta	0.387	3,001	200.067	199.680
sd	0.020	54.781	3.652	3.652

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - C

Addr: 14

Sample ID ICVABT-1835527; A

Repeat 15

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:29:09 PM

Count Ended 8/30/2020 4:44:16 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.104	10,367	691.133	691.029
sd	0.010	101.818	6.788	6.788
Beta	0.387	3,402	226.800	226.413
sd	0.020	58.327	3.888	3.888

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
15	99.49%	99.39%	99.49%	99.45%

Beta Activity 2009.34 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICV-51512;Beta 3 **Repeat** 14

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:14:38 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 9:19:40 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	9	1.800	1.698
sd	0.000			0.010	3.000	0.600	0.600
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	8,500	1,700.000	1,699.598
sd	0.000			0.020	92.195	18.439	18.439

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICV-51512;Beta 2

Repeat 15

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:23:10 PM

Count Ended 1/24/2013 9:28:13 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	4	0.800	0.698
sd	0.000			0.010	2.000	0.400	0.400
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	8,892	1,778.400	1,777.998
sd	0.000			0.020	94.297	18.859	18.859

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICV-51512;Beta 1 **Repeat** 16

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 9:34:32 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 9:39:35 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.102	6	1.200	1.098
sd	0.000			0.010	2.449	0.490	0.490
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.402	9,415	1,883.000	1,882.598
sd	0.000			0.020	97.031	19.406	19.406

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	1.000E+000mL		0.0314 g	Orange15	8/30/20 17:09		15.00	1000.00	1.00	1.00		
	Gross Alpha	10068	122	0.00	6.712E+002	1.220E-001	0.1508	**2.005E+003**pCi/mL	1.160E+002	1.998E+001	1.490E+000	4.465E-001	115.9992
ICVABT-1835527; B	160-36042-A-1-BH	1.000E+000mL		0.0588 g	Orange15	8/30/20 16:29		15.00	1000.00	1.00	1.00		
	Gross Alpha	8588	122	0.00	5.725E+002	1.220E-001	0.1206	**2.138E+003**pCi/mL	1.240E+002	2.307E+001	1.863E+000	5.582E-001	124.0265
ICVABT-1835527; C	160-36042-A-1-BI	1.000E+000mL		0.0961 g	Orange15	8/30/20 16:07		15.00	1000.00	1.00	1.00		
	Gross Alpha	13815	122	0.00	9.210E+002	1.220E-001	0.0925	**4.486E+003**pCi/mL	2.585E+002	3.817E+001	2.431E+000	7.281E-001	258.5413

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
15	100.62%	107.29%	112.56%	106.82%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
15	2.01E+03	2.14E+03	4.49E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICVABT-1835527; C

Repeat 14

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:07:45 PM

Count Ended 8/30/2020 4:22:51 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	13,815	921.000	920.878
sd	0.011	117.537	7.836	7.836
Beta	0.398	5,427	361.800	361.402
sd	0.020	73.668	4.911	4.911

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICVABT-1835527; B

Repeat 15

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 4:29:16 PM

Count Ended 8/30/2020 4:44:24 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	8,588	572.533	572.411
sd	0.011	92.671	6.178	6.178
Beta	0.398	3,074	204.933	204.535
sd	0.020	55.444	3.696	3.696

Alpha/Beta Count Results

Sample Activity Report

Orange 12-15 - D

Addr: 15

Sample ID ICVABT-1835527; A

Repeat 16

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 5:09:24 PM

Count Ended 8/30/2020 5:24:30 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.122	10,068	671.200	671.078
sd	0.011	100.339	6.689	6.689
Beta	0.398	3,595	239.667	239.269
sd	0.020	59.958	3.997	3.997

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
20	100.68%	99.39%	100.88%	100.31%

Beta Activity 2009.34 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICV-51512;Beta 1 **Repeat** 21

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 10:42:44 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 10:47:48 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	8	1.600	1.533
sd	0.000			0.008	2.828	0.566	0.566
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	9,601	1,920.200	1,919.931
sd	0.000			0.016	97.985	19.597	19.597

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICV-51512;Beta 3 **Repeat** 23

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 11:01:17 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 11:06:20 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	6	1.200	1.133
sd	0.000			0.008	2.449	0.490	0.490
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	8,653	1,730.600	1,730.331
sd	0.000			0.016	93.022	18.604	18.604

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICV-51512;Beta 2 **Repeat** 24

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 11:07:27 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 11:12:29 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.067	6	1.200	1.133
sd	0.000			0.008	2.449	0.490	0.490
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.269	8,925	1,785.000	1,784.731
sd	0.000			0.016	94.472	18.894	18.894

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	1.000E+000mL		0.0314 g	Orange20	8/30/20 19:33		15.00	1000.00	1.00	1.00		
	Gross Alpha	10160	196	0.00	6.773E+002	1.960E-001	0.1523	**2.003E+003**pCi/mL	1.159E+002	1.987E+001	1.712E+000	5.603E-001	115.8637
ICVABT-1835527; B	160-36042-A-1-BH	1.000E+000mL		0.0588 g	Orange20	8/30/20 19:01		15.00	1000.00	1.00	1.00		
	Gross Alpha	8826	196	0.00	5.884E+002	1.960E-001	0.1224	**2.164E+003**pCi/mL	1.255E+002	2.304E+001	2.130E+000	6.970E-001	125.4913
ICVABT-1835527; C	160-36042-A-1-BI	1.000E+000mL		0.0961 g	Orange20	8/30/20 18:38		15.00	1000.00	1.00	1.00		
	Gross Alpha	13981	196	0.00	9.321E+002	1.960E-001	0.0950	**4.418E+003**pCi/mL	2.546E+002	3.737E+001	2.745E+000	8.982E-001	254.6022

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
20	100.52%	108.60%	110.85%	106.66%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
20	2.00E+03	2.16E+03	4.42E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICVABT-1835527; C

Repeat 19

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 6:38:55 PM

Count Ended 8/30/2020 6:54:00 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	13,981	932.067	931.871
sd	0.014	118.241	7.883	7.883
Beta	0.377	5,776	385.067	384.690
sd	0.019	76.000	5.067	5.067

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICVABT-1835527; B

Repeat 20

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 7:01:43 PM

Count Ended 8/30/2020 7:16:51 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	8,826	588.400	588.204
sd	0.014	93.947	6.263	6.263
Beta	0.377	3,449	229.933	229.556
sd	0.019	58.728	3.915	3.915

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - A

Addr: 20

Sample ID ICVABT-1835527; A

Repeat 21

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 7:33:19 PM

Count Ended 8/30/2020 7:48:28 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.196	10,160	677.333	677.137
sd	0.014	100.797	6.720	6.720
Beta	0.377	3,858	257.200	256.823
sd	0.019	62.113	4.141	4.141

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013						
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery	Beta Activity	2009.34 pCi
21	98.14%	99.54%	101.13%	99.60%		

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICV-51512;Beta 2

Repeat 21

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 10:42:49 PM

Count Ended 1/24/2013 10:47:52 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	2	0.400	0.344
sd	0.000			0.007	1.414	0.283	0.283
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	9,010	1,802.000	1,801.747
sd	0.000			0.016	94.921	18.984	18.984

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICV-51512;Beta 1 **Repeat** 22

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 1/24/2013 10:50:49 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 1/24/2013 10:55:51 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	3	0.600	0.544
sd	0.000			0.007	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	9,432	1,886.400	1,886.147
sd	0.000			0.016	97.118	19.424	19.424

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICV-51512;Beta 3 **Repeat** 24

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 11:07:32 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 11:12:34 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.056	5	1.000	0.944
sd	0.000			0.007	2.236	0.447	0.447
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.253	8,735	1,747.000	1,746.747
sd	0.000			0.016	93.461	18.692	18.692

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	1.000E+000mL		0.0314	g	Orange21	8/30/20	20:03	15.00	1000.00	1.00	1.00		
	Gross Alpha	10172	172	0.00		6.781E+002	1.720E-001	0.1546	**1.976E+003**pCi/mL	1.143E+002	1.960E+001	1.617E+000	5.172E-001	114.3112
ICVABT-1835527; B	160-36042-A-1-BH	1.000E+000mL		0.0588	g	Orange21	8/30/20	19:33	15.00	1000.00	1.00	1.00		
	Gross Alpha	8805	172	0.00		5.870E+002	1.720E-001	0.1243	**2.127E+003**pCi/mL	1.233E+002	2.267E+001	2.011E+000	6.432E-001	123.3384
ICVABT-1835527; C	160-36042-A-1-BI	1.000E+000mL		0.0961	g	Orange21	8/30/20	19:01	15.00	1000.00	1.00	1.00		
	Gross Alpha	13954	172	0.00		9.303E+002	1.720E-001	0.0958	**4.375E+003**pCi/mL	2.521E+002	3.704E+001	2.610E+000	8.348E-001	252.1119

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
21	99.16%	106.74%	109.78%	105.23%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
21	1.98E+03	2.13E+03	4.38E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICVABT-1835527; C

Repeat 20

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 7:01:51 PM

Count Ended 8/30/2020 7:16:59 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	13,954	930.267	930.095
sd	0.013	118.127	7.875	7.875
Beta	0.341	5,815	387.667	387.326
sd	0.018	76.256	5.084	5.084

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICVABT-1835527; B

Repeat 21

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 7:33:26 PM

Count Ended 8/30/2020 7:48:29 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	8,805	587.000	586.828
sd	0.013	93.835	6.256	6.256
Beta	0.341	3,383	225.533	225.192
sd	0.018	58.164	3.878	3.878

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - B

Addr: 21

Sample ID ICVABT-1835527; A

Repeat 22

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 8:03:30 PM

Count Ended 8/30/2020 8:18:36 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.172	10,172	678.133	677.961
sd	0.013	100.856	6.724	6.724
Beta	0.341	3,828	255.200	254.859
sd	0.018	61.871	4.125	4.125

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Orange Beta ICV 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
23	98.69%	98.64%	101.53%	99.62%

Beta Activity 2009.34 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512 (Rad12-0043)
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	1/24/2013		(or date at which you wish to determine activity)
Elapsed Time:	56.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.996278064		
Corrected Activity:	2230.367701	dpm	
Decay Activity (Sr/Y-90)	4460.735402	dpm	2009.34 pCi

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICV-51512;Beta 3 **Repeat** 22

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 10:51:11 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 10:56:14 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	3	0.600	0.554
sd	0.000			0.007	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	8,756	1,751.200	1,750.870
sd	0.000			0.018	93.574	18.715	18.715

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICV-51512;Beta 2

Repeat 23

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 11:01:28 PM

Count Ended 1/24/2013 11:06:30 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	5	1.000	0.954
sd	0.000			0.007	2.236	0.447	0.447
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	8,918	1,783.600	1,783.270
sd	0.000			0.018	94.435	18.887	18.887

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICV-51512;Beta 1 **Repeat** 24

Carrier No. 0

Batch ID m122640

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 1/24/2013 11:07:36 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 1/24/2013 11:12:38 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	3	0.600	0.554
sd	0.000			0.007	1.732	0.346	0.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.330	9,421	1,884.200	1,883.870
sd	0.000			0.018	97.062	19.412	19.412

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

eurofins | Environment Testing TestAmerica

Analysis Report for Gross Alpha/Beta

Batch: 451383 **Operator:**

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma		
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC	
ICVABT-1835527; A	160-36042-A-1-BG	1.000E+000mL		0.0314	g	Orange23	8/30/20	21:08	15.00	1000.00	1.00	1.00		
	Gross Alpha	9493	91	0.00		6.329E+002	9.100E-002	0.1436	**1.985E+003**pCi/mL	1.150E+002	2.038E+001	1.438E+000	4.050E-001	114.9929
ICVABT-1835527; B	160-36042-A-1-BH	1.000E+000mL		0.0588	g	Orange23	8/30/20	20:50	15.00	1000.00	1.00	1.00		
	Gross Alpha	8185	91	0.00		5.457E+002	9.100E-002	0.1135	**2.165E+003**pCi/mL	1.257E+002	2.393E+001	1.818E+000	5.122E-001	125.7053
ICVABT-1835527; C	160-36042-A-1-BI	1.000E+000mL		0.0961	g	Orange23	8/30/20	20:03	15.00	1000.00	1.00	1.00		
	Gross Alpha	12954	91	0.00		8.636E+002	9.100E-002	0.0857	**4.539E+003**pCi/mL	2.618E+002	3.989E+001	2.409E+000	6.786E-001	261.7984

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

ICV is for Gross Alpha

Orange Alpha ICV 2020				
				Mean
	Low Mass	Medium Mass	High Mass	Recovery
Detector	Recovery	Recovery	Recovery	
23	99.61%	108.65%	113.89%	107.38%

Standard ID

Thorium-230

Th-230_00056 #1835527

Cert # 95358 Ref. date 01/11/2017

Activity 2x 1992.7 pCi/mL

Activity 4x 3985.5 pCi/mL

Prep Batch: 451383

	Low Mass	Medium Mass	High Mass
	0.314g	0.0588g	0.0961
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
23	1.99E+03	2.17E+03	4.54E+03

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICVABT-1835527; C

Repeat 22

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 8:03:42 PM

Count Ended 8/30/2020 8:18:45 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	12,954	863.600	863.509
sd	0.010	113.816	7.588	7.588
Beta	0.392	6,485	432.333	431.941
sd	0.020	80.529	5.369	5.369

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICVABT-1835527; B

Repeat 23

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 8:50:12 PM

Count Ended 8/30/2020 9:05:18 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	8,185	545.667	545.576
sd	0.010	90.471	6.031	6.031
Beta	0.392	3,667	244.467	244.075
sd	0.020	60.556	4.037	4.037

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - D

Addr: 23

Sample ID ICVABT-1835527; A

Repeat 24

Carrier No. 0

Batch ID 451383

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/30/2020 9:08:40 PM

Count Ended 8/30/2020 9:23:45 PM

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.091	9,493	632.867	632.776
sd	0.010	97.432	6.495	6.495
Beta	0.392	4,158	277.200	276.808
sd	0.020	64.483	4.299	4.299

Ra-226 Calibration Verifications

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
5	87.48%	96.14%	88.24%	90.62%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.310E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.638E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.339E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICVRa6-1063071;Ra3

Repeat 4

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:49:00 AM

Count Ended 7/10/2019 9:54:10 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.036	25,382	5,076.400	5,076.400
sd	0.000			0.000	159.317	31.863	31.863
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.317	33,824	6,764.800	6,764.800
sd	0.000			0.000	183.913	36.783	36.783

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICVRa6-1063071;Ra2

Repeat 5

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 9:54:56 AM

Count Ended 7/10/2019 10:00:05 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.036	26,221	5,244.200	5,244.200
sd	0.000			0.000	161.929	32.386	32.386
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.317	29,869	5,973.800	5,973.800
sd	0.000			0.000	172.827	34.565	34.565

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICVRa6-1063071;Ra1 **Repeat** 6

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 10:01:05 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 10:06:14 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.036	20,716	4,143.200	4,143.200
sd	0.000			0.000	143.931	28.786	28.786
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.317	23,478	4,695.600	4,695.600
sd	0.000			0.000	153.225	30.645	30.645

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
8	88.51%	97.10%	88.82%	91.48%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.349E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.674E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.361E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICVRa6-1063071;Ra1

Repeat 1

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:06:13 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:12:07 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.039	17,471	3,494.200	3,494.200
sd	0.000			0.000	132.178	26.436	26.436
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.492	24,248	4,849.600	4,849.600
sd	0.000			0.000	155.718	31.144	31.144

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICVRa6-1063071;Ra3

Repeat 7

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:50:01 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:55:10 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.039	21,044	4,208.800	4,208.800
sd	0.000			0.000	145.066	29.013	29.013
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.492	33,622	6,724.400	6,724.400
sd	0.000			0.000	183.363	36.673	36.673

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICVRa6-1063071;Ra2

Repeat 8

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:57:06 PM

Count Ended 7/10/2019 1:02:15 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.039	21,922	4,384.400	4,384.400
sd	0.000			0.000	148.061	29.612	29.612
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.492	30,311	6,062.200	6,062.200
sd	0.000			0.000	174.101	34.820	34.820

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
9	89.43%	97.02%	89.19%	91.88%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.384E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.671E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.375E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICVRa6-1063071;Ra2 **Repeat** 1

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:06:18 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:12:10 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.034	26,498	5,299.600	5,299.600
sd	0.000			0.000	162.782	32.556	32.556
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.316	29,498	5,899.600	5,899.600
sd	0.000			0.000	171.750	34.350	34.350

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICVRa6-1063071;Ra1 **Repeat** 2

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:17:13 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:22:23 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.034	21,261	4,252.200	4,252.200
sd	0.000			0.000	145.812	29.162	29.162
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.316	23,259	4,651.800	4,651.800
sd	0.000			0.000	152.509	30.502	30.502

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICVRa6-1063071;Ra3

Repeat 8

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:57:10 PM

Count Ended 7/10/2019 1:02:21 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.034	25,630	5,126.000	5,126.000
sd	0.000			0.000	160.094	32.019	32.019
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.316	32,934	6,586.800	6,586.800
sd	0.000			0.000	181.477	36.295	36.295

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
10	88.37%	97.15%	90.28%	91.93%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.344E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.676E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.416E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICVRa6-1063071;Ra3 **Repeat** 1

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:06:23 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:12:13 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.037	26,298	5,259.600	5,259.600
sd	0.000			0.000	162.167	32.433	32.433
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.440	33,394	6,678.800	6,678.800
sd	0.000			0.000	182.740	36.548	36.548

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICVRa6-1063071;Ra2 **Repeat** 2

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:17:18 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:22:29 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.037	26,907	5,381.400	5,381.400
sd	0.000			0.000	164.034	32.807	32.807
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.440	29,574	5,914.800	5,914.800
sd	0.000			0.000	171.971	34.394	34.394

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICVRa6-1063071;Ra1 **Repeat** 3

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:23:32 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:28:41 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.037	21,318	4,263.600	4,263.600
sd	0.000			0.000	146.007	29.201	29.201
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.440	23,627	4,725.400	4,725.400
sd	0.000			0.000	153.711	30.742	30.742

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
12	87.82%	97.39%	90.59%	91.93%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.323E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.685E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.428E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICVRa6-1063071;Ra3 **Repeat** 3

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 12:23:43 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:28:53 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.035	25,530	5,106.000	5,106.000
sd	0.000			0.000	159.781	31.956	31.956
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.587	33,857	6,771.400	6,771.400
sd	0.000			0.000	184.003	36.801	36.801

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICVRa6-1063071;Ra2

Repeat 4

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 12:29:51 PM

Count Ended 7/10/2019 12:35:01 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.035	26,147	5,229.400	5,229.400
sd	0.000			0.000	161.700	32.340	32.340
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.587	30,221	6,044.200	6,044.200
sd	0.000			0.000	173.842	34.768	34.768

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICVRa6-1063071;Ra1

Repeat 5

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:35:48 PM

Count Ended 7/10/2019 12:40:56 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.035	20,589	4,117.800	4,117.800
sd	0.000			0.000	143.489	28.698	28.698
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.587	23,975	4,795.000	4,795.000
sd	0.000			0.000	154.839	30.968	30.968

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
13	89.30%	96.12%	89.64%	91.69%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.379E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.637E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.392E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICVRa6-1063071;Ra3

Repeat 4

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 12:29:56 PM

Count Ended 7/10/2019 12:35:06 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.043	25,600	5,120.000	5,120.000
sd	0.000			0.000	160.000	32.000	32.000
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.334	33,589	6,717.800	6,717.800
sd	0.000			0.000	183.273	36.655	36.655

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICVRa6-1063071;Ra2

Repeat 5

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:35:54 PM

Count Ended 7/10/2019 12:41:04 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.043	26,007	5,201.400	5,201.400
sd	0.000			0.000	161.267	32.253	32.253
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.334	29,654	5,930.800	5,930.800
sd	0.000			0.000	172.203	34.441	34.441

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICVRa6-1063071;Ra1

Repeat 6

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:41:58 PM

Count Ended 7/10/2019 12:47:07 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.043	20,967	4,193.400	4,193.400
sd	0.000			0.000	144.800	28.960	28.960
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.334	23,798	4,759.600	4,759.600
sd	0.000			0.000	154.266	30.853	30.853

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
14	87.77%	96.94%	89.72%	91.48%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.321E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.668E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.395E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICVRa6-1063071;Ra3

Repeat 5

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:35:59 PM

Count Ended 7/10/2019 12:41:09 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.049	25,505	5,101.000	5,101.000
sd	0.000			0.000	159.703	31.941	31.941
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.510	33,508	6,701.600	6,701.600
sd	0.000			0.000	183.052	36.610	36.610

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICVRa6-1063071;Ra2

Repeat 6

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:42:04 PM

Count Ended 7/10/2019 12:47:15 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.049	26,213	5,242.600	5,242.600
sd	0.000			0.000	161.904	32.381	32.381
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.510	30,081	6,016.200	6,016.200
sd	0.000			0.000	173.439	34.688	34.688

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICVRa6-1063071;Ra1 **Repeat** 7

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 12:49:51 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:55:01 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.049	20,684	4,136.800	4,136.800
sd	0.000			0.000	143.819	28.764	28.764
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.510	23,547	4,709.400	4,709.400
sd	0.000			0.000	153.450	30.690	30.690

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019

	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
16	87.82%	95.56%	89.04%	90.81%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.323E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.616E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.369E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICVRa6-1063071;Ra1

Repeat 1

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:02:38 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:07:46 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.032	20,571	4,114.200	4,114.200
sd	0.000			0.000	143.426	28.685	28.685
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.318	23,581	4,716.200	4,716.200
sd	0.000			0.000	153.561	30.712	30.712

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICVRa6-1063071;Ra3

Repeat 7

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:52:02 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:57:12 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.032	25,369	5,073.800	5,073.800
sd	0.000			0.000	159.276	31.855	31.855
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.318	33,634	6,726.800	6,726.800
sd	0.000			0.000	183.396	36.679	36.679

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICVRa6-1063071;Ra2

Repeat 8

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:58:19 AM

Count Ended 7/10/2019 12:03:29 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.032	25,797	5,159.400	5,159.400
sd	0.000			0.000	160.614	32.123	32.123
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.318	30,234	6,046.800	6,046.800
sd	0.000			0.000	173.879	34.776	34.776

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

ICV is for Gross Alpha

Red Ra226 ICV 2019				
	Low Mass	Medium Mass	High Mass	Mean
Detector	Recovery	Recovery	Recovery	Recovery
17	87.42%	95.62%	89.41%	90.81%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity: 3.7839E+06 pCi/mL

Prep Batch: 291970
Date counted: 7/10/19

Ra:1	Activity	Units
Low Mass (0.0132g)	3.308E+06	pCi/mL

Ra:2	Activity	Units
Medium Mass (0.0271g)	3.618E+06	pCi/mL

Ra:3	Activity	Units
High Mass (0.0498g)	3.383E+06	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICVRa6-106307;1Ra2 **Repeat** 1

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 11:02:45 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 11:07:56 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.029	26,027	5,205.400	5,205.400
sd	0.000			0.000	161.329	32.266	32.266
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.334	30,320	6,064.000	6,064.000
sd	0.000			0.000	174.126	34.825	34.825

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICVRa6-1063071;Ra1

Repeat 2

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/10/2019 11:11:59 AM

Count Ended 7/10/2019 11:17:08 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.029	20,767	4,153.400	4,153.400
sd	0.000			0.000	144.108	28.822	28.822
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.334	23,921	4,784.200	4,784.200
sd	0.000			0.000	154.664	30.933	30.933

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICVRa6-1063071;Ra3 **Repeat** 8

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/10/2019 11:58:24 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 7/10/2019 12:03:34 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.029	25,558	5,111.600	5,111.600
sd	0.000			0.000	159.869	31.974	31.974
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.334	33,935	6,787.000	6,787.000
sd	0.000			0.000	184.215	36.843	36.843

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Monthly Backgrounds

Alpha/Beta Count Results

Source Count Report

Blue 0-3 - D

Addr: 3

Sample ID ICB
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 1967
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 9:51:38 PM
Count Ended 7/22/2023 2:58:34 PM
Sample Count Time 1,000.00 ***mins***

Calibration Date 3/21/2017 12:09:15 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	164	0.164	0.000	0.164
sd	12.806	0.013	0.000	0.013
Beta	457	0.457	0.000	0.457
sd	21.378	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Blue 16-19 - D

Addr: 19

Sample ID ICB
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 1983

Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***

Count Began 7/21/2023 9:52:13 PM

Count Ended 7/22/2023 3:03:17 PM

Calibration Date 3/21/2017 12:09:15 PM

Backgrounds From

Half Life 0.00 ***Years***

Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	255	0.255	0.000	0.255
sd	15.969	0.016	0.000	0.016
Beta	575	0.575	0.000	0.575
sd	23.979	0.024	0.000	0.024

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 0-3 - A

Addr: 0

Sample ID ICB
ICB;Monthly Background Check

Repeat 3399

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/21/2023 8:21:52 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/22/2023 1:14:36 PM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	82	0.082	0.000	0.082
sd	9.055	0.009	0.000	0.009
Beta	402	0.402	0.000	0.402
sd	20.050	0.020	0.000	0.020

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 0-3 - C

Addr: 2

Sample ID ICB
ICB;Monthly Background Check

Repeat 3401

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/21/2023 8:21:57 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/22/2023 1:14:40 PM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	85	0.085	0.000	0.085
sd	9.220	0.009	0.000	0.009
Beta	273	0.273	0.000	0.273
sd	16.523	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 12-15 - A

Addr: 12

Sample ID ICB
ICB;Monthly Background Check

Batch ID ICB;Monthly Background

Repeat 3410
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 8:22:22 PM
Count Ended 7/22/2023 1:16:43 PM
Sample Count Time 1,000.00 ***mins***

Calibration Date 8/4/2012 9:20:16 AM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	134	0.134	0.000	0.134
sd	11.576	0.012	0.000	0.012
Beta	312	0.312	0.000	0.312
sd	17.664	0.018	0.000	0.018

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 12-15 - C

Addr: 14

Sample ID ICB
ICB;Monthly Background Check

Batch ID ICB;Monthly Background

Repeat 3412
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 8:22:25 PM
Count Ended 7/22/2023 1:16:56 PM

Calibration Date 8/4/2012 9:20:16 AM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	121	0.121	0.000	0.121
sd	11.000	0.011	0.000	0.011
Beta	307	0.307	0.000	0.307
sd	17.521	0.018	0.000	0.018

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 12-15 - D

Addr: 15

Sample ID ICB
ICB;Monthly Background Check

Repeat 3413

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/21/2023 8:22:27 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/22/2023 1:17:09 PM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	88	0.088	0.000	0.088
sd	9.381	0.009	0.000	0.009
Beta	412	0.412	0.000	0.412
sd	20.298	0.020	0.000	0.020

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 20-23 - A

Addr: 20

Sample ID ICB
ICB;Monthly Background Check

Repeat 3414
Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 8:22:39 PM
Count Ended 7/22/2023 1:17:19 PM

Calibration Date 8/4/2012 9:20:16 AM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	98	0.098	0.000	0.098
sd	9.899	0.010	0.000	0.010
Beta	285	0.285	0.000	0.285
sd	16.882	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 20-23 - B

Addr: 21

Sample ID ICB
ICB;Monthly Background Check

Repeat 3415

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/21/2023 8:22:40 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/22/2023 1:17:37 PM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	84	0.084	0.000	0.084
sd	9.165	0.009	0.000	0.009
Beta	275	0.275	0.000	0.275
sd	16.583	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 20-23 - D

Addr: 23

Sample ID ICB
ICB;Monthly Background Check

Repeat 3417

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/21/2023 8:22:44 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/22/2023 1:17:52 PM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	101	0.101	0.000	0.101
sd	10.050	0.010	0.000	0.010
Beta	305	0.305	0.000	0.305
sd	17.464	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 1 (4-7) - B

Addr: 5

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 399
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:11:21 PM
Count Ended 7/22/2023 3:52:21 PM

Calibration Date 6/11/2019 3:16:53 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	144	0.144	0.000	0.144
sd	12.000	0.012	0.000	0.012
Beta	341	0.341	0.000	0.341
sd	18.466	0.018	0.000	0.018

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 2 (8-11) - A

Addr: 8

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 399
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:20:44 PM
Count Ended 7/22/2023 4:01:43 PM

Calibration Date 6/11/2019 3:22:31 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	57	0.057	0.000	0.057
sd	7.550	0.008	0.000	0.008
Beta	280	0.280	0.000	0.280
sd	16.733	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 2 (8-11) - B

Addr: 9

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 400
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:20:47 PM
Count Ended 7/22/2023 4:01:46 PM
Sample Count Time 1,000.00 ***mins***

Calibration Date 6/11/2019 3:22:31 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	86	0.086	0.000	0.086
sd	9.274	0.009	0.000	0.009
Beta	306	0.306	0.000	0.306
sd	17.493	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 2 (8-11) - C

Addr: 10

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 401
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:20:49 PM
Count Ended 7/22/2023 4:01:47 PM

Calibration Date 6/11/2019 3:22:31 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	81	0.081	0.000	0.081
sd	9.000	0.009	0.000	0.009
Beta	393	0.393	0.000	0.393
sd	19.824	0.020	0.000	0.020

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 2 (12-15) - A

Addr: 12

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 402
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:20:53 PM
Count Ended 7/22/2023 4:01:48 PM

Calibration Date 6/11/2019 3:22:31 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	83	0.083	0.000	0.083
sd	9.110	0.009	0.000	0.009
Beta	626	0.626	0.000	0.626
sd	25.020	0.025	0.000	0.025

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 2 (12-15) - B

Addr: 13

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 404
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***

Count Began 7/21/2023 11:20:55 PM
Count Ended 7/22/2023 4:01:53 PM

Calibration Date 6/11/2019 3:22:31 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	97	0.097	0.000	0.097
sd	9.849	0.010	0.000	0.010
Beta	359	0.359	0.000	0.359
sd	18.947	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 2 (12-15) - C

Addr: 14

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 405
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:20:57 PM
Count Ended 7/22/2023 4:01:53 PM

Calibration Date 6/11/2019 3:22:31 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	81	0.081	0.000	0.081
sd	9.000	0.009	0.000	0.009
Beta	380	0.380	0.000	0.380
sd	19.494	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 3 (16-19) - A

Addr: 16

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 376
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:29:46 PM
Count Ended 7/22/2023 4:20:16 PM

Calibration Date 6/11/2019 3:25:04 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	76	0.076	0.000	0.076
sd	8.718	0.009	0.000	0.009
Beta	345	0.345	0.000	0.345
sd	18.574	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Red 3 (16-19) - B

Addr: 17

Sample ID ICB;Monthly Background
ICB;Monthly Background

Batch ID ICB;Monthly Background

Repeat 377
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/21/2023 11:29:49 PM
Count Ended 7/22/2023 4:20:18 PM

Calibration Date 6/11/2019 3:25:04 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	107	0.107	0.000	0.107
sd	10.344	0.010	0.000	0.010
Beta	423	0.423	0.000	0.423
sd	20.567	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Run Logs

Gas Flow Proportional Counter Run Log

Detector: Blue3 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/19/17 14:32	5	ICABT 160-568325/12		568325			PS
03/19/17 14:40	5	ICABT 160-568325/13		568325			PS
03/19/17 23:09	5	ICABT 160-568325/14		568325			PS
03/19/17 23:27	5	ICABT 160-568325/15		568325			PS
03/19/17 23:56	5	ICABT 160-568325/16		568325			PS
03/20/17 00:22	5	ICABT 160-568325/17		568325			PS
03/20/17 00:38	5	ICABT 160-568325/18		568325			PS
03/20/17 00:59	5	ICABT 160-568325/19		568325			PS
03/31/17 12:18	5	ICVABT 160-568325/20		568325			PS
03/31/17 12:27	5	ICVABT 160-568325/21		568325			PS
03/31/17 12:43	5	ICVABT 160-568325/22		568325			PS
06/01/22 14:10	45	ICABT 160-568325/1		568325			PS
06/01/22 15:00	45	ICABT 160-568325/2		568325			PS
06/01/22 15:48	45	ICABT 160-568325/3		568325			PS
06/01/22 16:37	45	ICABT 160-568325/4		568325			PS
06/01/22 17:27	45	ICABT 160-568325/5		568325			PS
06/01/22 18:17	45	ICABT 160-568325/6		568325			PS
06/01/22 19:05	45	ICABT 160-568325/7		568325			PS
06/01/22 19:54	45	ICABT 160-568325/8		568325			PS
06/02/22 13:06	20	ICVABT 160-568325/9		568325			PS
06/02/22 13:28	20	ICVABT 160-568325/10		568325			PS
06/02/22 13:54	20	ICVABT 160-568325/11		568325			PS
07/21/23 21:51	1000	ICB 160-621401/4		621401			SWS
08/14/23 09:42	0	CCB 160-624093/4		624093			SWS
08/14/23 13:13	2	CCVA 160-624093/27		624093			SWS
08/14/23 13:30	2	CCVB 160-624093/48		624093			SWS
08/14/23 14:28	100	500-237220-7	2S/3S Duplicate	624093	622159	904.0	SWS
08/14/23 19:46	200	ZZZZZ		624093			

Detector: Blue19 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/17 14:53	5	ICABT 160-568309/12		568309			PS
05/15/17 22:01	5	ICABT 160-568309/13		568309			PS
05/16/17 12:58	5	ICABT 160-568309/14		568309			PS
05/16/17 13:17	5	ICABT 160-568309/15		568309			PS
05/16/17 14:27	5	ICABT 160-568309/16		568309			PS
05/16/17 15:01	5	ICABT 160-568309/17		568309			PS
05/16/17 15:09	5	ICABT 160-568309/18		568309			PS
05/19/17 11:21	5	ICABT 160-568309/19		568309			PS
05/19/17 11:33	5	ICABT 160-568309/20		568309			PS
05/27/17 14:36	5	ICVABT 160-568309/21		568309			PS
05/27/17 14:43	5	ICVABT 160-568309/22		568309			PS
05/27/17 14:51	5	ICVABT 160-568309/23		568309			PS
06/02/22 08:56	45	ICABT 160-568309/1		568309			PS
06/02/22 09:46	45	ICABT 160-568309/2		568309			PS
06/02/22 10:35	45	ICABT 160-568309/3		568309			PS
06/02/22 11:24	45	ICABT 160-568309/4		568309			PS
06/02/22 12:14	45	ICABT 160-568309/5		568309			PS
06/02/22 13:02	45	ICABT 160-568309/6		568309			PS
06/02/22 13:52	45	ICABT 160-568309/7		568309			PS
06/02/22 14:41	45	ICABT 160-568309/8		568309			PS
06/02/22 19:20	20	ICVABT 160-568309/9		568309			PS

Gas Flow Proportional Counter Run Log

Detector: Blue19 (Continued) — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
06/02/22 19:42	20	ICVABT 160-568309/10		568309			PS
06/02/22 20:04	20	ICVABT 160-568309/11		568309			PS
07/21/23 21:52	1000	ICB 160-621401/20		621401			SWS
08/14/23 09:43	0	CCB 160-624093/19		624093			SWS
08/14/23 13:23	2	CCVA 160-624093/41		624093			SWS
08/14/23 13:40	2	CCVB 160-624093/62		624093			SWS
08/14/23 14:28	100	500-237220-7 DU	2S/3S Duplicate DU	624093	622159	904.0	SWS
08/14/23 19:40	400	ZZZZZ		624093			

Detector: Orange0

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 14:44	5	ICABT 160-480956/13		480956			JLW
01/23/13 14:53	5	ICABT 160-480956/14		480956			JLW
01/23/13 15:01	5	ICABT 160-480956/15		480956			JLW
01/23/13 15:09	5	ICABT 160-480956/16		480956			JLW
01/23/13 15:19	5	ICABT 160-480956/17		480956			JLW
01/23/13 15:26	5	ICABT 160-480956/18		480956			JLW
01/23/13 15:37	5	ICABT 160-480956/19		480956			JLW
01/23/13 15:46	5	ICABT 160-480956/20		480956			JLW
01/24/13 19:06	5	ICVABT 160-480956/21		480956			JLW
01/24/13 19:16	5	ICVABT 160-480956/22		480956			JLW
01/24/13 19:24	5	ICVABT 160-480956/23		480956			JLW
08/26/20 08:22	25	ICABT 160-480956/1		480956			JLW
08/26/20 09:58	25	ICABT 160-480956/2		480956			JLW
08/26/20 10:26	25	ICABT 160-480956/3		480956			JLW
08/26/20 10:55	25	ICABT 160-480956/4		480956			JLW
08/26/20 11:23	25	ZZZZZ		480956			
08/26/20 12:03	25	ICABT 160-480956/6		480956			JLW
08/26/20 13:05	25	ICABT 160-480956/7		480956			JLW
08/26/20 13:32	25	ICABT 160-480956/8		480956			JLW
08/27/20 12:57	25	ICABT 160-480956/9		480956			JLW
08/27/20 14:35	15	ICVABT 160-480956/10		480956			JLW
08/27/20 15:06	15	ICVABT 160-480956/11		480956			JLW
08/27/20 15:33	15	ICVABT 160-480956/12		480956			JLW
07/21/23 20:21	1000	ICB 160-621402/1		621402			SWS
08/14/23 09:47	0	CCB 160-624094/1		624094			FLC
08/14/23 13:41	2	CCVA 160-624094/19		624094			FLC
08/14/23 13:46	2	CCVB 160-624094/26		624094			FLC
08/14/23 14:25	100	MB 160-622159/1-A		624094	622159	904.0	FLC

Detector: Orange2

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 14:45	5	ICABT 160-480958/13		480958			JLW
01/23/13 14:53	5	ICABT 160-480958/14		480958			JLW
01/23/13 15:00	5	ICABT 160-480958/15		480958			JLW
01/23/13 15:09	5	ICABT 160-480958/16		480958			JLW
01/23/13 15:19	5	ICABT 160-480958/17		480958			JLW
01/23/13 15:27	5	ICABT 160-480958/18		480958			JLW
01/23/13 15:37	5	ICABT 160-480958/19		480958			JLW
01/23/13 15:46	5	ICABT 160-480958/20		480958			JLW

Gas Flow Proportional Counter Run Log

Detector: Orange2 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/24/13 19:06	5	ICVABT 160-480958/21		480958			JLW
01/24/13 19:16	5	ICVABT 160-480958/22		480958			JLW
01/24/13 19:24	5	ICVABT 160-480958/23		480958			JLW
08/26/20 09:06	25	ICABT 160-480958/1		480958			JLW
08/26/20 09:58	25	ICABT 160-480958/2		480958			JLW
08/26/20 10:26	25	ICABT 160-480958/3		480958			JLW
08/26/20 10:56	25	ICABT 160-480958/4		480958			JLW
08/26/20 11:24	25	ICABT 160-480958/5		480958			JLW
08/26/20 12:03	25	ICABT 160-480958/6		480958			JLW
08/26/20 13:05	25	ZZZZZ		480958			
08/26/20 13:32	25	ICABT 160-480958/8		480958			JLW
08/27/20 14:04	25	ICABT 160-480958/9		480958			JLW
08/27/20 14:35	15	ICVABT 160-480958/10		480958			JLW
08/27/20 15:06	15	ICVABT 160-480958/11		480958			JLW
08/27/20 15:34	15	ICVABT 160-480958/12		480958			JLW
07/21/23 20:21	1000	ICB 160-621402/3		621402			SWS
08/14/23 09:47	0	CCB 160-624094/3		624094			FLC
08/14/23 13:41	2	CCVA 160-624094/21		624094			FLC
08/14/23 13:46	2	CCVB 160-624094/28		624094			FLC
08/14/23 14:25	100	LCS 160-622159/2-A		624094	622159	904.0	FLC

Detector: Orange12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 14:27	5	ICABT 160-481605/16		481605			PS
01/23/13 14:36	5	ICABT 160-481605/15		481605			PS
01/23/13 16:47	5	ICABT 160-481605/14		481605			PS
01/23/13 16:58	5	ICABT 160-481605/13		481605			PS
01/23/13 17:05	5	ICABT 160-481605/12		481605			PS
01/23/13 17:12	5	ICABT 160-481605/19		481605			PS
01/23/13 17:19	5	ICABT 160-481605/18		481605			PS
01/23/13 17:28	5	ICABT 160-481605/17		481605			PS
01/24/13 21:08	5	ICVABT 160-481605/20		481605			PS
01/24/13 21:22	5	ICVABT 160-481605/22		481605			PS
01/24/13 21:34	5	ICVABT 160-481605/21		481605			PS
08/27/20 15:35	25	ICABT 160-481605/1		481605			PS
08/27/20 16:53	25	ICABT 160-481605/2		481605			PS
08/27/20 17:41	25	ICABT 160-481605/3		481605			PS
08/27/20 18:17	25	ICABT 160-481605/4		481605			PS
08/27/20 18:58	25	ICABT 160-481605/5		481605			PS
08/27/20 19:35	25	ICABT 160-481605/6		481605			PS
08/27/20 20:47	25	ICABT 160-481605/7		481605			PS
08/27/20 21:33	25	ICABT 160-481605/8		481605			PS
08/28/20 07:50	15	ICVABT 160-481605/9		481605			PS
08/30/20 15:16	15	ICVABT 160-481605/10		481605			PS
08/30/20 15:37	15	ICVABT 160-481605/11		481605			PS
07/21/23 20:22	1000	ICB 160-621402/13		621402			SWS
08/14/23 09:47	0	CCB 160-624094/11		624094			FLC
08/14/23 13:47	2	CCVA 160-624094/36		624094			FLC
08/14/23 13:56	2	CCVB 160-624094/47		624094			FLC
08/14/23 14:23	100	500-237220-1	MW-05	624094	622159	904.0	FLC
08/14/23 16:21	0	ZZZZZ		624094			
08/14/23 19:58	200	ZZZZZ		624094			

Gas Flow Proportional Counter Run Log

Detector: Orange14

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 14:28	5	ICABT 160-481607/18		481607			PS
01/23/13 14:37	5	ICABT 160-481607/17		481607			PS
01/23/13 16:47	5	ICABT 160-481607/16		481607			PS
01/23/13 16:58	5	ICABT 160-481607/15		481607			PS
01/23/13 17:05	5	ICABT 160-481607/14		481607			PS
01/23/13 17:12	5	ICABT 160-481607/13		481607			PS
01/23/13 17:19	5	ICABT 160-481607/12		481607			PS
01/23/13 17:28	5	ICABT 160-481607/19		481607			PS
01/24/13 21:08	5	ICVABT 160-481607/22		481607			PS
01/24/13 21:14	5	ICVABT 160-481607/21		481607			PS
01/24/13 21:23	5	ICVABT 160-481607/20		481607			PS
08/27/20 15:35	25	ICABT 160-481607/1		481607			PS
08/27/20 16:53	25	ICABT 160-481607/2		481607			PS
08/27/20 17:41	25	ICABT 160-481607/3		481607			PS
08/27/20 18:10	25	ICABT 160-481607/4		481607			PS
08/27/20 18:58	25	ICABT 160-481607/5		481607			PS
08/27/20 19:35	25	ICABT 160-481607/6		481607			PS
08/27/20 20:47	25	ICABT 160-481607/7		481607			PS
08/27/20 21:33	25	ICABT 160-481607/8		481607			PS
08/30/20 15:37	15	ICVABT 160-481607/9		481607			PS
08/30/20 16:07	15	ICVABT 160-481607/10		481607			PS
08/30/20 16:29	15	ICVABT 160-481607/11		481607			PS
07/21/23 20:22	1000	ICB 160-621402/15		621402			SWS
08/14/23 09:47	0	CCB 160-624094/13		624094			FLC
08/14/23 13:47	2	CCVA 160-624094/38		624094			FLC
08/14/23 13:56	2	CCVB 160-624094/49		624094			FLC
08/14/23 14:23	100	500-237220-2	MW-06	624094	622159	904.0	FLC

Detector: Orange15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 14:28	5	ICABT 160-481608/19		481608			PS
01/23/13 14:37	5	ICABT 160-481608/18		481608			PS
01/23/13 16:47	5	ICABT 160-481608/17		481608			PS
01/23/13 16:58	5	ICABT 160-481608/16		481608			PS
01/23/13 17:05	5	ICABT 160-481608/15		481608			PS
01/23/13 17:12	5	ICABT 160-481608/14		481608			PS
01/23/13 17:19	5	ICABT 160-481608/13		481608			PS
01/23/13 17:27	5	ICABT 160-481608/12		481608			PS
01/24/13 21:14	5	ICVABT 160-481608/22		481608			PS
01/24/13 21:23	5	ICVABT 160-481608/21		481608			PS
01/24/13 21:34	5	ICVABT 160-481608/20		481608			PS
08/27/20 15:35	25	ICABT 160-481608/1		481608			PS
08/27/20 16:53	25	ICABT 160-481608/2		481608			PS
08/27/20 17:41	25	ICABT 160-481608/3		481608			PS
08/27/20 18:10	25	ICABT 160-481608/4		481608			PS
08/27/20 18:58	25	ICABT 160-481608/5		481608			PS
08/27/20 19:35	25	ICABT 160-481608/6		481608			PS
08/27/20 20:47	25	ICABT 160-481608/7		481608			PS
08/27/20 21:33	25	ICABT 160-481608/8		481608			PS
08/30/20 16:07	15	ICVABT 160-481608/9		481608			PS
08/30/20 16:29	15	ICVABT 160-481608/10		481608			PS
08/30/20 17:09	15	ICVABT 160-481608/11		481608			PS

Gas Flow Proportional Counter Run Log

Detector: Orange15 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/21/23 20:22	1000	ICB 160-621402/16		621402			SWS
08/14/23 09:47	0	CCB 160-624094/14		624094			FLC
08/14/23 13:48	2	CCVA 160-624094/39		624094			FLC
08/14/23 13:56	2	CCVB 160-624094/50		624094			FLC
08/14/23 14:23	100	500-237220-3	MW-09	624094	622159	904.0	FLC

Detector: Orange20

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 12:20	5	ICABT 160-481613/12		481613			PS
01/23/13 12:30	5	ICABT 160-481613/13		481613			PS
01/23/13 12:37	5	ICABT 160-481613/14		481613			PS
01/23/13 12:45	5	ICABT 160-481613/15		481613			PS
01/23/13 12:53	5	ICABT 160-481613/16		481613			PS
01/23/13 13:01	5	ICABT 160-481613/17		481613			PS
01/23/13 13:07	5	ICABT 160-481613/18		481613			PS
01/23/13 13:15	5	ICABT 160-481613/19		481613			PS
01/24/13 22:42	5	ICVABT 160-481613/20		481613			PS
01/24/13 23:01	5	ICVABT 160-481613/21		481613			PS
01/24/13 23:07	5	ICVABT 160-481613/22		481613			PS
08/27/20 22:09	25	ICABT 160-481613/1		481613			PS
08/27/20 22:38	25	ICABT 160-481613/2		481613			PS
08/28/20 07:49	25	ICABT 160-481613/3		481613			PS
08/28/20 13:20	25	ICABT 160-481613/4		481613			PS
08/28/20 15:20	25	ICABT 160-481613/5		481613			PS
08/30/20 15:14	25	ICABT 160-481613/6		481613			PS
08/30/20 16:06	25	ICABT 160-481613/7		481613			PS
08/30/20 16:32	25	ICABT 160-481613/8		481613			PS
08/30/20 18:38	15	ICVABT 160-481613/9		481613			PS
08/30/20 19:01	15	ICVABT 160-481613/10		481613			PS
08/30/20 19:33	15	ICVABT 160-481613/11		481613			PS
07/21/23 20:22	1000	ICB 160-621402/17		621402			SWS
08/14/23 09:48	0	CCB 160-624094/15		624094			FLC
08/14/23 13:55	2	CCVA 160-624094/42		624094			FLC
08/14/23 14:02	2	CCVB 160-624094/51		624094			FLC
08/14/23 14:23	100	500-237220-4	MW-10	624094	622159	904.0	FLC

Detector: Orange21

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 12:20	5	ICABT 160-481614/12		481614			PS
01/23/13 12:30	5	ICABT 160-481614/13		481614			PS
01/23/13 12:37	5	ICABT 160-481614/14		481614			PS
01/23/13 12:45	5	ICABT 160-481614/15		481614			PS
01/23/13 12:53	5	ICABT 160-481614/16		481614			PS
01/23/13 13:00	5	ICABT 160-481614/17		481614			PS
01/23/13 13:08	5	ICABT 160-481614/18		481614			PS
01/23/13 13:15	5	ICABT 160-481614/19		481614			PS
01/24/13 22:42	5	ICVABT 160-481614/20		481614			PS
01/24/13 22:50	5	ICVABT 160-481614/21		481614			PS
01/24/13 23:07	5	ICVABT 160-481614/22		481614			PS
08/27/20 22:09	25	ICABT 160-481614/1		481614			PS

Gas Flow Proportional Counter Run Log

Detector: Orange21 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/27/20 22:39	25	ICABT 160-481614/2		481614			PS
08/28/20 07:49	25	ICABT 160-481614/3		481614			PS
08/28/20 13:20	25	ICABT 160-481614/4		481614			PS
08/28/20 15:20	25	ICABT 160-481614/5		481614			PS
08/30/20 15:15	25	ICABT 160-481614/6		481614			PS
08/30/20 16:06	25	ICABT 160-481614/7		481614			PS
08/30/20 16:33	25	ICABT 160-481614/8		481614			PS
08/30/20 19:01	15	ICVABT 160-481614/9		481614			PS
08/30/20 19:33	15	ICVABT 160-481614/10		481614			PS
08/30/20 20:03	15	ICVABT 160-481614/11		481614			PS
07/21/23 20:22	1000	ICB 160-621402/18		621402			SWS
08/14/23 09:48	0	CCB 160-624094/16		624094			FLC
08/14/23 13:55	2	CCVA 160-624094/40		624094			FLC
08/14/23 14:02	2	CCVB 160-624094/52		624094			FLC
08/14/23 14:23	100	500-237220-5	MW-11	624094	622159	904.0	FLC
08/14/23 19:58	200	ZZZZZ		624094			

Detector: Orange23

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
01/23/13 12:20	5	ICABT 160-481616/12		481616			PS
01/23/13 12:30	5	ICABT 160-481616/13		481616			PS
01/23/13 12:38	5	ICABT 160-481616/14		481616			PS
01/23/13 12:46	5	ICABT 160-481616/15		481616			PS
01/23/13 12:53	5	ICABT 160-481616/16		481616			PS
01/23/13 13:00	5	ICABT 160-481616/17		481616			PS
01/23/13 13:07	5	ICABT 160-481616/18		481616			PS
01/23/13 13:14	5	ICABT 160-481616/19		481616			PS
01/24/13 22:51	5	ICVABT 160-481616/20		481616			PS
01/24/13 23:01	5	ICVABT 160-481616/21		481616			PS
01/24/13 23:07	5	ICVABT 160-481616/22		481616			PS
08/27/20 22:10	25	ICABT 160-481616/1		481616			PS
08/27/20 22:39	25	ICABT 160-481616/2		481616			PS
08/28/20 07:49	25	ICABT 160-481616/3		481616			PS
08/28/20 13:20	25	ICABT 160-481616/4		481616			PS
08/28/20 15:21	25	ICABT 160-481616/5		481616			PS
08/30/20 15:15	25	ICABT 160-481616/6		481616			PS
08/30/20 16:06	25	ICABT 160-481616/7		481616			PS
08/30/20 16:33	25	ICABT 160-481616/8		481616			PS
08/30/20 20:03	15	ICVABT 160-481616/9		481616			PS
08/30/20 20:50	15	ICVABT 160-481616/10		481616			PS
08/30/20 21:08	15	ICVABT 160-481616/11		481616			PS
07/21/23 20:22	1000	ICB 160-621402/20		621402			SWS
08/14/23 09:48	0	CCB 160-624094/18		624094			FLC
08/14/23 13:55	2	CCVA 160-624094/43		624094			FLC
08/14/23 14:03	2	CCVB 160-624094/54		624094			FLC
08/14/23 14:23	100	500-237220-6	MW-12	624094	622159	904.0	FLC

Detector: Red5

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 16:28	15	ICRA6 160-438591/1		438591			SCB

Gas Flow Proportional Counter Run Log

Detector: Red5 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 16:47	15	ICRA6 160-438591/2		438591			SCB
07/09/19 17:31	15	ICRA6 160-438591/3		438591			SCB
07/09/19 17:50	15	ICRA6 160-438591/4		438591			SCB
07/09/19 18:08	15	ICRA6 160-438591/5		438591			SCB
07/09/19 18:45	15	ICRA6 160-438591/6		438591			SCB
07/09/19 19:02	15	ICRA6 160-438591/7		438591			SCB
07/10/19 09:49	5	ICVRA6 160-438591/8		438591			SCB
07/10/19 09:54	5	ICVRA6 160-438591/9		438591			SCB
07/10/19 10:01	5	ICVRA6 160-438591/10		438591			SCB
07/21/23 23:11	1000	ICB 160-621400/6		621400			SWS
08/22/23 00:04	2	CCVA 160-625099/6		625099			FLC
08/22/23 00:08	2	CCVB 160-625099/14		625099			FLC
08/22/23 00:18	200	CCB 160-625099/22		625099			FLC
08/22/23 08:19	100	500-237220-1	MW-05	625099	622153	903.0	FLC
08/22/23 10:14	100	ZZZZZ		625099			
08/22/23 15:04	100	ZZZZZ		625099			
08/22/23 18:01	200	ZZZZZ		625099			
08/22/23 21:29	100	ZZZZZ		625099			

Detector: Red8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/10/19 09:27	15	ICRA6 160-438595/1		438595			SCB
07/10/19 09:47	15	ICRA6 160-438595/2		438595			SCB
07/10/19 10:05	15	ICRA6 160-438595/3		438595			SCB
07/10/19 10:23	15	ICRA6 160-438595/4		438595			SCB
07/10/19 10:57	15	ICRA6 160-438595/5		438595			SCB
07/10/19 11:14	15	ICRA6 160-438595/6		438595			SCB
07/10/19 11:32	15	ICRA6 160-438595/7		438595			SCB
07/10/19 12:06	5	ICVRA6 160-438595/8		438595			SCB
07/10/19 12:50	5	ICVRA6 160-438595/9		438595			SCB
07/10/19 12:57	5	ICVRA6 160-438595/10		438595			SCB
07/21/23 23:20	1000	ICB 160-621400/9		621400			SWS
08/22/23 00:03	2	CCVB 160-625099/35		625099			FLC
08/22/23 00:09	2	CCVA 160-625099/42		625099			FLC
08/22/23 00:17	200	CCB 160-625099/49		625099			FLC
08/22/23 08:20	100	500-237220-2	MW-06	625099	622153	903.0	FLC
08/22/23 10:15	100	ZZZZZ		625099			
08/22/23 18:03	200	ZZZZZ		625099			
08/22/23 21:30	100	ZZZZZ		625099			

Detector: Red9

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 19:38	15	ICRA6 160-438596/1		438596			SCB
07/10/19 09:47	15	ICRA6 160-438596/2		438596			SCB
07/10/19 10:05	15	ICRA6 160-438596/3		438596			SCB
07/10/19 10:23	15	ICRA6 160-438596/4		438596			SCB
07/10/19 10:57	15	ICRA6 160-438596/5		438596			SCB
07/10/19 11:14	15	ICRA6 160-438596/6		438596			SCB
07/10/19 11:32	15	ICRA6 160-438596/7		438596			SCB
07/10/19 12:06	5	ICVRA6 160-438596/8		438596			SCB

Gas Flow Proportional Counter Run Log

Detector: Red9 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/10/19 12:17	5	ICVRA6 160-438596/9		438596			SCB
07/10/19 12:57	5	ICVRA6 160-438596/10		438596			SCB
07/21/23 23:20	1000	ICB 160-621400/10		621400			SWS
08/22/23 00:03	2	CCVB 160-625099/36		625099			FLC
08/22/23 00:09	2	CCVA 160-625099/43		625099			FLC
08/22/23 00:17	200	CCB 160-625099/50		625099			FLC
08/22/23 08:20	100	500-237220-3	MW-09	625099	622153	903.0	FLC
08/22/23 10:15	100	ZZZZZ		625099			
08/22/23 15:06	100	ZZZZZ		625099			
08/22/23 18:03	200	ZZZZZ		625099			
08/22/23 21:30	100	ZZZZZ		625099			

Detector: Red10

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 19:38	15	ICRA6 160-438597/1		438597			SCB
07/10/19 09:26	15	ICRA6 160-438597/2		438597			SCB
07/10/19 10:05	15	ICRA6 160-438597/3		438597			SCB
07/10/19 10:23	15	ICRA6 160-438597/4		438597			SCB
07/10/19 10:57	15	ICRA6 160-438597/5		438597			SCB
07/10/19 11:14	15	ICRA6 160-438597/6		438597			SCB
07/10/19 11:32	15	ICRA6 160-438597/7		438597			SCB
07/10/19 12:06	5	ICVRA6 160-438597/8		438597			SCB
07/10/19 12:17	5	ICVRA6 160-438597/9		438597			SCB
07/10/19 12:23	5	ICVRA6 160-438597/10		438597			SCB
07/21/23 23:20	1000	ICB 160-621400/11		621400			SWS
08/22/23 00:03	2	CCVB 160-625099/37		625099			FLC
08/22/23 00:09	2	CCVA 160-625099/44		625099			FLC
08/22/23 00:17	200	CCB 160-625099/51		625099			FLC
08/22/23 08:20	100	500-237220-4	MW-10	625099	622153	903.0	FLC
08/22/23 10:15	100	ZZZZZ		625099			
08/22/23 15:06	100	ZZZZZ		625099			
08/22/23 18:03	200	ZZZZZ		625099			

Detector: Red12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 19:38	15	ICRA6 160-438599/1		438599			SCB
07/10/19 09:26	15	ICRA6 160-438599/2		438599			SCB
07/10/19 09:46	15	ICRA6 160-438599/3		438599			SCB
07/10/19 10:04	15	ICRA6 160-438599/4		438599			SCB
07/10/19 10:57	15	ICRA6 160-438599/5		438599			SCB
07/10/19 11:15	15	ICRA6 160-438599/6		438599			SCB
07/10/19 11:32	15	ICRA6 160-438599/7		438599			SCB
07/10/19 12:23	5	ICVRA6 160-438599/8		438599			SCB
07/10/19 12:29	5	ICVRA6 160-438599/9		438599			SCB
07/10/19 12:35	5	ICVRA6 160-438599/10		438599			SCB
07/21/23 23:20	1000	ICB 160-621400/13		621400			SWS
08/22/23 00:03	2	CCVB 160-625099/39		625099			FLC
08/22/23 00:10	2	CCVA 160-625099/46		625099			FLC
08/22/23 00:17	200	CCB 160-625099/53		625099			FLC
08/22/23 08:20	100	500-237220-5	MW-11	625099	622153	903.0	FLC

Gas Flow Proportional Counter Run Log

Detector: Red12 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/22/23 10:15	100	ZZZZZ		625099			
08/22/23 15:06	100	ZZZZZ		625099			
08/22/23 18:03	200	ZZZZZ		625099			

Detector: Red13

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 19:38	15	ICRA6 160-438600/1		438600			SCB
07/10/19 09:26	15	ICRA6 160-438600/2		438600			SCB
07/10/19 09:46	15	ICRA6 160-438600/3		438600			SCB
07/10/19 10:04	15	ICRA6 160-438600/4		438600			SCB
07/10/19 10:22	15	ICRA6 160-438600/5		438600			SCB
07/10/19 11:15	15	ICRA6 160-438600/6		438600			SCB
07/10/19 11:33	15	ICRA6 160-438600/7		438600			SCB
07/10/19 12:29	5	ICVRA6 160-438600/8		438600			SCB
07/10/19 12:35	5	ICVRA6 160-438600/9		438600			SCB
07/10/19 12:41	5	ICVRA6 160-438600/10		438600			SCB
07/21/23 23:20	1000	ICB 160-621400/14		621400			SWS
08/22/23 00:03	2	CCVB 160-625099/40		625099			FLC
08/22/23 00:10	2	CCVA 160-625099/47		625099			FLC
08/22/23 00:17	200	CCB 160-625099/54		625099			FLC
08/22/23 08:21	100	500-237220-6	MW-12	625099	622153	903.0	FLC
08/22/23 10:16	100	ZZZZZ		625099			
08/22/23 15:06	100	ZZZZZ		625099			
08/22/23 18:03	200	ZZZZZ		625099			

Detector: Red14

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 19:38	15	ICRA6 160-438601/1		438601			SCB
07/10/19 09:26	15	ICRA6 160-438601/2		438601			SCB
07/10/19 09:46	15	ICRA6 160-438601/3		438601			SCB
07/10/19 10:05	15	ICRA6 160-438601/4		438601			SCB
07/10/19 10:22	15	ICRA6 160-438601/5		438601			SCB
07/10/19 10:58	15	ICRA6 160-438601/6		438601			SCB
07/10/19 11:33	15	ICRA6 160-438601/7		438601			SCB
07/10/19 12:35	5	ICVRA6 160-438601/8		438601			SCB
07/10/19 12:42	5	ICVRA6 160-438601/9		438601			SCB
07/10/19 12:49	5	ICVRA6 160-438601/10		438601			SCB
07/21/23 23:20	1000	ICB 160-621400/15		621400			SWS
08/22/23 00:03	2	CCVB 160-625099/41		625099			FLC
08/22/23 00:10	2	CCVA 160-625099/48		625099			FLC
08/22/23 00:17	200	CCB 160-625099/55		625099			FLC
08/22/23 08:21	100	500-237220-7	2S/3S Duplicate	625099	622153	903.0	FLC
08/22/23 10:16	100	ZZZZZ		625099			
08/22/23 15:08	100	ZZZZZ		625099			
08/22/23 18:03	200	ZZZZZ		625099			

Detector: Red15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/22/23 14:06	2	CCVA 160-625099/103		625099			

Gas Flow Proportional Counter Run Log

Detector: Red15 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/22/23 14:09	2	CCVB 160-625099/104		625099			
08/22/23 14:13	0	CCB 160-625099/105		625099			FLC

Detector: Red16

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 13:00	15	ICRA6 160-438604/1		438604			SCB
07/09/19 13:22	15	ICRA6 160-438604/2		438604			SCB
07/09/19 13:41	15	ICRA6 160-438604/3		438604			SCB
07/09/19 14:09	15	ICRA6 160-438604/4		438604			SCB
07/09/19 14:29	15	ICRA6 160-438604/5		438604			SCB
07/09/19 14:48	15	ICRA6 160-438604/6		438604			SCB
07/09/19 15:07	15	ICRA6 160-438604/7		438604			SCB
07/10/19 11:02	5	ICVRA6 160-438604/8		438604			SCB
07/10/19 11:52	5	ICVRA6 160-438604/9		438604			SCB
07/10/19 11:58	5	ICVRA6 160-438604/10		438604			SCB
07/21/23 23:29	1000	ICB 160-621400/17		621400			SWS
08/22/23 00:05	2	CCVA 160-625099/69		625099			FLC
08/22/23 00:11	2	CCVB 160-625099/76		625099			FLC
08/22/23 00:17	200	CCB 160-625099/83		625099			FLC
08/22/23 08:00	100	MB 160-622153/1-A		625099	622153	903.0	FLC
08/22/23 10:17	100	500-237220-7 DU	2S/3S Duplicate DU	625099	622153	903.0	FLC
08/22/23 15:12	100	ZZZZZ		625099			
08/22/23 18:07	200	ZZZZZ		625099			

Detector: Red17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/09/19 12:41	15	ICRA6 160-438605/1		438605			JLW
07/09/19 13:22	15	ICRA6 160-438605/2		438605			JLW
07/09/19 13:41	15	ICRA6 160-438605/3		438605			JLW
07/09/19 14:10	15	ICRA6 160-438605/4		438605			JLW
07/09/19 14:29	15	ICRA6 160-438605/5		438605			JLW
07/09/19 14:48	15	ICRA6 160-438605/6		438605			JLW
07/09/19 15:07	15	ICRA6 160-438605/7		438605			JLW
07/10/19 11:02	5	ICVRA6 160-438605/8		438605			JLW
07/10/19 11:11	5	ICVRA6 160-438605/9		438605			JLW
07/10/19 11:58	5	ICVRA6 160-438605/10		438605			JLW
07/21/23 23:29	1000	ICB 160-621400/18		621400			SWS
08/22/23 00:05	2	CCVA 160-625099/70		625099			FLC
08/22/23 00:12	2	CCVB 160-625099/77		625099			FLC
08/22/23 00:17	200	CCB 160-625099/84		625099			FLC
08/22/23 08:01	100	LCS 160-622153/2-A		625099	622153	903.0	FLC
08/22/23 10:17	100	ZZZZZ		625099			
08/22/23 15:12	100	ZZZZZ		625099			
08/22/23 18:08	200	ZZZZZ		625099			

Subcontract Data

Shipping and Receiving Documents

Eurofins Chicago
2417 Bond Street
University Park IL 60484
Phone 708-534-5200 Fax 708-534-5211

Chain of Custody Record

eurofins
Environment Testing

500-237220 COC

Client Information	Sampler: IAN SOHN HONRESON	Lab PM: Mockler Diana J	Carr	COC No: 500-114451-45942 1
Client Contact: Patrick Allenstein	Phone: 630 325 1300	E-Mail: Diana Mockler@et.eurofinsus com	Sta	Page: Page 1 of 1
Company: KPRG and Associates Inc	PWSID:	Analysis Requested		Job #: 500-237220
Address: 14665 West Lisbon Road Suite 1A	Due Date Requested			Preservation Codes: A HCL, B NaOH, C Zn Acetate, D Nitric Acid, E NaHSO4, F MeOH, G Amchlor, H Ascorbic Acid, I Ice, J DI Water, K EDTA, L EDA, M Hexane, N None, O AsNaO2, P Na2O4S, Q Na2SO3, R Na2S2O3, S H2SO4, T TSP Dodecahydrate, U Acetone, V MCAA, W pH 4-5, Y Trizma, Z other (specify)
City: Brookfield	TAT Requested (days):			
State Zip: WI 53005	Compliance Project: Δ Yes Δ No			
Phone	PO #: 4502116506			Other:
Email: patricka@kprginc com	WO #:			
Project Name: Will County 2S/3S Event Desc Quarterly GW Monitoring CCR	Project #: 50011609			
Site: Illinois	SSOW#:			

	Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, 904.0	6010C, 6020A, 7470A	2540C, 4500_F_C, SM4500_Cl_E, SM4500_SO4_E	Total Number of containers	Special Instructions/Note
				Preservation Code:				D	D	N		
1	MW-05	7-26-23	08:49	G	Water	N	N	X	X	X	5	
2	MW-06	7-26-23	10:56	G	Water	N	N	X	X	X	5	
3	MW-09	7-26-23	13:10	G	Water	N	N	X	X	X	5	
4	MW-10	7-26-23	11:55	G	Water	N	N	X	X	X	5	
5	MW-11	7-25-23	10:55	G	Water	N	N	X	X	X	5	
6	MW-12	7-25-23	10:03	G	Water	N	N	X	X	X	5	
7	2S/3S Duplicate	7-26-23	—	G	Water	N	N	X	X	X	5	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested I II III IV Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by:	Date	Time	Method of Shipment:

	Date/Time	Company	Received by	Date/Time	Company
Relinquished by:	7-26-23 16:40	PEPPER	Euphonie Hernandez	7/26/23 1640	EEIA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact. Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks	
		2.1+1.7, 2.9+2.5, 5.8+5.4	

8/24/2023 9:47 AM

Eurofins Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Mockler, Diana J	Carrier Tracking No(s):	COC No: 500-177111.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Diana.Mockler@et.eurofinsus.com	State of Origin: Wisconsin	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-237220-2
Address: 13715 Rider Trail North, ,	Due Date Requested: 8/29/2023			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Will County 2S/3S CCR (RAD)	Project #: 50011609			
Site: NRG Midwest Generation Will County	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-05 (500-237220-1)	7/26/23	08:49 Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;
MW-06 (500-237220-2)	7/26/23	10:56 Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;
MW-09 (500-237220-3)	7/26/23	13:10 Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;
MW-10 (500-237220-4)	7/26/23	11:55 Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;
MW-11 (500-237220-5)	7/25/23	10:55 Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;
MW-12 (500-237220-6)	7/25/23	10:03 Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;
2S/3S Duplicate (500-237220-7)	7/26/23	Central		Water			X	X	X	3	Batch QC must be performed (dup, spikes, etc) - no NCMs concerning limited volume;

Note: Since laboratory accreditations are subject to change, Eurofins Chicago places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Chicago laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Chicago attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Chicago.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by: FED EX	Date/Time: 7/27/23 1600	Company: EE TA	Received by: FED E
Relinquished by: FED EX	Date/Time:	Company	Received by: Jena Worthington
Relinquished by:	Date/Time:	Company	Received by:

Date/Time:	Company
JUL 28 2023 0847	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: Midwest Generation EME LLC

Job Number: 500-237220-2

Login Number: 237220
List Number: 1
Creator: Hernandez, Stephanie

List Source: Eurofins Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.7,2.5,5.4
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Midwest Generation EME LLC

Job Number: 500-237220-2

Login Number: 237220
List Number: 2
Creator: Pinette, Meadow L

List Source: Eurofins St. Louis
List Creation: 07/28/23 11:53 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

PROJECT NAME	NRG – WILL COUNTY STATION (12313.3)		DATE 7-26-23
Sample Name	MW-05	Start Time	08:37
Condition of Well	GOOD		
Water Level	10.26	Total Depth	—
Well Diameter	PVC – 2 inch	Volume in Well	—
Method of Purge	Low-Flow	Purge Characteristics	COLORLESS ODORLESS
Volume Removed	2.0 QTS	W L at Sample Time	10.29
Method of Sample	Low-Flow	Sample Characteristics	APPEARS CLEAR
Sample Analysis	CCA + CCR + CCA 2N 2S DUPS	Sample Time	08:49
Water Quality Meter	YSI ProDss		

Time	Depth to Water (ft)	ph (SU)	Temp (°C)	Spec. Cond (mS/cm).	DO (mg/L)	ORP (mV)	Turbidity (NTU)
08:40	10.30	7.28	17.6	1.860	78.2	120.4	6.9
08:43	10.34	6.96	16.7	1.736	38.3	115.3	7.1
08:46	10.39	6.92	16.7	1.700	25.2	111.3	7.1
08:49	10.29	6.91	16.8	1.697	23.0	110.6	7.1

SAMPLING NOTES:

Sampler Name and Company: KPRG and Associates

PROJECT NAME	NRG – WILL COUNTY STATION (12313.3)		DATE	7-26-23
Sample Name	MW - 06	Start Time	10:38	
Condition of Well	GOOD			
Water Level	11.96	Total Depth	—	
Well Diameter	PVC – 2 inch	Volume in Well	—	
Method of Purge	Low-Flow	Purge Characteristics	COLORLESS ODORLESS	
Volume Removed	3.0 QTS	W L at Sample Time	12.03	
Method of Sample	Low-Flow	Sample Characteristics	TRACE TURB	
Sample Analysis	CCA + CCR	Sample Time	10:56	
Water Quality Meter	YSI ProDss			

Time	Depth to Water (ft)	ph (SU)	Temp (°C)	Spec. Cond (mS/cm).	DO (mg/L)	ORP (mV)	Turbidity (NTU)
10:41	12.05	7.07	23.1	1.625	56.1	89.7	4.8
10:44	12.07	7.51	16.0	1.007	44.2	24.3	11.2
10:47	12:02	7.56	16.4	1.012	17.4	-6.5	19.7
10:50	11.99	7.58	16.8	1.015	10.7	-25.9	10.3
10:53	12.03	7.59	16.9	1.014	10.0	-33.3	5.1
10:56	12.03	7.60	16.8	1.015	8.8	-35.4	3.7

SAMPLING NOTES:

Sampler Name and Company: KPRG and Associates

PROJECT NAME	NRG – WILL COUNTY STATION (12313.3)		DATE 7-26-23
Sample Name	MW-09	Start Time	12:52
Condition of Well	GOOD		
Water Level	11.90	Total Depth	—
Well Diameter	PVC – 2 inch	Volume in Well	—
Method of Purge	Low-Flow	Purge Characteristics	COLORLESS SLIGHT ODOR
Volume Removed	3.0 GAL	W L at Sample Time	12.01
Method of Sample	Low-Flow	Sample Characteristics	APPEARS CLEAR
Sample Analysis	CCA + CCR + CCR (IN/RN 2N/25)	Sample Time	13:10
Water Quality Meter	YSI ProDss		

Time	Depth to Water (ft)	ph (SU)	Temp (°C)	Spec. Cond (mS/cm).	DO (mg/L)	ORP (mV)	Turbidity (NTU)
12:55	12.04	8.69	16.3	1.315	50.1	-172.9	6.9
12:58	12.08	8.92	17.7	1.311	41.7	-178.1	6.7
13:01	12.03	8.90	19.7	1.302	35.1	-173.1	7.1
13:04	12.0	8.89	20.9	1.315	29.7	-168.6	7.1
13:07	11.98	8.85	21.6	1.335	27.1	-160.3	6.6
13:10	12.01	8.83	22.4	1.337	26.6	-160.2	6.5

SAMPLING NOTES:

Sampler Name and Company: KPRG and Associates

PROJECT NAME	NRG – WILL COUNTY STATION (12313.3)		DATE 7-26-23
Sample Name	MW-10	Start Time	11:37
Condition of Well	GOOD		
Water Level	11.09	Total Depth	—
Well Diameter	PVC – 2 inch	Volume in Well	—
Method of Purge	Low-Flow	Purge Characteristics	COLORLESS ODORLESS
Volume Removed	3.0 QTS	W L at Sample Time	11.22
Method of Sample	Low-Flow	Sample Characteristics	APPEARS CLEAR
Sample Analysis	CCA + CCR	Sample Time	11:55
Water Quality Meter	YSI ProDss		

Time	Depth to Water (ft)	ph (SU)	Temp (°C)	Spec. Cond (mS/cm).	DO (mg/L)	ORP (mV)	Turbidity (NTU)
11:40	11.11	7.39	17.0	1.438	52.6	-68.9	6.2
11:43	11.17	7.36	16.6	1.512	37.0	-89.8	11.0
11:46	11.25	7.37	15.8	1.561	16.9	-105.4	6.0
11:49	11.23	7.37	18.2	1.564	13.4	-112.2	5.6
11:52	11.25	7.37	19.1	1.584	9.3	-116.9	3.3
11:55	11.22	7.37	19.1	1.593	7.7	-118.3	1.4

SAMPLING NOTES:

Sampler Name and Company: KPRG and Associates

PROJECT NAME	NRG – WILL COUNTY STATION (12313.3)		DATE 7-25-23
Sample Name	MW-11	Start Time	10:37
Condition of Well	GOOD		
Water Level	10.51	Total Depth	—
Well Diameter	PVC – 2 inch	Volume in Well	—
Method of Purge	Low-Flow	Purge Characteristics	COLORLESS SLIGHT ODOR
Volume Removed	3.0 QTS	W L at Sample Time	10.88
Method of Sample	Low-Flow	Sample Characteristics	APPEARS CLEAR
Sample Analysis	CCR	Sample Time	10:55
Water Quality Meter	YSI ProDss		

Time	Depth to Water (ft)	ph (SU)	Temp (°C)	Spec. Cond (mS/cm).	DO (mg/L)	ORP (mV)	Turbidity (NTU)
10:40	10.68	7.19	21.4	1.489	82.6	-126.5	0.97
10:43	10.76	7.20	16.6	1.291	79.3	-129.0	0.7
10:46	10.72	7.24	16.2	1.296	74.7	-139.3	1.4
10:49	10.82	7.24	15.2	1.282	70.8	-139.8	1.9
10:52	10.86	7.17	15.6	1.290	63.3	-145.7	1.1
10:55	10.88	7.12	15.9	1.295	59.0	-146.1	1.0

SAMPLING NOTES:

Sampler Name and Company: KPRG and Associates

PROJECT NAME	NRG – WILL COUNTY STATION (12313.3)		DATE 7-25-23
Sample Name	MW-12	Start Time	09:45
Condition of Well	GOOD		
Water Level	10.53	Total Depth	—
Well Diameter	PVC – 2 inch	Volume in Well	—
Method of Purge	Low-Flow	Purge Characteristics	COLORLESS SLIGHT ODOR
Volume Removed	2.5 Qts	W L at Sample Time	10:58
Method of Sample	Low-Flow	Sample Characteristics	APPEARS CLEAR
Sample Analysis	CCR	Sample Time	10:03
Water Quality Meter	YSI ProDss		

Time	Depth to Water (ft)	ph (SU)	Temp (°C)	Spec. Cond (mS/cm).	DO (mg/L)	ORP (mV)	Turbidity (NTU)
09:48	10.57	6.98	15.2	1.776	47.1	-23.2	7.13
09:51	10.57	6.95	15.2	1.841	16.6	2.8	7.20
09:54	10.58	6.95	16.6	1.847	10.0	21.8	7.2
09:57	10.59	6.96	16.7	1.865	6.6	29.4	7.1
10:00	10.58	6.96	16.6	1.870	5.4	33.3	7.0
10:03	10.58	6.96	16.3	1.872	5.0	35.1	6.8

SAMPLING NOTES:

Sampler Name and Company: KPRG and Associates