

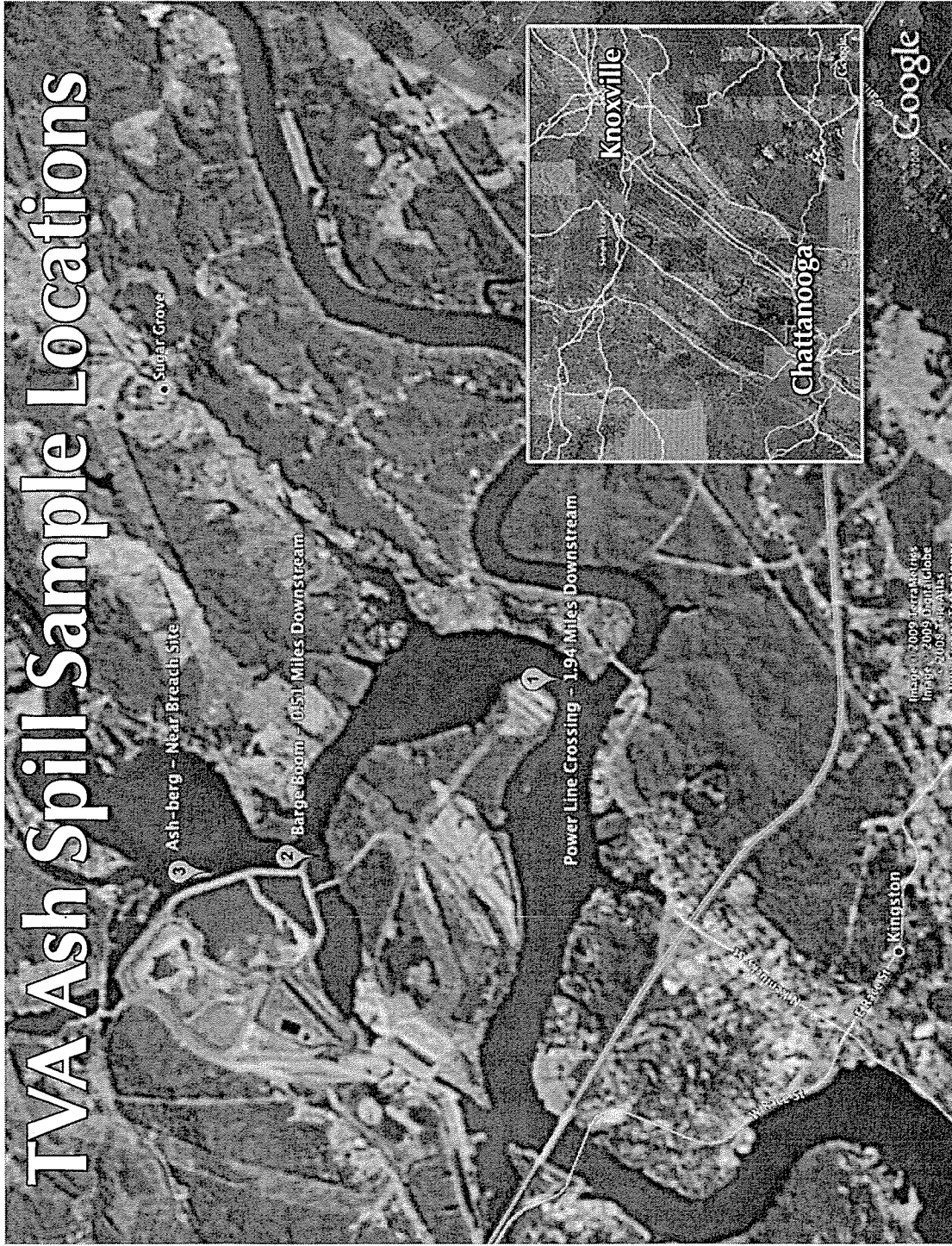
Results of ICP-OES analyses of the TVA ash spill samples collected 12-27-08 from the Emory River
 Samples collected by Donna Lisenby (Appalachian Voices/Watauga Riverkeeper) and analyzed by Shea Tuberty, PhD and Carol Babyak, PhD (Appalachian State University)

Element	N=3 mean std dev	Water Samples				Sediment		TN Water Quality Standards (mg/L or ppm)			Notes
		Power Line Crossing		Barge Boom		Ash-berg		Domestic Water Supply	Fish & Aquatic Maximum (CMC)	Notes	
		1.94 miles downstream	0.51 miles downstream	0.51 miles downstream	Near breach site	Near breach site					
Arsenic	mean std dev	0.356 0.063	3.062 0.572	1.083 0.082	135.205 4.363	0.010	0.340	35 to 300 times higher than drinking water criteria 3-10 times the max TN aquatic life criteria			
Barium	mean std dev	0.818 0.214	5.265 0.920	7.904 1.576	583.603 11.576	2.000	n/a	2 to 4 times higher than drinking water criteria			
Cadmium	mean std dev	0.001 0.000	0.014 0.001	0.008 0.000	0.985 0.002	0.005	0.002	0.25 to 3 times higher than drinking water criteria 4-7 times the max TN aquatic life criteria			
Chromium	mean std dev	0.049 0.014	0.376 0.033	0.345 0.023	49.857 1.730	0.100	*	3-5 times higher than max drinking water criteria			
Cobalt	mean std dev	0.031 0.009	0.195 0.042	0.141 0.059	11.143 1.152	n/a	n/a				
Copper	mean std dev	0.095 0.019	0.622 0.058	1.025 0.121	86.624 3.217	n/a	0.013	7-70 times the max TN aquatic life criteria			
Iron	mean std dev	28.004 10.497	151.917 22.554	122.988 13.471	18849.288 1009.305	n/a	n/a				
Lead	mean std dev	0.029 0.006	0.137 0.018	0.313 0.044	25.931 0.842	0.005	0.065	6 to 60 times higher than max drinking water limit 0.5 to 5 the max TN aquatic life criteria			
Manganese	mean std dev	1.172 0.003	10.893 0.249	1.705 0.007	92.870 2.794	n/a	n/a				
Mercury	mean std dev	0.010 0.013	not detected	0.017 0.022	0.173 0.088	0.002	0.001	5 to 8 times higher than max drinking water limit 7-12 the max TN aquatic life criteria			
Molybdenum	mean std dev	0.027 0.012	0.182 0.075	0.061 0.004	4.034 0.099	n/a	n/a				
Nickel	mean std dev	0.046 0.012	0.339 0.026	0.363 0.063	40.016 1.430	0.100	0.470	3 times higher than max drinking water limit			
Selenium	mean std dev	0.005 0.001	0.036 0.007	0.042 0.013	2.598 0.558	0.050	0.020	0.25 to 2 the max TN aquatic life criteria			
Silver	mean std dev	not detected	not detected	not detected	0.021 0.008	n/a	n/a				
Thallium	mean std dev	not detected	0.006 0.000	0.008 0.003	0.808 0.449	0.002	n/a	3 to 4 times higher than max drinking water limit			
Vanadium	mean std dev	0.196 0.050	1.280 0.128	1.388 0.145	124.074 3.257	n/a	n/a				
Zinc	mean std dev	0.164 0.045	0.977 0.055	0.619 0.022	71.149 5.584	n/a	0.120	1.5 to 8 the max TN aquatic life criteria			

not detected = no levels were found at the limits of our analytical instrumentation
 n/a = there are no regulated levels of these elements in drinking water
 *Fish and Aquatic criteria are speciated into Co III and Co IV but samples are not speciated

Sample exceeds one or more TN water quality criteria
Description of domestic drinking water criteria exceedence
Description of fish and aquatic criteria exceedence

TVA Ash Spill Sample Locations



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Samples analyzed by Professor Shea Tuberty, PhD and Professor Carol Babyak, PhD - Appalachian State University

Each field sample was used to prepare 3 replicate samples for analyses, means and standard deviations were calculated from these three replicates

Element	Water Samples from Emory River Sites				Ash Pile Sample mg/kg dry ash wt
	Power Line Crossing	Barge Boom	Ash-berg	Ash-berg	
	Water values are expressed in mg/L (or parts per million)				
Arsenic	0.380	3.711	0.989	135.691	
	0.285	2.635	1.116	139.304	
	0.403	2.839	1.142	130.619	
mean	0.356	3.062	1.083	135.205	
std dev	0.063	0.572	0.082	4.363	
Barium	0.916	5.750	8.649	570.244	
	0.572	4.965	8.188	589.901	
	0.965	5.079	6.876	590.665	
mean	0.818	5.265	7.904	583.603	
std dev	0.214	0.424	0.920	11.576	
Cadmium	0.001	0.015	0.009	0.987	
	0.001	0.013	0.009	0.985	
	0.001	0.013	0.008	0.983	
mean	0.001	0.014	0.008	0.985	
std dev	0.000	0.001	0.000	0.002	
Chromium	0.055	0.414	0.329	48.901	
	0.033	0.358	0.371	48.815	
	0.058	0.356	0.336	51.854	
mean	0.049	0.376	0.345	49.857	
std dev	0.014	0.033	0.023	1.730	
Cobalt	0.035	0.169	0.207	9.891	
	0.021	0.243	0.121	12.158	
	0.037	0.172	0.094	11.381	
mean	0.031	0.195	0.141	11.143	

	std dev	0.009	0.042	0.059	1.152
Copper		0.105	0.689	1.120	83.573
		0.073	0.581	1.066	89.985
		0.108	0.596	0.890	86.314
	mean	0.095	0.622	1.025	86.624
	std dev	0.019	0.058	0.121	3.217
Iron		32.638	177.875	117.263	18575.140
		15.988	137.125	138.375	18005.377
		35.388	140.750	113.325	19967.345
	mean	28.004	151.917	122.988	18849.288
	std dev	10.497	22.554	13.471	1009.305
Lead		0.031	0.157	0.347	25.070
		0.023	0.126	0.329	26.752
		0.035	0.128	0.264	25.970
	mean	0.029	0.137	0.313	25.931
	std dev	0.006	0.018	0.044	0.842
Manganese		1.179	11.075	1.758	89.838
		1.144	10.609	1.729	93.430
		1.193	10.994	1.630	95.342
	mean	1.172	10.893	1.705	92.870
	std dev	0.025	0.249	0.067	2.794
Mercury		0.020	not detected	0.042	0.273
		0.001	not detected	0.006	0.141
		not detected	not detected	0.004	0.105
	mean	0.010	not detected	0.017	0.173
	std dev	0.013		0.022	0.088
Molybdenum		0.032	0.267	0.060	4.082
		0.012	0.127	0.057	4.100
		0.035	0.153	0.065	3.920
	mean	0.027	0.182	0.061	4.034
	std dev	0.012	0.075	0.004	0.099

Nickel		0.052	0.369	0.395	38.479
	mean	0.033	0.322	0.380	40.262
	std dev	0.055	0.328	0.313	41.308
		0.046	0.339	0.363	40.016
		0.012	0.026	0.043	1.430
Selenium		0.006	0.044	0.026	2.275
	mean	0.004	0.030	0.049	3.242
	std dev	0.006	0.035	0.050	2.277
		0.005	0.036	0.042	2.598
		0.001	0.007	0.013	0.558
Silver		not detected	not detected	not detected	0.027
	mean	not detected	not detected	not detected	0.012
	std dev	not detected	not detected	not detected	0.024
					0.021
					0.008
Thallium		not detected	0.006	0.007	1.158
	mean	not detected	0.006	0.007	0.965
	std dev	not detected	0.006	0.011	0.302
			0.006	0.008	0.808
			0.000	0.003	0.449
Vanadium		0.219	1.426	1.221	120.404
	mean	0.139	1.188	1.479	126.617
	std dev	0.230	1.225	1.464	125.202
		0.196	1.280	1.388	124.074
		0.050	0.128	0.145	3.257
Zinc		0.182	1.037	0.644	65.887
	mean	0.113	0.930	0.612	70.551
	std dev	0.198	0.964	0.602	77.007
		0.164	0.977	0.619	71.149
		0.045	0.055	0.022	5.584