

# EDEN NORTH CAROLINA COAL ASH SPILL SEDIMENT RESULTS

NOTE: The data below represents sediment samples that were collected on June 20, 2014 by EPA START Team 1. Sediment sample measurements are in milligrams per kilogram (mg/kg). The data is being compared to ecological risk screening levels (ERSLs) to protect aquatic life in the sediments of the Dan River. Specific qualifiers and footnotes are listed below the summary table. These samples were collected at various locations along the river (refer to map for generalized locations). The detected concentrations in sediment are all below the ERSLs with the exception of aluminum, barium, chromium, copper, iron, manganese, nickel, and vanadium. There were no exceedances of human health screening criteria for sediment. When chemical concentrations exceed the screening values it doesn't mean there will be adverse health or ecological effects, but recommends further investigation may be needed.

Analyte	Ecological Screening Standards for Sediment <sup>2</sup>		Schoolfield Dredge Area 8A 0-6 inches	Schoolfield Dredge Area 8A 6-12 inches	Schoolfield Dredge Area 7A 0-6 inches			
<b>Sample Information</b>								
Sample ID	-		EDEN-SFDA-8A-0006-SD-20140620	EDEN-SFDA-8A-0612-SD-20140620	EDEN-SFDA-7A-0006-SD-20140620			
Date	-		6/20/2014	6/20/2014	06/20/2014			
Time	-		815	815	840			
Status	-		Validation Complete	Validation Complete	Validation Complete			
Type	-		Sediment	Sediment	Sediment			
<b>Total Metals</b>								
Aluminum	3,200 (bkg)	mg/kg	28000	mg/Kg	25000	mg/Kg	15000	mg/Kg
Antimony	2 <sup>a</sup>	mg/kg	1.9UJ	mg/Kg	1.7UJ	mg/Kg	1.4UJ	mg/Kg
Arsenic	9.8	mg/kg	4.7	mg/Kg	3.9	mg/Kg	2.7	mg/Kg
Barium	60 <sup>b</sup>	mg/kg	200	mg/Kg	190	mg/Kg	130	mg/Kg
Beryllium	-	-	1.3	mg/Kg	1.2	mg/Kg	0.74	mg/Kg
Boron	-	-	19U	mg/Kg	17U	mg/Kg	14U	mg/Kg
Cadmium	0.99	mg/kg	0.17	mg/Kg	0.12	mg/Kg	0.11	mg/Kg
Calcium	-	-	1,400J-	mg/Kg	860J-	mg/Kg	590J-	mg/Kg
Chromium	43.4	mg/kg	46J-	mg/Kg	43J-	mg/Kg	28J-	mg/Kg
Cobalt	50	mg/kg	17J-	mg/Kg	15J-	mg/Kg	12J-	mg/Kg
Copper	31.6	mg/kg	31J-	mg/Kg	29J-	mg/Kg	18J-	mg/Kg
Iron	6,800 (bkg)	mg/kg	37000	mg/Kg	34000	mg/Kg	20000	mg/Kg
Lead	35.8	mg/kg	19J-	mg/Kg	18J-	mg/Kg	11J-	mg/Kg
Magnesium	-	-	4300	mg/Kg	4000	mg/Kg	3200	mg/Kg
Manganese	460 <sup>c</sup>	mg/kg	1000	mg/Kg	790	mg/Kg	350	mg/Kg
Mercury	0.18	mg/kg	0.04U	mg/Kg	0.054	mg/Kg	0.03	mg/Kg
Molybdenum	-	-	0.93J	mg/Kg	0.73J	mg/Kg	0.63J	mg/Kg
Nickel	22.7	mg/kg	20J	mg/Kg	18J	mg/Kg	13J	mg/Kg
Potassium	-	-	3000	mg/Kg	2900	mg/Kg	2300	mg/Kg
Selenium	2 <sup>d</sup>	mg/kg	0.98	mg/Kg	0.89	mg/Kg	0.55J	mg/Kg
Silver	0.733	mg/kg	0.19U	mg/Kg	0.093J	mg/Kg	0.14U	mg/Kg
Sodium	-	-	160J	mg/Kg	200J	mg/Kg	150J	mg/Kg
Thallium	-	mg/kg	0.39	mg/Kg	0.35	mg/Kg	0.24	mg/Kg
Vanadium	57 <sup>e</sup>	mg/kg	75	mg/Kg	72	mg/Kg	45	mg/Kg
Zinc	121	mg/kg	87	mg/Kg	78	mg/Kg	53	mg/Kg
<b>Physical Properties</b>								
Percent Ash	-	-	-	-	-	-	-	-

**Notes**

<sup>2</sup> MacDonald, D.D.; Ingersoll, C.G.; Smorong, D.E.; Lindscoog, R.A.; Sloane, G; and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters.

<sup>a</sup> The screening value for antimony is from Long, Edward R., and Lee G. Morgan. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52.

<sup>b</sup> The screening value for barium was the probable effect level (PEL) instead of the threshold effect level (TEL) because the TEL was below background

<sup>c</sup> Sediment screening values for manganese and vanadium come from the NOAA SQUIRT.

<http://response.restoration.noaa.gov/sites/default/files/SQUIRTs.pdf>

<sup>d</sup> The screening value for selenium is from Region 3 after Lemley, A.D. 2002. Selenium assessment in aquatic ecosystems. US Forest Service, Blacksburg, VA.

<sup>e</sup> Cadmium from diet

<sup>f</sup> Chromium (VI)

<sup>g</sup> Methyl Mercury

<sup>h</sup> Thallium Chloride

% Percent

EPA U.S. Environmental Protection Agency

J Value is estimated

J- Value is estimated with a possible low bias

mg/kg milligrams per kilogram

ND No fly ash detected at a PLM reporting limit of 1 percent

PLM Polarized light microscopy

U Analyte was not detected at the listed reporting limit.

UJ Analyte was not detected at the listed reporting limit, which is an estimated quantitation.

# EDEN NORTH CAROLINA COAL ASH SPILL SEDIMENT RESULTS

Analyte	Ecological Screening Standards for Sediment <sup>2</sup>		Schoolfield Dredge Area 7A	Schoolfield Dredge Area 6A	Schoolfield Dredge Area 6A			
			6-12 inches	0-6 inches	0-6 inches			
<b>Sample Information</b>								
Sample ID	-		EDEN-SFDA-7A-0612-SD-20140620	EDEN-SFDA-6A-0006-SD-20140620	EDEN-SFDA-6A-0006-SD-20140620-DUP			
Date	-		06/20/2014	06/20/2014	06/20/2014			
Time	-		840	748	751			
Status	-		Validation Complete	Validation Complete	Validation Complete			
Type	-		Sediment	Sediment	Sediment			
<b>Total Metals</b>								
Aluminum	3,200 (bkg)	mg/kg	34000	mg/Kg	34000	mg/Kg	22000	mg/Kg
Antimony	2 <sup>a</sup>	mg/kg	2.2UJ	mg/Kg	2.3UJ	mg/Kg	1.7UJ	mg/Kg
Arsenic	9.8	mg/kg	5.1	mg/Kg	6.4	mg/Kg	4.3	mg/Kg
Barium	60 <sup>b</sup>	mg/kg	250	mg/Kg	240	mg/Kg	170	mg/Kg
Beryllium	-	-	1.6	mg/Kg	1.7	mg/Kg	1.1	mg/Kg
Boron	-	-	22U	mg/Kg	23U	mg/Kg	17U	mg/Kg
Cadmium	0.99	mg/kg	0.19	mg/Kg	0.22	mg/Kg	0.13	mg/Kg
Calcium	-	-	1,100J-	mg/Kg	1,700J-	mg/Kg	1,100J-	mg/Kg
Chromium	43.4	mg/kg	57J-	mg/Kg	55J-	mg/Kg	38J-	mg/Kg
Cobalt	50	mg/kg	21J-	mg/Kg	20J-	mg/Kg	13J-	mg/Kg
Copper	31.6	mg/kg	37J-	mg/Kg	36J-	mg/Kg	24J-	mg/Kg
Iron	6,800 (bkg)	mg/kg	45000	mg/Kg	45000	mg/Kg	30000	mg/Kg
Lead	35.8	mg/kg	23J-	mg/Kg	22J-	mg/Kg	15J-	mg/Kg
Magnesium	-	-	5800	mg/Kg	5000	mg/Kg	3800	mg/Kg
Manganese	460 <sup>c</sup>	mg/kg	990	mg/Kg	1000	mg/Kg	710	mg/Kg
Mercury	0.18	mg/kg	0.063	mg/Kg	0.05U	mg/Kg	0.045	mg/Kg
Molybdenum	-	-	1.1J	mg/Kg	1.1J	mg/Kg	0.64J	mg/Kg
Nickel	22.7	mg/kg	24J	mg/Kg	24J	mg/Kg	16J	mg/Kg
Potassium	-	-	4300	mg/Kg	3600	mg/Kg	2800	mg/Kg
Selenium	2 <sup>d</sup>	mg/kg	1.1	mg/Kg	1.3	mg/Kg	0.98	mg/Kg
Silver	0.733	mg/kg	0.22U	mg/Kg	0.23U	mg/Kg	0.17U	mg/Kg
Sodium	-	-	280J	mg/Kg	200J	mg/Kg	160J	mg/Kg
Thallium	-	mg/kg	0.48	mg/Kg	0.47	mg/Kg	0.34	mg/Kg
Vanadium	57 <sup>e</sup>	mg/kg	90	mg/Kg	89	mg/Kg	60	mg/Kg
Zinc	121	mg/kg	110	mg/Kg	100	mg/Kg	69	mg/Kg
<b>Physical Properties</b>								
Percent Ash	-	-	-	-	-	-	-	-

**Notes**

<sup>2</sup> MacDonald, D.D.; Ingersoll, C.G.; Smorong, D.E.; Lindskoog, R.A.; Sloane, G; and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters.

<sup>a</sup> The screening value for antimony is from Long, Edward R., and Lee G. Morgan. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52.

<sup>b</sup> The screening value for barium was the probable effect level (PEL) instead of the threshold effect level (TEL) because the TEL was below background

<sup>c</sup> Sediment screening values for manganese and vanadium come from the NOAA SQiRT.

<http://response.restoration.noaa.gov/sites/default/files/SQIRTs.pdf>

<sup>d</sup> The screening value for selenium is from Region 3 after Lemley, A.D. 2002. Selenium assessment in aquatic ecosystems. US Forest Service, Blacksburg, VA.

<sup>e</sup> Cadmium from diet

<sup>f</sup> Chromium (VI)

<sup>g</sup> Methyl Mercury

<sup>h</sup> Thallium Chloride

% Percent

EPA U.S. Environmental Protection Agency

J Value is estimated

J- Value is estimated with a possible low bias

mg/kg milligrams per kilogram

ND No fly ash detected at a PLM reporting limit of 1 percent

PLM Polarized light microscopy

U Analyte was not detected at the listed reporting limit.

UJ Analyte was not detected at the listed reporting limit, which is an estimated quantitation.

# EDEN NORTH CAROLINA COAL ASH SPILL SEDIMENT RESULTS

Analyte	Ecological Screening Standards for Sediment <sup>2</sup>		Schoolfield Dredge Area 6A 6-12 inches	
<b>Sample Information</b>				
Sample ID	-		EDEN-SFDA-6A-0612-SD-20140620	
Date	-		06/20/2014	
Time	-		748	
Status	-		Validation Complete	
Type	-		Sediment	
<b>Total Metals</b>				
Aluminum	3,200 (bkg)	mg/kg	20000	mg/Kg
Antimony	2 <sup>a</sup>	mg/kg	1.4UJ	mg/Kg
Arsenic	9.8	mg/kg	3.8	mg/Kg
Barium	60 <sup>b</sup>	mg/kg	150	mg/Kg
Beryllium	-	-	0.99	mg/Kg
Boron	-	-	14U	mg/Kg
Cadmium	0.99	mg/kg	0.12	mg/Kg
Calcium	-	-	1,000J-	mg/Kg
Chromium	43.4	mg/kg	33J-	mg/Kg
Cobalt	50	mg/kg	12J-	mg/Kg
Copper	31.6	mg/kg	21J-	mg/Kg
Iron	6,800 (bkg)	mg/kg	27000	mg/Kg
Lead	35.8	mg/kg	13J-	mg/Kg
Magnesium	-	-	3300	mg/Kg
Manganese	460 <sup>c</sup>	mg/kg	640	mg/Kg
Mercury	0.18	mg/kg	0.039	mg/Kg
Molybdenum	-	-	0.6J	mg/Kg
Nickel	22.7	mg/kg	14J	mg/Kg
Potassium	-	-	2500	mg/Kg
Selenium	2 <sup>d</sup>	mg/kg	0.76	mg/Kg
Silver	0.733	mg/kg	0.14U	mg/Kg
Sodium	-	-	160J	mg/Kg
Thallium	-	mg/kg	0.29	mg/Kg
Vanadium	57 <sup>c</sup>	mg/kg	52	mg/Kg
Zinc	121	mg/kg	60	mg/Kg
<b>Physical Properties</b>				
Percent Ash	-	-	-	-

**Notes**

<sup>2</sup>MacDonald, D.D.; Ingersoll, C.G.; Smorong, D.E.; Lindskoog, R.A.; Sloane, G; and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters.

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<sup>e</sup> Cadmium from diet

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<sup>g</sup> Methyl Mercury

<sup>h</sup> Thallium Chloride

% Percent

EPA U.S. Environmental Protection Agency

J Value is estimated

J- Value is estimated with a possible low bias

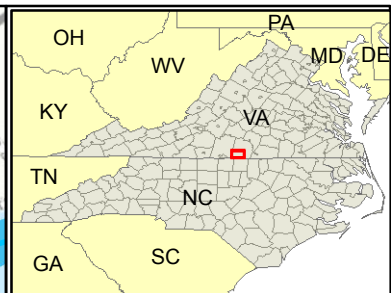
mg/kg milligrams per kilogram

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PLM Polarized light microscopy

U Analyte was not detected at the listed reporting limit.

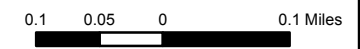
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Legend

-  Approximate Spill Location
-  Sediment Sample Location

Imagery Source:  
ESRI, USGS Mapping Service, 2013



Eden Coal Ash Spill  
Eden, North Carolina

Sediment  
Sample Locations  
June 20, 2014

