

EDEN NORTH CAROLINA COAL ASH SPILL SEDIMENT RESULTS

NOTE: The data below represents sediment samples that were collected on June 2, 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, iron, manganese, and selenium. 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 ²		Transect FWS 4A Right Descending		Transect FWS 4B Left Descending		Transect EPA 02 Right Descending	
Sample Information								
Sample ID	-		EDEN-FWS4A-R-SD-20140602		EDEN-FWS4B-L-SD-20140602		EDEN-EPA02-R-SD-20140602	
Date	-		6/2/2014		6/2/2014		6/2/2014	
Time	-		1140		1315		1445	
Status	-		Validation Complete		Validation Complete		Validation Complete	
Type	-		Sediment		Sediment		Sediment	
Total Metals								
Aluminum	3,200 (bkg)	mg/kg	8200	mg/Kg	6900	mg/Kg	7700	mg/Kg
Antimony	2 ^a	mg/kg	1.4UJ	mg/Kg	1.7UJ	mg/Kg	1.3UJ	mg/Kg
Arsenic	9.8	mg/kg	2.4J	mg/Kg	8.9	mg/Kg	2.3J	mg/Kg
Barium	60 ^b	mg/kg	83	mg/Kg	130	mg/Kg	85	mg/Kg
Beryllium	-	-	0.5J	mg/Kg	0.94	mg/Kg	0.5J	mg/Kg
Boron	-	-	14U	mg/Kg	17U	mg/Kg	13U	mg/Kg
Cadmium	0.99	mg/kg	0.052J	mg/Kg	0.065J	mg/Kg	0.048J	mg/Kg
Calcium	-	-	780	mg/Kg	880	mg/Kg	800	mg/Kg
Chromium	43.4	mg/kg	19	mg/Kg	18	mg/Kg	18	mg/Kg
Cobalt	50	mg/kg	6.9	mg/Kg	7	mg/Kg	6.9	mg/Kg
Copper	31.6	mg/kg	9.4	mg/Kg	17	mg/Kg	9.6	mg/Kg
Iron	6,800 (bkg)	mg/kg	15000	mg/Kg	12000	mg/Kg	14000	mg/Kg
Lead	35.8	mg/kg	5.7	mg/Kg	6.3	mg/Kg	5.9	mg/Kg
Magnesium	-	-	2600	mg/Kg	1900	mg/Kg	2400	mg/Kg
Manganese	460 ^c	mg/kg	290	mg/Kg	210	mg/Kg	290	mg/Kg
Mercury	0.18	mg/kg	0.026U	mg/Kg	0.055	mg/Kg	0.015J	mg/Kg
Molybdenum	-	-	1.4U	mg/Kg	1.7U	mg/Kg	1.3U	mg/Kg
Nickel	22.7	mg/kg	8.3	mg/Kg	9.4	mg/Kg	7.9	mg/Kg
Potassium	-	-	2200	mg/Kg	1700	mg/Kg	1900	mg/Kg
Selenium	2 ^d	mg/kg	0.7U	mg/Kg	2.1	mg/Kg	0.49J	mg/Kg
Silver	0.733	mg/kg	0.14U	mg/Kg	0.17U	mg/Kg	0.13U	mg/Kg
Sodium	-	-	280U	mg/Kg	330U	mg/Kg	260U	mg/Kg
Thallium	-	mg/kg	0.16	mg/Kg	0.31	mg/Kg	0.16	mg/Kg
Vanadium	57 ^c	mg/kg	27	mg/Kg	28	mg/Kg	26	mg/Kg
Zinc	121	mg/kg	34	mg/Kg	28	mg/Kg	32	mg/Kg

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Analyte	Ecological Screening Standards for Sediment ²	Transect FWS 4A Right Descending	Transect FWS 4B Left Descending	Transect EPA 02 Right Descending
Sample Information				
Sample ID	-	EDEN-FWS4A-R-SD-20140602	EDEN-FWS4B-L-SD-20140602	EDEN-EPA02-R-SD-20140602
Date	-	6/2/2014	6/2/2014	6/2/2014
Time	-	1140	1315	1445
Status	-	Validation Complete	Validation Complete	Validation Complete
Type	-	Sediment	Sediment	Sediment
Physical Properties				
Percent Ash	-	-	ND % 27 %	ND %

Notes

² MacDonal, 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.

^a 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.

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

^c Sediment screening values for manganese and vanadium come from the NOAA SQuIRT. <http://response.restoration.noaa.gov/sites/default/files/SQuiRTs.pdf>

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

^e Cadmium from diet

^f Chromium (VI)

^g Methyl Mercury

^h Thallium Chloride

% Percent

EPA U.S. Environmental Protection Agency

J Value is estimated

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 ²		Transect EPA 09 Left Descending		Transect EPA 10 Left Descending		Transect EPA 11 Right Descending	
Sample Information								
Sample ID	-		EDEN-EPA09-L-SD-20140602		EDEN-EPA10-L-SD-20140602		EDEN-EPA11-R-SD-20140602	
Date	-		6/2/2014		6/2/2014		6/2/2014	
Time	-		1010		1200		1300	
Status	-		Validation Complete		Validation Complete		Validation Complete	
Type	-		Sediment		Sediment		Sediment	
Total Metals								
Aluminum	3,200 (bkg)	mg/kg	4200	mg/Kg	9000	mg/Kg	15000	mg/Kg
Antimony	2 ^a	mg/kg	1.4UJ	mg/Kg	1.4UJ	mg/Kg	1.9UJ	mg/Kg
Arsenic	9.8	mg/kg	1.4J	mg/Kg	1.9J	mg/Kg	3.9	mg/Kg
Barium	60 ^b	mg/kg	49	mg/Kg	85	mg/Kg	150	mg/Kg
Beryllium	-	-	0.31J	mg/Kg	0.54J	mg/Kg	1	mg/Kg
Boron	-	-	14U	mg/Kg	14U	mg/Kg	19U	mg/Kg
Cadmium	0.99	mg/kg	0.035J	mg/Kg	0.048J	mg/Kg	0.11	mg/Kg
Calcium	-	-	570	mg/Kg	910	mg/Kg	1800	mg/Kg
Chromium	43.4	mg/kg	15	mg/Kg	22	mg/Kg	34	mg/Kg
Cobalt	50	mg/kg	5.3	mg/Kg	6.8	mg/Kg	12	mg/Kg
Copper	31.6	mg/kg	5.5	mg/Kg	9.6	mg/Kg	20	mg/Kg
Iron	6,800 (bkg)	mg/kg	8900	mg/Kg	15000	mg/Kg	25000	mg/Kg
Lead	35.8	mg/kg	4.4	mg/Kg	7.3	mg/Kg	13	mg/Kg
Magnesium	-	-	1400	mg/Kg	1900	mg/Kg	3900	mg/Kg
Manganese	460 ^c	mg/kg	230	mg/Kg	580	mg/Kg	670	mg/Kg
Mercury	0.18	mg/kg	0.026U	mg/Kg	0.025U	mg/Kg	0.047	mg/Kg
Molybdenum	-	-	1.4U	mg/Kg	1.4U	mg/Kg	1.9U	mg/Kg
Nickel	22.7	mg/kg	5.3J	mg/Kg	7.4	mg/Kg	14	mg/Kg
Potassium	-	-	970	mg/Kg	1400	mg/Kg	2800	mg/Kg
Selenium	2 ^d	mg/kg	0.69U	mg/Kg	0.39J	mg/Kg	0.82J	mg/Kg
Silver	0.733	mg/kg	0.14U	mg/Kg	0.14U	mg/Kg	0.19U	mg/Kg
Sodium	-	-	280U	mg/Kg	270U	mg/Kg	380U	mg/Kg
Thallium	-	mg/kg	0.086J	mg/Kg	0.15	mg/Kg	0.31	mg/Kg
Vanadium	57 ^c	mg/kg	19	mg/Kg	30	mg/Kg	53	mg/Kg
Zinc	121	mg/kg	20	mg/Kg	30	mg/Kg	54	mg/Kg

EDEN NORTH CAROLINA COAL ASH SPILL SEDIMENT RESULTS

Analyte	Ecological Screening Standards for Sediment ²	Transect EPA 09 Left Descending	Transect EPA 10 Left Descending	Transect EPA 11 Right Descending
Sample Information				
Sample ID	-	EDEN-EPA09-L-SD-20140602	EDEN-EPA10-L-SD-20140602	EDEN-EPA11-R-SD-20140602
Date	-	6/2/2014	6/2/2014	6/2/2014
Time	-	1010	1200	1300
Status	-	Validation Complete	Validation Complete	Validation Complete
Type	-	Sediment	Sediment	Sediment
Physical Properties				
Percent Ash	-	1	3	ND

Notes

² 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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^c Sediment screening values for manganese and vanadium come from the NOAA SQUIRT. <http://response.restoration.noaa.gov/sites/default/files/SQUIRTs.pdf>

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

^e Cadmium from diet

^f Chromium (VI)

^g Methyl Mercury

^h Thallium Chloride

% Percent

EPA U.S. Environmental Protection Agency

J Value is estimated

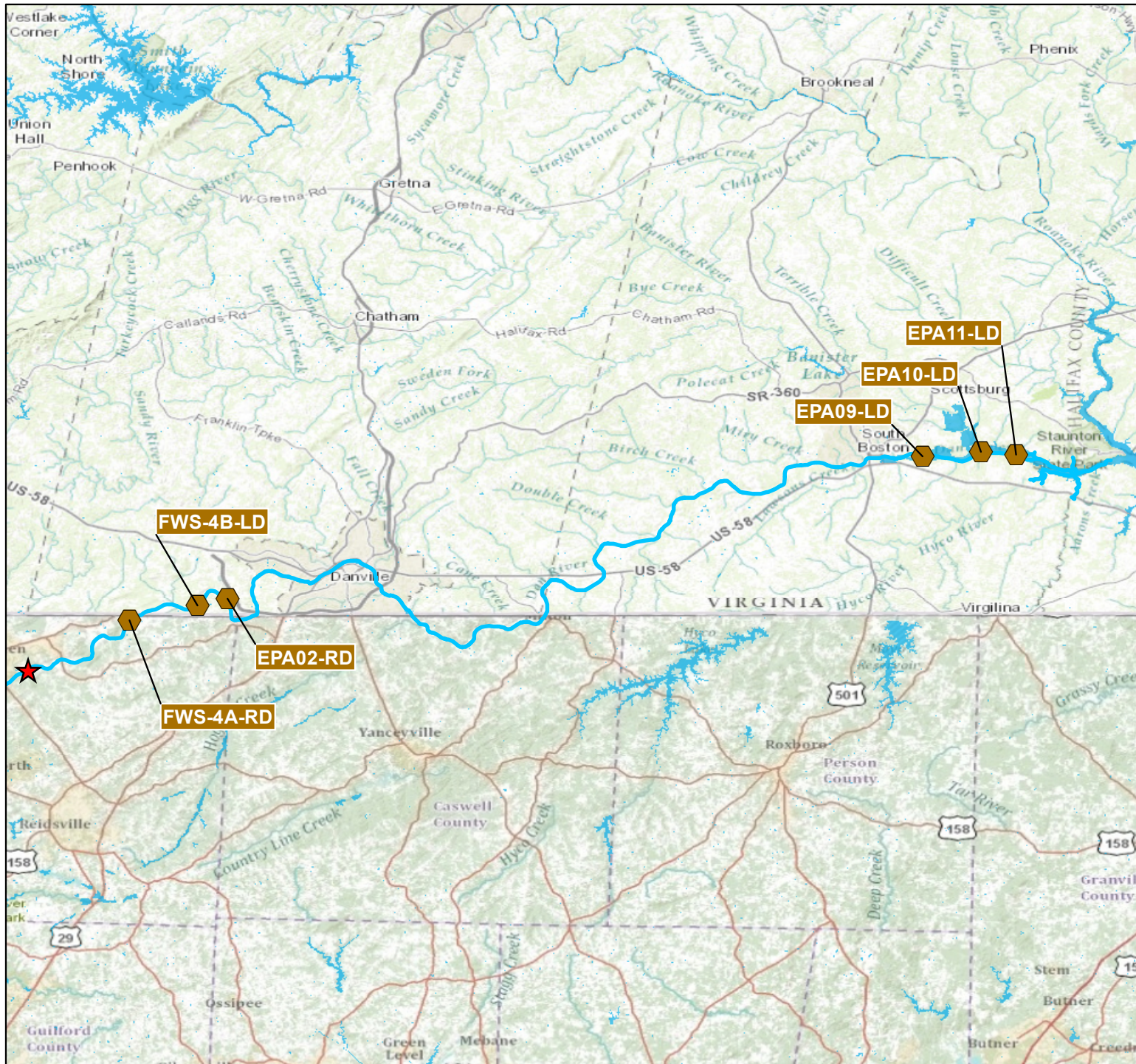
mg/kg milligrams per kilogram

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.

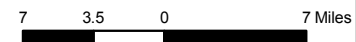
UJ Analyte was not detected at the listed reporting limit, which is an estimated quantitation.



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 02, 2014

