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December 7, 2011

via Federal Express

Operations and Readiness Division Regulatory Branch, Huntington District US Army Corps of Engineers 502 Eighth Street Huntington, WV 25701-2070

Re: LRH-2006-2394; Maple Coal Co. Sycamore North Surface Mine Project; Submission of As-Built and Year One (2011) Mitigation Monitoring Report for the Paint Creek Stream Enhancement Areas

Attn: Mr. Mark Taylor, Chief, Energy Resource Section

On behalf of our client, Maple Coal Co. (Maple), please find enclosed the As-Built and Year One (2011) Mitigation Monitoring Report covering stream enhancement areas along Paint Creek in Kanawha and Fayette Counties, West Virginia. Also enclosed for your convenience is a copy of the report on compact disk (CD) and one additional hard copy set of report drawings.

Total stream enhancement work conducted to date totals approximately 10,300 linear feet and was completed on Maple's behalf by Appalachian Stream Restoration of Chapmanville, West Virginia. The Burnwell Segment of the Paint Creek enhancement area begins near Collinsdale of Fayette County, West Virginia at approximately N 38° 02' 16", W 81° 21' 51" and runs approximately 10,000 linear feet downstream. The Standard Segment of the enhancement area begins behind the Lower Paint Creek Watershed office near Standard of Kanawha County, West Virginia at approximately N 38° 08' 23", W 81° 24' 07" and runs approximately 300 linear feet downstream.

If you have questions, require any additional information or wish to schedule a site visit, please contact Mr. Brian Bridgewater at (304) 595-2845 or via e-mail at bbridgewater@dei-wv.com.

Sincerely,

R. B. (Barry) Doss, PE, PS, MBA

Principal Engineer

As-Built and Year One (2011) Mitigation Monitoring Report Paint Creek Stream Enhancement Areas

for

Maple Coal Co. Sycamore North Surface Mine LRH-2006-2394-KAN

Paint Creek of Kanawha River Fayette & Kanawha Counties, West Virginia

submitted to

U.S. Army Corps of Engineers, Huntington District South Regulatory Section

December 2011

Purpose and Introduction

<u>Background.</u> Maple Coal Co. (Maple) was issued an Individual §404 Department of the Army Permit, LRH-2006-2394-KAN, for its Sycamore North Surface Mine¹ in July 2009. As part of the approved Compensatory Mitigation Plan (CMP), stream enhancement activities were proposed along a 10,300 foot section of Paint Creek of the Kanawha River. Maple contracted Appalachian Stream Restoration LLC of Chapmanville, West Virginia (ASR) to perform the Paint Creek enhancement work. The enhancement work, as proposed and approved in the CMP, was designed by an affiliate of ASR, Compliance Monitoring Laboratories Inc., also of Chapmanville, West Virginia (CMLI).

Maple engaged Doss Engineering, Inc. of Shrewsbury, West Virginia (DEI) as an independent third-party to prepare an initial as-built report and to conduct 2011 (year one) monitoring and inspection of the Paint Creek enhancement areas in accordance with permit guidelines and special conditions.

<u>Location</u>. The Paint Creek stream enhancement project consists of: a 10,000 linear foot segment of Paint Creek in Fayette and Kanawha Counties located near and above Burnwell (the Burnwell Segment); and a 300 linear foot segment of Paint Creek in Kanawha County located near Standard (the Standard Segment).

The Burnwell enhancement area begins near the Sunoco station at Collinsdale, with its upstream extent at N 38° 02' 16", W 81° 21' 51". The Burnwell Segment then runs approximately 10,000 linear feet downstream through Burnwell toward Greencastle, paralleling the West Virginia Turnpike (I64/I77) and West Virginia State Route 83 (SR 83). The Standard enhancement area begins behind the Lower Paint Creek Watershed office near Standard, with its upstream extent at N 38° 08' 23", W 81° 24' 07". The Standard Segment then runs approximately 300 linear feet downstream toward the WV Department of Highways (WVDOH) bridge located along SR 83. Refer to the enclosed General Location Map, Exhibit A.

Summary of Proposed Mitigation and Goals

The CMP proposed (among other mitigation work²) to enhance a total of 10,300 feet of Paint Creek to help offset permanent losses of aquatic habitat that would result from the proposed project activities.

Included in the overall goals of the stream enhancement project were to improve channel stability, morphology and stream habitat; and to enhance and/or protect the riparian corridor – all in order to improve water quality and aquatic habitat in general within the proposed enhancement reaches.

Proposed mitigation at the Burnwell Segment was designed using natural stream enhancement techniques to include as appropriate: bank stabilization by re-sloping and the addition of toe protections; the installation of appropriately designed bankfull benches; the installation of Log Vanes, Cross Vanes, W-Weirs, J-Hooks and Deflectors to improve sediment transport and reduce erosive forces; the removal of excess woody debris and garbage causing channel alteration and depositions; and the proper installation, where appropriate, of instream structures such as boulders, boulder clusters, root wads, large woody debris (LWD) and so forth in order to promote riffle/pool sequences and other suitable aquatic habitat. The mitigation plan also proposed the reestablishment, where damaged or deficient, of a riparian buffer zone of 25 feet on either side of the enhancement reaches (50 foot total) utilizing native vegetation.

Proposed mitigation at the Standard Segment was designed to concentrate on bank stabilization, the installation of cross vanes and J-Hooks to create pools and minimize width-to-depth ratio, and the reestablishment, where damaged or deficient, of a riparian buffer zone of 25 feet on either side of the enhancement reach (50 foot total) utilizing native vegetation.

Other mitigation goals and requirements included:

• Native grass species were to be seeded at the entry points to the stream corridor in those areas disturbed by construction of instream structures;

¹ SMCRA Permit S-3007-95, §402 NPDES WV1009311 and §401 State Water Quality Certification WV1009311.

² It is noted that other proposed and approved mitigation work, consisting of stream restoration along Toms and Sycamore Branches of Paint Creek, is not scheduled to be conducted until the completion of project activities.

- Paint Creek Stream Enhancement As-Built and Year One (2011) Monitoring Report
 - Site protection of stream enhancement and adjacent riparian areas was to be provided in the form of restrictive covenants; and
 - Site monitoring and maintenance was required to be conducted for a minimum of five (5) years following initial completion of each phase of the mitigation work.

Methodology

Based upon a review of the approved CMP, the §404 USACE Permit (2006-2394-KAN) and Special Conditions thereto, DEI collected and assembled data to quantify the stream enhancement work performed and as-built conditions. This included in-field inspection and surveys of installed features and vegetation surveys as briefly described below.

- 1. For both enhancement segments, site reconnaissance and visual inspection was conducted by DEI biologists and technicians. The location of each instream structure and types were documented by stream station number (i.e., X+XX).
- 2. Photographic documentation of each of the installed structures was taken from various vantage points to represent actual as-built conditions.
- 3. New River Engineering Inc. of Shrewsbury, West Virginia (NREI) was sub-contracted by DEI to assist with:
 - Setting permanent bench mark locations along each of the enhancement segments using surveygrade GPS technology (Thales Z-Max GPS system); and
 - Performing total station surveys (Topcon Model GTS-225) to record cross-sections and longitudinal profiles representative of the installed structures and stream features; and to locate and install permanent cross-section markers.
- 4. Three <u>permanent stream cross-sections</u> were selected in the Burnwell Segment to be used for future evaluation, sampling and assessment. These selected stream cross-sections included one representative of an instream structure (PMS), one in a stream riffle (PMR) and one in a stream pool (PMP). A (single) cross-section was surveyed at each site running perpendicular to channel flow direction and extending from bankfull elevation on the opposing banks.
- 5. Representative structure cross-sections were surveyed for three of the different structure types installed. The selected structures consisted of a Cross Vane, W-Weir and J-Hook. These surveys were performed in order to establish baseline data on representative structure form, construction dimensions, and to provide a basis for future monitoring and assessment (i.e., degree of stability, movement and so forth) of installed structures. Multiple cross-sections were collected at each of the selected sites, with sections running perpendicular to channel flow direction.
- 6. <u>Longitudinal profiles</u> were surveyed through each of the permanent cross-section locations (PMS, PMR, and PMP), as well as at each of the selected representative structure types (J-Hook, Cross Vane and W-Weir). These profiles were surveyed along the approximate channel thalweg, in a downstream direction.
- 7. As-built drawings were prepared by DEI to illustrate the general (plan) layout of the enhancement work as well as the location of the above-referenced surveys, cross-sections and profiles.
- 8. Rapid Bio-Assessment Protocol (RBP) habitat assessments were conducted along a 100-meter longitudinal stream reach below each of the permanent stream cross-sections (i.e., PMS, PMR and PMP). Methodology followed "Rapid Bioassessment Protocols For Use In Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish", Second Edition, EPA 841-B-99-002, Barbour, et. al. (1999).
- 9. Riparian vegetation monitoring sites were established at three locations in proximity of the permanent stream cross-sections (PMS, PMR and PMP). Vegetative surveys were conducted using EMAP

protocol "Quantifying Physical Habitat in Wadeable Streams", EPA-620-R-99-003, Kaufmann, et. al. (1999).

- 10. Wolman pebble count technique was used to characterize stream bed composition along each permanent stream cross-section station (at PMS, PMR and PMP). Sampling was limited to the localized area within each stream feature (i.e., structure, riffle or pool). Pebble count sampling technique was taken from "A Method of Sampling Coarse River Bed Material".
- 11. Macroinvertebrate benthic sample results were collected by DEI (from existing data and monitoring stations) to illustrate biological communities present along the Paint Creek enhancement area. Sample stations were at existing WV Department of Environmental Protection (WVDEP) Biological Assessment Station (BAS) sites as well as one of Maple's supplemental benthic monitoring stations along Paint Creek. Sampling methodology followed US EPA's "Rapid Bioassessment Protocols For Use In Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish", WVDNR's "Scientific Collecting Permit Standard Conditions for Environmental Assessments on Wadeable Streams", as well as WVDEP's "West Virginia Stream Condition Index (WVSCI)" protocols.
- 12. Water quality data was assembled from ongoing sampling being conducted as part of the permittee's NPDES monitoring from sites located within the Burnwell Segment of the Paint Creek enhancement area. Water quality data was also collected in conjunction with the above referenced benthic macroinvertebrate sampling.
- 13. A Functional Stream Assessment (IFAA) was conducted along the Paint Creek stream enhancement, for comparison to the IFAA data contained in the approved CMP. Methodology followed the interim "Functional Assessment Approach for High Gradient Streams", U.S. Army Corp of Engineers Engineering Research and Development Center (ERDC), (2007).
- 14. Although not required by the permit conditions, the results of two recent fish surveys were obtained and included in this report. The permittee had commissioned these surveys to be collected in the vicinity of the Paint Creek enhancement reach for an unrelated purpose. Sampling was conducted by Potesta & Associates, Inc. of Charleston West Virginia (Potesta) on two occasions during 2011. [Maple reports that future fish surveys may or may not be conducted.]
- 15. DEI performed a records review/search for recorded site protection instruments (i.e., Declaration of Restriction Covenants).

Overview of Enhancement / Mitigation Work Performed - Summary of Results

<u>Timing</u>. Stream enhancement work along Paint Creek took place in two phases from July 2009 to November 2010 and from August 2010 to March 2011. The break in construction periods was reportedly to avoid high flows and aquatic spawning seasons. All field and construction work was conducted and supervised by ASR, under direct contract with Maple. DEI began conducting site inspections and surveys in July 2011, subsequent to completion of the enhancement efforts.

<u>Number of Structures Installed.</u> Within the Burnwell Segment (from Collinsdale downstream) ASR installed forty (40) instream structures along the 10,000 foot enhancement reach. Within the Standard Segment, four (4) instream structures are observed to have been installed along the 300 foot enhancement reach. Structure locations and types can be seen on the As-Built Plan View Map in Exhibit B. Also refer to Table 1, on the following page, for a listing of structure type and location by stream station number.

<u>Riparian Zones.</u> Concerning the riparian zones adjacent to the Paint Creek enhancement areas, ASR reportedly performed visual riparian vegetative inspection and determined few areas to be damaged and/or deficient. As such, no new riparian plantings were deemed necessary or installed. Native and mature vegetation was observed by DEI to be established along much of the riparian zones adjacent to the Paint Creek enhancement areas. In areas affected by construction, (i.e., access and entry points to the stream corridor), native grasses were observed to have been seeded upon the regraded areas.

³ Wolman, M. G. (1954). A method of sampling coarse river bed material. *Trans. AGU*, 35(6), 951-956.

TABLE 1 - Location and Type of Instream Structures Along Paint Creek Enhancement Areas

Burnwell Segment					
Station					
0+00					
4+00					
7+00					
9+00					
11+00					
13+00					
15+00					
17+00					
19+00					
21+00					
23+00					
24+00					
25+00					
27+00					
29+00					
31+00					
33+00					
35+00					
37+00					
40+00					
43+00					
44+00					
47+00					
49+00					
50+00					
53+00					
55+00					
57+00					
60+00					
70+00					
75+00					
77+00					
81+00					
83+00					
85+00					
90+00					
92+00					
95+00					
99+00					
100+00					
Station					
0+00					
1+00					
2+00					
3+00					

As-Built Plan View Drawing was prepared by DEI to depict the location and type of structures installed by ASR along the Paint Creek enhancement areas. The plan view layout (and other features) is shown on Exhibit B. Details shown include stream stationing and the location of: installed instream structures, photographic documentation "vantage points", RBP habitat assessment sites, riparian vegetation survey sites, pebble count sites, benthic sampling sites, instream water quality monitoring site, fish survey sites, as well as the locations of permanent monuments for the surveyed cross-sections and structures.

<u>Photographic Documentation</u> of each of the as-built structures along the 10,300 feet of enhancement can be seen in the Appendix. Approximately 70 photographs have been included to represent structure attributes.

Photograph locations, photograph numbers and vantage points are shown on Exhibit B. At the time of inspection, no significant structural defects, hazards or failures were observed to be apparent in the enhancement areas.

Three <u>Permanent Stream Cross-Sections</u> were surveyed to be representative of an instream structure (PMS), a stream riffle (PMR) and a stream pool (PMP). These sections were located at approximately stations 0+00, 4+50, and 70+25, respectively. Detailed depictions of the permanent stream cross-sections can be found on the As-Built Sections and Profiles map in Exhibit C.

Pre-project cross-sections were included in the CMP from station 19+00 along the Burnwell Segment and an unknown location in the Standard Segment. These cross-sections were shown as being representative of the Paint Creek enhancement areas. Copies of the CMLI cross-section data (graphs) are included at the end of the Appendix.

Representative Structure Cross-sections were surveyed as previously described - to be representative of a Cross Vane, W-weir and J-Hook. The representative structures selected were located in the Burnwell Segment at stations 0+00, 4+50 and 70+25, respectively – in close proximity to the selected permanent stream cross-section stations. Multiple cross-sections were taken at each structure location. These locations can be seen on Exhibit B and are identified respectively as Structure Cross-Sections CV, WW and JH. The detailed cross-section series' and corresponding stream station locations are depicted on Exhibit C.

<u>Longitudinal Profiles</u> were surveyed through select features within the Burnwell Segment as previously described; and are depicted on Exhibit C. A profile was surveyed from 150 feet above the first Cross Vane beginning at stream station -1+50 downstream for approximately 1,000 feet to stream station 8+50. This profile passed through permanent stream cross-sections PMS and PMR as well as representative structure cross-sections CV and WW. Due to survey data corruption, approximated data had to be utilized for much of the longitudinal profile passing through representative structure cross-section JH and permanent stream cross-section PMP. The longitudinal profile through JH and PMP runs from approximately steam station 69+50 downstream to stream station 72+00.

A pre-project longitudinal profile was included in the CMP for a location near Paint Creek stream enhancement station 0+00 downstream to station 12+50. Copies of the CMLI profile (graph) are included at the end of the Appendix.

<u>Discussion of Profile and Cross-Section Data</u>. DEI notes that the bedforms observed at the time of inspection appear to generally be consistent with those observed for channels of this stream type. The collected profile and section data can also be used to determine future stability of the installed bedform features at the surveyed sites. Future profiles should show that the pools remain deep, with flat water surface slopes, and the riffles remain steeper and shallower than the pools.

Wolman Pebble Count data was collected during August 2011 from the vicinity of the three permanent cross-section sites, PMS, PMR and PMP. Pebble count estimates were also made at the benthic macroinvertebrate and RBP habitat sites at stations MCBAS-5, MCBAS-8 and Maple's supplemental site Station 10 (during September 2010 NPDES sampling as discussed below). The pebble count data was collected to serve as comparison to baseline data. Barring external influences, it would be expected that future data would indicate a relative "coarsening" within riffles (or maintenance of a coarse bed in constructed riffles) and a relative "fining" within pool areas.

A summary of substrate composition observed by DEI at each site can be found in Table 2, below. Complete copies of DEI's data and field notes can be found in the Appendix.

Pre-project pebble count data was included in the CMP from one riffle, one pool and the longitudinal profile area as being representative of the Paint Creek enhancement areas – although particular stream station or location did not appear to be identified for the former in the CMP. Copies of the CMLI pre-project pebble count data (graphs) are included at the end of the Appendix.

	Substrate Characterization								
Particle Size	Station ID								
Class	Permanent Riffle	Permanent Pool	Structure MCRAS-5* MCRAS-8* Station 10*						
Silt	0%	8%	5%	0%	0%	0%			
Sand	1%	33%	9%	5%	5%	5%			
Gravel	31%	32%	43%	25%	15%	15%			
Cobble	59%	28%	39%	65%	70%	70%			
Boulder	9%	0%	4%	5%	10%	10%			
Bedrock	0%	0%	0%	0%	0%	0%			

TABLE 2 - Substrate Characterization from Permanent Cross-Sections and BAS Sites

<u>Riparian Vegetation Surveys</u> were conducted by DEI at three locations along the Burnwell Segment of the Paint Creek enhancement areas around the selected permanent cross-section stations. A summary of this data can be found in Table 3 below. Field notes are included in the Appendix. Overall, riparian vegetation was observed to be generally well established, except at construction access points which recently had been reseeded. In the locations that were reseeded, re-vegetation primarily consisted of native grasses. It is noted that vegetation scores associated with the permanent structure monitoring site at site PMS was recorded to be a lower score for the right descending bank (RDB) due to anthropogenic influences.

TABLE 3 - Visual Riparian Estimates at Permanent Cross-Sections

		Visual Riparia	an Estimates			
	Permanent	Riffle (PMR)		t Pool (PMP)	Structu	re (PMS)
Riparian Vegetation Cover	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
Canopy (>5m high)						
Vegetation Type	D = Deciduous	D = Deciduous	D = Deciduous	D = Deciduous	D = Deciduous	D = Deciduous
Big Trees (Trunk >0.3m DBH)	2	1	1	0	2	0
Small Trees (Trunk < 0.3m DBH)	2	2	3	2	3	1
Understory (0.5 to 5m high))					
Vegetation Type	M = Mixed	D = Deciduous	D = Deciduous	D = Deciduous	D = Deciduous	D = Deciduous
Woody Shrubs & Saplings	3	3	2	2	2	1
No-Woody Herbs, Grasses, Forbes	2	2	1	2	2	3
Ground Cover (<0.5m high)					
Woody Shrubs & Saplings	1	1	1	2	2	2
No-Woody Herbs, Grasses, Forbes	3	3	2	2	2	2
Barren, Bare Dirt or Duff	1	1	1	1	1	1
	1 = Absent		D = Deciduou	S		
	2 = Sparse (<1	0%)	C = Coniferou	S		
	3 = Moderate	(10-40%)	E = Broadleaf Evergreen			
	4 = Heavy (40	-75%)	M = Mixed			
	5 = Very Heav	yy (>75%)	N= None			

^{*} Indicates visual estimations.

<u>Invasive Species</u>. DEI notes that invasive Japanese Knotweed (*Polygonum cuspidatum*) was observed to be present in many areas along Paint Creek, including within riparian zones adjacent to the enhancement areas. Eradication efforts have reportedly not been attempted within the riparian corridors due to the pre-existing and wide spread presence of knotweed. The species is observed along not only the subject riparian corridors, but also in numerous adjacent areas and locations within the Paint Creek watershed. In those areas of the stream access corridors (that were recently seeded), knotweed was not present and progression of native plants was observed. The permittee believes the pre-existing presence of Japanese Knotweed is so extensive within the watershed, that eradication would be beyond the scope of the stream enhancement project.

<u>RBP Habitat Assessments</u> were collected at three 100-meter stream reaches lying immediately downstream of each of the permanent stream cross-section stations, PMS, PMR and PMP during August 2011; and at benthic sampling stations MCBAS-5, MCBAS-8 and Maple's supplemental Station 10, during September 2010. Data derived from these existing habitat assessments can be used in comparison to baseline and future data to determine if habitat changes result.

RBP habitat scores for the referenced sites can be found in Table 4 below. Field notes describing the site locations can be found in the Appendix. Composite RBP scores for these sites ranged from 112 to 155, which overall would be indicative of suboptimal aquatic habitat.

A comparison of the post-enhancement scores calculated by DEI to the pre-project (baseline) score that was reported in the CMP of 118 shows that habitat has remained near-equal or slightly improved. It is noted that this baseline RBP habitat score of 118 was included in Appendix 5 of the CMP Addendum as being representative of the Paint Creek enhancement areas – although a particular stream station or location did not appear to be identified.

TABLE 4 - RBP Habitat Scores for Permanent Cross-Section and Benthic Collection Sites

	Habitat Parameter (High Gradient Protocol)		anent ool MP)	Ri	anent ffle MR)	Stru	anent cture MS)	МСЕ	BAS-5	МСН	BAS-8	Stati	on 10		
		Sc	ore	Sc	ore	Sc	ore	Sc	ore	Sc	ore	Sc	ore		
1	Epifaunal Substrate/Available Cover	(6	9	9		5	1	.6	1	.6	1	.6		
2	Embeddedness	1	.4	1	2	1	4	1	.3	1	.6	1	.6		
3	Velocity / Depth Regime	(6	1	4	1	0	1	0	1	.6	1	.6		
4	Sediment Deposition	1	11 12 15		16		15		1	.5					
5	Channel Flow Status	8 13		.3	10		16		16		16				
6	Channel Alteration	10		10		1	.0	1	5	1	.6	1	.5	1	.5
7	Frequency of Riffles (or bends)	1	2	1	.3	1	6	,	7	1	.5	1	.5		
		LB	RB	LB	RB	LB	RB	LB	RB	LB	RB	LB	RB		
8	Bank Stability	6	8	8	8	7	5	8	8	8	9	7	9		
9	Vegetative Protection	8	7	7	7	8	2	7	7	9	9	8	9		
10	Riparian Vegetative Zone Width	9	7	3	3	8	1	5	5	7	4	7	5		
	Total Score		12	1	19	1	16	1:	34	1	55	1:	54		
	Composite Rating	Subo	ptimal	Subo	ptimal	Subo	otimal	Subo	ptimal	Subo	ptimal	Subo	ptimal		

<u>Water Quality.</u> The following water quality data was assembled by DEI from samples being collected at one of Maple's permanent monitoring sites in Paint Creek for NPDES Permit WV1009311. This site is station UPC-1, which is located within the Burnwell Segment above the confluence of Laurel Creek at approximately enhancement station 21+00 (refer to Exhibit B). Data shown was collected between July 2010 and June 2011 and is summarized in Table 5 below. Water quality data was also collected during benthic sampling in September 2010 at sites MCBAS-5, MCBAS-8 and Station 10. This data can be found summarized in Table 6.

Collectively, this water quality data is intended to be used for comparison with future monitoring results from these sites. Although conductivity and iron were at times elevated, all other parameters appear to be within desirable limits. It is noted that the majority of the Paint Creek stream enhancement area lies upstream from

any current or future discharges from the Sycamore North project area. No adverse effects on water quality are expected to occur as a result of stream enhancement activities.

TABLE 5 - Water Quality Data from Instream Monitoring Station UPC-1, Paint Creek

Date	pН	Temp. °C	Flow (cfs)	Spec. Cond. (umhos)	Total Fe (ppm)	Total Mn (ppm)	TSS (ppm)	Al dissolved (ppm)
07/16/2010	7.86	21.6	60	702	0.340	0.087	3	0.216
08/06/2010	7.40	21.9	120	554	1.610	0.169	22	0.256
09/02/2010	7.46	19.9	40	762	0.175	0.066	3	0.235
10/12/2010	6.83	18.3	30	892	0.112	0.050	3	0.257
11/04/2010	7.08	11.8	50	805	0.386	0.158	5	0.178
12/02/2010	7.24	9.5	80	282	1.470	0.192	27	0.069
01/06/2011	7.18	6.3	80	544	0.303	0.097	3	0.066
02/16/2011	6.84	10.0	60	645	0.377	0.139	3	0.135
03/05/2011	7.06	8.3	100	406	0.375	0.088	5	0.077
04/11/2011	6.98	14.8	120	249	1.210	0.104	31	0.660
05/11/2011	6.95	16.0	90	332	0.498	0.080	8	0.095
06/09/2011	6.95	19.0	60	529	0.346	0.085	8	0.177
Max/Min	7.86 6.83	21.9 6.3	120 30	892 249	1.610 0.112	0.192 0.050	31	0.660 0.066
Average	*	14.8	74	558.5	0.600	0.110	10	0.202

TABLE 6 - Water Quality Data from Benthic Collection Sites

WATER QUALITY RESULTS (September 2010)							
		Station ID					
Parameter	MCBAS-5	MC-BAS-8	Station 10				
Field Readings							
water temperature (°C)	18	17.7	17.6				
pH (SI units)	7.95	7.98	8.05				
conductivity (µS)	970	870	1,027				
Laboratory Readings							
TSS (mg/l)	4	<3.00	4				
TDS (mg/l)	658	578	708				
nitrogen – nitrate (mg/l)	0.332	0.269	0.447				
nitrogen – nitrite (mg/l)	< 0.003	< 0.003	< 0.003				
sulfate (mg/l)	284	224	344				
chloride (mg/l)	37	43	38.4				
dissolved aluminum (mg/l)	0.536	0.214	0.185				
total aluminum (mg/l)	0.55	0.225	0.216				
dissolved iron (mg/l)	0.17	0.111	0.119				
total iron (mg/l)	0.193	0.126	0.159				
magnesium (mg/l)	48.7	34.7	62				
dissolved manganese (mg/l)	0.259	0.0374	0.0382				
total manganese (mg/l)	0.258	0.0383	0.0406				

A Functional Stream Assessment following USACE IFAA methodology was prepared by DEI for the Paint Creek enhancement area. The following IFAA scores were calculated for the purpose of meeting the requirement stated in Special Condition 19 of the permit. Although improvements are indicated versus the preproject IFAA scores that are contained in the approved CMP documents, it is noted that IFFA methodology is not specifically intended for use in (nor as an effective analysis of) large perennial streams and their watersheds.

Nonetheless, IFAA variables specific to stream channel conditions (CHANNELALT, SED, LWDEBRIS, and CHANNGEO) were estimated based on DEI's post-enhancement observations, while watershed specific variables (such as COVER, TREE, etc.) were repeated as shown in the original FA document that was submitted within the approved CMP. Resultant FCIs for functional categories (i.e., Hydrology, Biogeochemical, Plant Community, Habitat) were then multiplied by the length of stream enhancement (10,300 feet) to obtain Functional Capacity Units (FCUs) for each of these functions. Copies of applicable IFAA worksheets are included in the Appendix and summarized in Table 7 below. As can be seen, improvement is indicated.

Paint Creek Enhancement Area Paint Creek Pre-**Paint Creek Post-**Net Gain Function Enhancement Enhancement Y=1 Y=1(from CMP) FCU FCU Score **FCU** Score 5633 **Hydrology Functions** 0.14 1453 0.69 7086 0.15 1555 0.51 5252 3697 Biogeochemical Functions 0.28 2924 0.78 8009 5085 Plant Community Functions 0.23 2324 0.73 7508 **Habitat Functions** 5184 NA 8257 NA 27855 19598 Total (Memo Only)

TABLE 7 - IFAA Comparison Pre-Project to Post-Enhancement Year One

Benthic Macroinvertebrate Sample data was assembled from data collected by DEI for Maple's WVNPDES permit 1022164 during September 2010. Sample sites located on Paint Creek are MCBAS-5 (38° 03' 39.8" N, 81° 22' 26.6" W), MCBAS-8 (38° 02' 38.9" N, 81° 21' 53.9" W) and supplemental Station 10 (38° 02' 40.0" N, 81° 21' 54.9" W). Station MCBAS-5 is located on Paint Creek upstream of Paint Creek's confluence with Sycamore Branch. Station MCBAS-8 is located on Paint Creek upstream of Paint Creek's confluence with Laurel Branch. Station 10 is located on Paint Creek downstream of Paint Creek's confluence with Laurel Branch. Site locations can be seen on Exhibit B. As indicated previously, field collection, benthic macroinvertebrate sub-sampling and identifications were performed by DEI in accordance with applicable U.S. EPA, WVDNR and WVDEP protocols. This data was used to calculate WVSCI scores, which can be used for comparison to future monitoring. Biotic success and increases in WVSCI scores have been shown to correlate with an increase in suitable habitat and water quality.

Complete results of the benthic sampling can be found in the Appendix and are summarized below.

TABLE 8 - Summary of Benthic Sample Results from September 2010

IDENT	TFIER	WVSCI METRICS AND SCORES							
Station ID	Stream Name / Station	# Taxa (Family)	# EPT Taxa (Family)	% EPT	% Chironomidae	% Top 2 Dominant Taxa (Family)	HBI (Family)	WVSCI Score	WVSCI Ranking
MCBAS-5	Paint Creek, Downstream of Burnwell Segment	15	6	62.56%	7.18%	51.28%	4.69	71.40	Unimpaired, Fully Supporting
MCBAS-8	Paint Creek, 22+50	15	6	53.88%	15.05%	56.31%	5.13	66.12	Gray Zone, Not Fully Supporting
Station 10	Paint Creek, 24+00	15	5	57.21%	14.86%	50.00%	4.87	67.74	Gray Zone, Not Fully Supporting

MCBAS-5 had a WVSCI score calculated to be 71.40, which would be indicative of a "Good" ranking. This score falls above WVDEP's threshold for unimpaired stream conditions (being a WVSCI > 68.0). MCBAS-8 had a WVSCI score calculated to be 66.12, which would be indicative of a "Fair" ranking. This score falls within WVDEP's "gray zone" between biologically impaired and unimpaired stream conditions (based on a single observation). Applicant's Station 10 had a WVSCI score calculated to be 67.74, which would be indicative of a "Fair" ranking. This score falls within WVDEP's "gray zone" between biologically impaired and unimpaired stream conditions. Due to the observed WVSCI scores being < 68.0 at MCBAS-8 and Station 10, both results would be considered indicative of a stream "not fully-supporting" of aquatic use.

Concerning pre-project benthic data for Paint Creek, the approved CMP documents contained WVDEP benthic sample results from stations near Burnwell (c. 2005, MP 12.8), upstream of Standard (c. 1996, MP 6.9) and below Burnwell near Ash Camp Branch (c. 1996, MP 8.6). The reported WVSCI scores for these locations were respectively 57.12, 47.07 and 55.72. All of the September 2010 WVSCI scores exceeded these values.

<u>Fish Sample</u> survey data is being included in this report that was commissioned by Maple for an unrelated purpose. This supplemental data is provided for informational purposes only. Fish surveys are not a requirement of annual monitoring of the stream enhancement project, but will be submitted in the future if available.

Potesta conducted back-pack electro fishing at two locations along the Burnwell Segment during the 2011 sampling season. Site WC-1 is located behind the Sunoco station at N 38° 02' 25.2" W 81° 22' 08.4". Site WC-2 is located near the mouth of Laurel Branch at N 38° 02' 19.3" W 81° 21 47.9". Locations of the sample sites are shown on Exhibit B.

As can be seen in Table 9 below, there were 17 species and 241 individuals collected from WC-1 and 13 species and 148 individuals collected from WC-2. Dominant species captured included River Chub (*Nocomis micropogon*), Mottled Sculpin (*Cottus bairdii*), Central Stoneroller (*Campostoma anomalum*), Northern Hog Sucker (*Hypentelium nigricans*), Rock Bass (*Ambloplites rupestris*), Rainbow Darter (*Etheostoma caeruleum*) and Green Sunfish (*Lepomis cyanellus*). It is also noted that while upstream reaches of Paint Creek are considered by WVDNR to be trout waters, no species of trout were captured or observed by Potesta. A complete list of species and data collected can be found in the Appendix.

TABLE 9 - Fish Survey Summary, Paint Creek Near Burnwell

Fish Survey Summary						
Site ID Total # Species Total # Fish						
WC - 1	WC - 1 17					
WC - 2	13	148				

Site Protection / Restrictive Covenants. With respect to real estate instruments, Declarations of Restrictive Covenants referencing the Paint Creek enhancement (and other mitigation) areas were found to have been recorded in the Kanawha County Clerk's Office on behalf of: Floyd E. Cales in Deed Book 2756 at Page 507 dated October 30, 2009; John G. McCune in Deed Book 2756 at Page 518 dated October 30, 2009; and Pardee Minerals LLC and Pardee & Curtin Reality LLC in Deed Book 2756 at Page 525, dated October 30, 2009. Copies of these documents are understood to have previously been submitted to the USACE District Engineer (on or about November 6, 2009).

Summary of Future Monitoring and Reporting

In accordance with the USACE Special Conditions for Individual §404 Permit 2006-2394-KAN, the mitigation/stream enhancement areas in the Paint Creek watershed will be monitored and inspected annually for a minimum of five (5) years. Any future deficiencies or corrective actions will be recorded and reported to the USACE in subsequent annual monitoring reports.

All required inspections are to be conducted by a qualified aquatic biologist or other knowledgeable professional engaged on behalf of the applicant. Annual inspections will be conducted in order to monitor progress and identify any deficiencies, deviations, failures, unforeseen circumstances or unexpected problems

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that may be associated with the enhancement areas. Annual monitoring reports are to be submitted to the USACE no later than December 31 of each year following completion of mitigation - for a minimum period of five (5) years.

This report is intended to serve as the initial As-Built Report and the Year One Monitoring Report applicable to calendar year 2011.

Respectfully prepared and submitted on behalf of Maple Coal Co. by:

/s/ Brian Bridgewater

Brian B. Bridgewater, BS Biologist Doss Engineering, Inc.

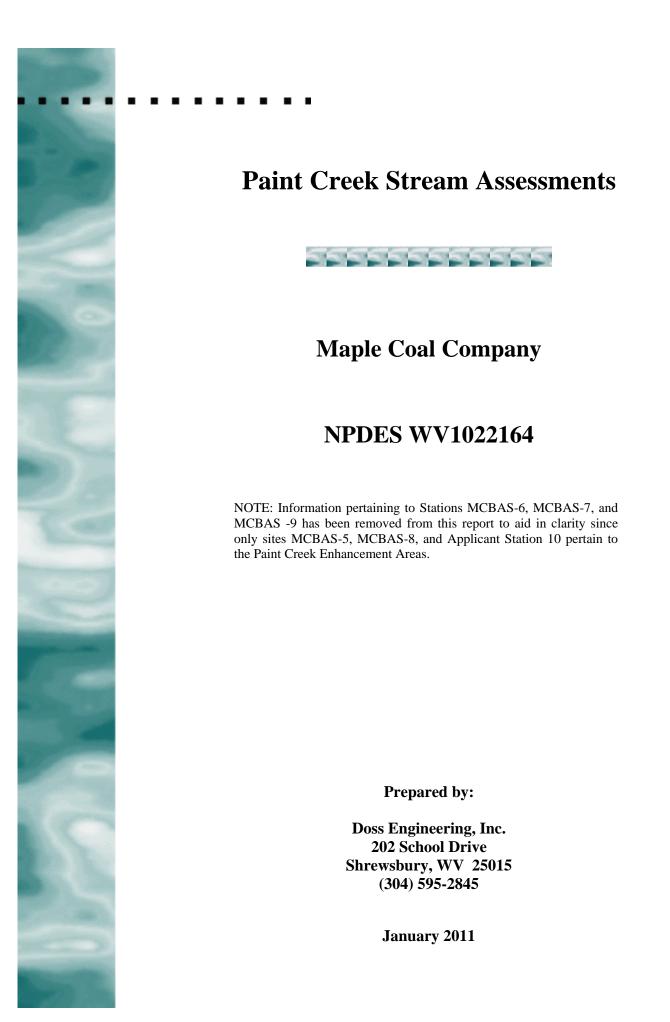
/s/ Justin Elkins

Justin M. Elkins, BS, MS Project Manager, Environmental Ecologist Doss Engineering, Inc.

/s/ R. B. Doss

R. B. (Barry) Doss, PE, PS, MBA Principal Engineer Doss Engineering, Inc.

Benthic Macroinvertebrate Report



Paint Creek Stream Assessments Maple Coal Co. Survey Conducted September 2010

Client: Maple Coal Co.

Project / Purpose: NPDES Modification, WV1022164

Biological Assessment Station (BAS) ID: <u>MCBAS-5</u>

Stream Name: Paint Creek

Location: Sampling station upstream of Sycamore Branch

confluence with Paint Creek

Latitude: 38° 03' 39.8" N Longitude: 81° 22' 26.6" W

Biological Assessment Station (BAS) ID:<u>MCBAS-8</u>

Stream Name: Paint Creek

Location: Sampling station upstream of Laurel Branch confluence

with Paint Creek

Latitude: 38° 02' 38.9" N Longitude: 81° 21' 53.9" W

Biological Assessment Station (BAS) ID: Applicant Station 10

Stream Name: Paint Creek

Location: Sample station downstream of confluence with Laurel

Branch

Latitude: 38° 02' 40.0" N Longitude: 81° 21' 54.9" W

Date Sampled: September 16, 2010

Sample Collection / Field Assessment: Doss Engineering, Inc.

Supervising Biologist: Justin Elkins, BS, MS

Methods: USEPA Rapid Bioassessment Protocols for use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition, WVDNR Scientific Collecting Permits Standard Conditions for Environmental Assessments on Wadeable Streams, as well as WVDEP's West Virginia Stream Condition Index (WVSCI) protocol.

Water Quality

Field Readings by: Doss Engineering, Inc.

Laboratory Water Analysis by: Analabs, Inc.

Benthic Sorting / Identification by:Doss Engineering, Inc.

Supervising Biologist: April Keenan, BS, MS

BACKGROUND

Stream habitat, water quality and benthic macroinvertebrate assessments were conducted September 16, 2010 at three(3) sampling stations located in Kanawha County, West Virginia Paint Creek of the Kanawha River. Station MCBAS-5 is located on Paint Creek upstream of Paint Creek's confluence with Sycamore Branch. Station MCBAS-8 is located on Paint Creek upstream of Paint Creek's confluence with Laurel Branch. Applicant Station 10 is located on Paint Creek downstream of Paint Creek's confluence with Laurel Branch.

Biological Assessment Station (BAS) points were chosen by West Virginia Department of Environmental Protection (WVDEP) personnel. Sampling was conducted for inclusion in the NPDES WV1022164 modification application. Substrate characterization, visual riparian estimates, rapid bioassessment protocol (RBP) habitat assessments, field collection, benthic macroinvertebrate sub-sampling and identifications were performed by Doss Engineering, Inc (DEI) of Shrewsbury, West Virginia. Laboratory analysis of water samples was performed by Analabs, Inc of Beckley, West Virginia.

It is noted that water quality results discussed below are indicative of a one-time sampling event and should not be construed as an indicator of long-term or short-term water quality trends within the streams.

Results for each station are summarized below and are shown in attached tables.

DISCUSSION

Station MCBAS-5 was judged to exhibit suboptimal aquatic habitat, scoring a 134 out of a possible 200 RBP, with the marginal parameters being "Velocity / Depth Regime", "Frequency of Riffles (or bends)", and the "Riparian Zone Width" along both banks. A visual substrate characterization was performed at this station and revealed that the substrate was dominated by cobbles (see table, Substrate Characterization). Habitat did not appear to be a limiting factor affecting the health of the benthic macroinvertebrate community present at this sampling station. Field water measurements revealed a slightly basic pH (7.95) with elevated conductivity (970 μ S/cm). Laboratory water analysis revealed trace amounts of most constituents of interest, while levels of magnesium (48.7 mg/l) were observed to be elevated and above the recommended range for aquatic organisms. TDS (658 mg/l) and total hardness (380 mg/l) were elevated at this station. Levels of acidity, alkalinity, TSS and remaining parameters were within acceptable limits.

Concerning benthic identification, the target benthic subsample consisted of 195 individuals (Full Pick) from 21 different taxa, with 62.56% of these individuals from EPT orders. Mayflies and caddisflies were both abundant and diverse, while stoneflies were entirely absent from this station. The WVSCI score was calculated to be 71.40, which would be indicative of a "Good" ranking. This score falls above WVDEP's threshold for unimpaired stream conditions (being a WVSCI > 68.0). The WVSCI score was not limited by any of the six parameters used to calculate the score. Overall, the benthic macroinvertebrate population present at this station could be concluded to be healthy and unimpaired.

Station MCBAS-8 was judged to exhibit suboptimal aquatic habitat, scoring a 155 out of a possible 200 RBP, with the only marginal parameter being the "Riparian Zone Width" along the right bank. A visual substrate characterization was performed at this station and revealed that the substrate was dominated by cobbles (see table, Substrate Characterization). Habitat did not appear to be a limiting factor affecting the health of the benthic macroinvertebrate community present at this sampling station. Field water measurements revealed a slightly basic pH (7.98) with elevated conductivity (870 μ S/cm). Laboratory water analysis revealed trace amounts of most constituents of interest, while levels of magnesium (34.7 mg/l) were observed to be elevated and above the recommended range for aquatic organisms. TDS (578 mg/l) and total hardness (300 mg/l) were both slightly elevated at this station. Total hardness was within the recommended range for aquatic organisms. Levels of acidity, alkalinity, TSS and remaining parameters were within acceptable limits.

Concerning benthic identification, the target benthic subsample consisted of 206 individuals from 14 different families, with 53.88% of these individuals from EPT orders. Mayflies were fairly abundant and diverse. Stoneflies were entirely absent from this station. Caddisflies were abundant, but not diverse. The WVSCI score was calculated to be 66.12, which would be indicative of a "Fair" ranking. This score falls within WVDEP's "gray zone" between biologically impaired and unimpaired stream conditions. The WVSCI score was slightly limited by the Hilsenhoff Biotic Index (HBI). Overall, the benthic macroinvertebrate population

present at this station could be concluded to be fairly healthy, but due to the HBI score, only slightly above WVDEP's threshold for biological impairment and eligibility for 303(d) listing (i.e., a WVSCI score below 60.6 for single observations).

Applicant's Station 10 was judged to exhibit suboptimal aquatic habitat, scoring a 154 out of a possible 200 RBP, with the only marginal parameter being the "Riparian Zone Width" along the right bank. A visual substrate characterization was performed at this station and revealed that the substrate was dominated by cobble (see table, Substrate Characterization). Habitat did not appear to be a limiting factor affecting the health of the benthic macroinvertebrate community present at this sampling station. Field water measurements revealed a slightly basic pH (8.05) with elevated conductivity (1,027 μS/cm). Laboratory water analysis revealed trace amounts of most constituents of interest, while levels of magnesium (62.0 mg/l) were observed to be elevated and above the recommended range for aquatic organisms. TDS (708 mg/l) were moderately elevated at this station. Total hardness (448 mg/l) was elevated and above the recommended range for aquatic organisms. Levels of acidity, alkalinity, TSS and remaining parameters were within acceptable limits.

Concerning benthic identification, the target benthic subsample consisted of 222 individuals from 21 different taxa, with 57.21% of these individuals from EPT orders. Mayflies were fairly abundant and diverse. Stoneflies were entirely absent from this station. Caddisflies were abundant, but only fairly diverse. The WVSCI score was calculated to be 67.74, which would be indicative of a "Fair" ranking. This score falls within WVDEP's "gray zone" between biologically impaired and unimpaired stream conditions. All six metrics used to calculate the WVSCI score fell in the fair range. No individual metric limited the score. Overall, the benthic macroinvertebrate population present at this station could be concluded to be fairly healthy, but fell slightly below WVDEP's threshold for biologically unimpaired stream conditions (i.e., a WVSCI score above 68.0 for single observations).

	HABITAT ASSESSMENTS									
	Habitat Parameter (High Gradient Protocol)				Station ID					
Hab					SAS-8	Stati	on 10			
1	Epifaunal Substrate/Available Cover	1	6	1	6	1	6			
2	Embeddedness	1	3	1	6	1	6			
3	Velocity / Depth Regime	1	0	16		16				
4	Sediment Deposition	16		15		15				
5	Channel Flow Status	16		16		16				
6	Channel Alteration	1	6	1	5	1	5			
7	Frequency of Riffles (or bends)	,	7	1	5	1	5			
		LB	RB	LB	RB	LB	RB			
8	Bank Stability	8	8	8	9	7	9			
9	Vegetative Protection	7	7	9	9	8	9			
10	Riparian Vegetative Zone Width	5	5	7	4	7	5			
	Total Score				55	1:	54			
	Composite Rating	Subo	ptimal	Subo	otimal	Suboj	otimal			

RBP Habitat Assessments of each were conducted based upon ten parameters in three categories which include:

Primary – Substrate and Instream Cover

- Epifaunal Substrate: Substrate favorable for macroinvertebrate and fish colonization.
- <u>Embeddedness</u>: The degree to which the bottom substrate is surrounded by sedimentation.
- <u>Velocity/Depth</u>: Presence of all four flow regimes, slow deep, slow shallow, fast deep, fast shallow.

Secondary – Channel Morphology

- Sediment Deposition: The degree to which sediment has changed the contour of the flow regime.
- <u>Channel Flow Status</u>: Percentage of the stream channel filled with water.
- Channel Alteration: Percentage of stream alteration not caused by a natural event.
- Frequency of Riffles: Relative occurrence of riffles.

Tertiary – Riparian and Bank Stability

- Bank Stability: Left bank (LB) and right bank (RB) erosion levels, vegetative cover height.
- Vegetative Cover: Left bank (LB) and right bank (RB) native vegetative cover.
- Riparian Zone: Left bank (LB) and right bank (RB) distance from stream channel to human impact.

Qualitative rankings associated with these habitat assessments can be described as follows:

- Optimal: Habitat which has the structure and stability of substrate necessary to sustain a viable benthic macroinvertebrate population. Primary and Secondary Scores (16-20); Tertiary (9-10).
- <u>Suboptimal</u>: Habitat with 40% to 70% of the necessary structure and stability of substrate to sustain a viable benthic macroinvertebrate population. Primary and Secondary Scores (11-15); Tertiary (6-8).
- <u>Marginal</u>: Habitat with 20% to 40% of the necessary structure and stability of substrate to sustain a viable benthic macroinvertebrate population. Primary and Secondary Scores (6-10); Tertiary (3-5).
- <u>Poor</u>: Habitat with less than 20% of the necessary structure and stability of substrate to sustain a viable benthic macroinvertebrate population. Primary and Secondary Scores (0-5); Tertiary (0-2).

Substrate Characterization						
	Station ID					
Particle Size Class	MCBAS-5*	MCBAS-8*	Station 10*			
Silt	0%	0%	0%			
Sand	5%	5%	5%			
Gravel	25%	15%	15%			
Cobble	65%	70%	70%			
Boulder	5%	10%	10%			
Bedrock	0%	0%	0%			

^{*}Indicates Visual Substrate Characterization.

Particle Size Ranges: Silt 0 - 0.062 mm;

Sand 0.062 - 2 mm; Gravel 2 - 64 mm; Cobble 64 - 256 mm;

Boulder 256 - 4096 mm; and

Bedrock >4096 mm

WATER QUALITY RESULTS					
Parameter		Station ID			
rarameter	MC-BAS-5	MC-BAS-8	Station 10		
water temperature (°C)	18.0	17.7	17.6		
pH (SI units)	7.95	7.98	8.05		
conductivity (µS)	970	870	1,027		
acidity (mg/l)	<4.97	<4.97	<4.97		
alkalinity (mg/l)	146	160	174		
TSS (mg/l)	4	<3.00	4		
TDS (mg/l)	658	578	708		
total hardness (mg/l)	380	300	448		
total organic carbon (mg/l)	1.75	1.97	1.80		
nitrogen - nitrate (mg/l)	0.332	0.269	0.447		
nitrogen - nitrite (mg/l)	< 0.003	< 0.003	< 0.003		
sulfate (mg/l)	284	224	344		
chloride (mg/l)	37.0	43.0	38.4		
dissolved aluminum (mg/l)	0.5360	0.2140	0.1850		
total aluminum (mg/l)	0.5500	0.2250	0.2160		
calcium (mg/l)	71.8	63.0	77.2		
dissolved iron (mg/l)	0.1700	0.1110	0.1190		
total iron (mg/l)	0.1930	0.1260	0.1590		
magnesium (mg/l)	48.7	34.7	62.0		
dissolved manganese (mg/l)	0.2590	0.0374	0.0382		
total manganese (mg/l)	0.2580	0.0383	0.0406		
sodium (mg/l)	87.4	97.0	84.6		
mercury (ug/l)	< 0.049	< 0.049	< 0.049		
antimony (ug/l)	< 0.572	< 0.572	< 0.572		
arsenic (ug/l)	0.288	0.414	0.298		
barium (ug/l)	81.5	71.0	65.5		
beryllium (ug/l)	0.290	< 0.248	< 0.248		
cadmium (ug/l)	< 0.194	< 0.194	< 0.194		
chromium (ug/l)	< 0.304	< 0.304	< 0.304		
copper (ug/l)	2.20	<1.91	<1.91		
lead (ug/l)	0.182	< 0.178	0.262		
nickel (ug/l)	10.1	5.12	5.74		
selenium (ug/l)	1.10	0.781	2.03		
silver (ug/l)	< 0.560	< 0.560	< 0.560		
thallium (ug/l)	<0.238	<0.238	< 0.238		
zinc (ug/l)	15.1	4.22	4.40		

Ranges For Select Chemical Water Quality Constituents					
Water Quality Parameter	Water Quality Parameter Range for Freshwater Organisms				
pН	6 to 9	Stumm and Morgan 1996			
Alkalinity	10 to 400 mg/L	Jenkins et. al. 1995			
Calcium	4 to 160 mg/L	Heinen 1996			
Chloride	<230 mg/L	46 CSR WVDEP			
Sulfate	<850 mg/L	Jenkins et. al. 1995			
Iron	< 1 mg/L	Jenkins et. al. 1995			
Magnesium	< 28 mg/L	Heinen 1996			
Manganese	< 1 mg/L	Heinen 1996; Jenkins et. al. 1996			
Selenium	<0.005 mg/L	US EPA 1986			
Aluminum	<0.750 mg/L	WVDEP 2006			
Hardness	10 to 400 mg/L	Heinen 1996			

BENTHIC SUBSAMPLE					
Tr	Station ID				
Taxonomy	MCBAS-5	MCBAS-8	Station 10		
Insecta					
Ephemeroptera (mayflies)					
Ameletidae (S)		8			
Baetidae (F)		12			
Acentrella (F)	3		2		
Baetis (T)	32		8		
Plauditus (F)	1		4		
Caenidae					
Caenis (T)	1				
Ephemerellidae (S)		4			
Heptageniidae (F)			5		
Maccaffertium (F)	3				
Isonychiidae		1			
Isonychia (S)			4		
Plecoptera (stoneflies)					
Chloroperlidae (S)					
Leuctridae (S)					
Perlodidae (S)					
Trichoptera (caddisflies)					
Hydropsychidae (F)		85			
Ceratopsyche (F)	49		49		
Cheumatopsyche (F)	13		29		
Hydropsyche (F)					
Hydroptilidae (F)		1			
Hydroptila (T)	19		25		
Leucotrichia (T)			1		
Philopotamidae (S)					
Chimarra (F)	1				
Polycentropodidae (F)					
Psychomyiidae (S)					
Rhyacophilidae (S)					
Rhyacophila (S)					
Diptera (true flies)					
Athericidae (S)		1			
Atherix (S)	2		2		
Ceratopogonidae					
Atrichopogon (T)					
Chironomidae (T)	14	31	33		

BENTHIC SUBS.	BENTHIC SUBSAMPLE (continued)					
T.	Station ID					
Taxonomy	MCBAS-5	MCBAS-8	Station 10			
Dixidae						
Dixa (S)						
Empididae						
Hemerodromia (T)	1		2			
Simuliidae (T)		25				
Simulium (T)			11			
Tanyderidae						
Protoplasa (T)	1					
Tipulidae (S)		1				
Antocha (S)	1		4			
Tipula (F)						
Coleoptera (beetles)						
Elmidae (F)		19				
Macronychus (F)			1			
Optioservus (F)	30		20			
Oulimnius (F)	7		10			
Stenelmis (F)	1					
Psephenidae (F)						
Ectopria (F)						
Megaloptera (hellgrammites)						
Corydalidae (S)		4				
Corydalus (S)	7		2			
Nigronia (S)	2					
Sialidae (S)						
Odonata (dragonflies & damselflies)						
Gomphidae						
Lanthus (S)						
Lepidoptera (caterpillars)						
Noctuidae (T)						
Decapoda (crayfish)						
Cambaridae (T)						
Cambarus (T)						
Annelida						
Oligochaeta (aquatic worms) (T)		11				
Enchytraeidae (T)			4			
Tubificidae (T)	5					

BENTHIC SUBSAMPLE (continued)					
Taxonomy	Station ID				
Taxonomy	MCBAS-5 MCBAS-8		Station 10		
Pelecypoda (clams)					
Pisidiidae					
Pisidium (T)			1		
Gastropoda (snails)					
Planorbidae (T)					
Hydrachnida (water mites) (T)	2	3	5		
Collembola (springtails) (T)					
Total Individuals	195	206	222		
Total Taxa (Genus)	21	14	21		
Total Taxa (Family)	15	15	15		
Sensitive Taxa	4	6	4		
% Sensitive	6.20%	9.22%	5.41%		
Facultative Taxa	9	4	8		
% Facultative	55.40%	56.80%	54.05%		
Tolerant Taxa	8	4	8		
% Tolerant	38.50%	33.98%	40.54%		

S = Sensitive F = Facultative T = Tolerant U = Unclassified

IDE	NTIFIER	WVSCI METRICS AND SCORES							
Station ID	Stream Name	# Taxa (Family)	# EPT Taxa (Family)	% EPT	% Chironomidae	% Top 2 Dominant Taxa (Family)	HBI (Family)	WVSCI Score	WVSCI Ranking
MCBAS-5	Paint Creek	15	6	62.56%	7.18%	51.28%	4.69	71.40	Unimpaired
MCBAS-8	Paint Creek	15	6	53.88	15.05	56.31	5.13	66.12	Gray Zone
Station 10	Paint Creek	15	5	57.21%	14.86%	50.00%	4.87	67.74	Gray Zone

West Virginia Stream Condition Index Ranges and Ranks				
WVSCI Score	Listing Category	Rank		
78.01-100	Unimpaired	Very Good		
68.01-78.00	Unimpaired	Good		
60.61-68.00	Gray Zone*	Fair		
45.01-60.60	Impaired	rair		
22.01-45.00	Impaired Poor			
0-22.00	Impaired	Very Poor		

^{*} According to WVDEP, streams with single observation WVSCI scores less than 60.6 are considered biologically impaired and eligible for inclusion on the State's 303(d) list of impaired waters. WVDEP's statistical threshold for impairment is 68.0. But for single observation WVSCI scores between 60.6 and 68.0, WVDEP considers these to be within a "gray zone".



Station MCBAS-5, Upstream View



Station MCBAS-8, Upstream View



Applicant Station 10, Upstream View