Chemical Data from Mill Creek
at 91 Chimney Drive, Hunker Hill, WV 254[illegible]

Temperature	—	10.5°C	5°C	
pH	—	7.5	7	
Alkalinity	120 ppm $CaCO_3$ (Calcium carbonate)	160 ppm	140 ppm $CaCO_3$	
Nitrate-Nitrogen	0-1	0	0	
phosphates	0	0	0	
Dissolved Oxygen	I don't have this	[illegible]	152 ppm	

November

November 28th 2009

December 12th 2009

Bar Graphs to compare data.

Papers from Sampling with Jessie and Meghan

Data Sheet

dep

Save Our Streams

http://[illegible]

(1) Determine your stream-reach boundary: this is a stream length up to 100-meters, which may be more or less under certain circumstances. (2) Near the lower end of the reach (in the deepest portion of the run), collect water samples and analyze using the chemical tests you have available. You may use your collection container to observe watercolor and clarity and to determine water odors. (3) Measure the width-depth and velocity, and estimate the water level. (4) Using a kick-net, collect a minimum of three benthic macroinvertebrate samples from the best riffles or runs within your stream reach. Use the tally sheet on page three to record information about your collections. (5) Evaluate the physical and habitat conditions, and record information about known land use activities. (6) Sketch your reach or submit photographs with the survey, and add any other comments that you feel are important for evaluating the conditions of your stream study site.

Stream name: Mill Creek Survey date: 11/23/05
Watershed: ______ County: Berkeley
Latitude: ______ Longitude: ______ Directions to site: ______
Start time: 9:00 Am
Survey completed by: ______ Site code: 12:30 pm
Affiliation: ______ Email: ______
Mailing address: ______ Phone number: ______

Water chemistry: Use the boxes below to record the results of your water chemistry analysis; attach additional sheets if necessary.

	Result	units		Result	units		Result	units
Temperature (C/F)	10.5	C	Conductivity			Alkalinity	160	ppm
Dissolved oxygen			Nitrate/Nitrite	C	ppm	Metals (describe)		
pH	7.5		Phosphate	0	ppm	Fecal/E-coli		

Additional tests (describe and record results) ______

Physical conditions: Use the check boxes below to describe the conditions that closely resemble those of your stream. The extra lines are provided to write in any additional comments. You may see more than one type of condition; if so, be sure to indicate these on your survey (check all that apply). If multiple conditions are observed, always indicate the most dominant condition. Note: If the condition you observe is not listed, describe it in the comment section.

Water clarity		Water color		Water odor		Surface foam	
Clear		None		None	✓	None	
Murky	✓	Brown	✓	Fishy		Slight	
Milky		Black		Musky		Moderate	
Muddy		Orange/red		Rotten egg		High	
Other (describe)		Gray/White		Sewage			
		Green		Chemical			

Algae color		Algae abundance		Algae growth habit		Streambed color	
Light green		None		Even coating	✓	Brown	✓
Dark green		Scattered		Hairy		Black	
Brown	✓	Moderate	✓	Matted		Green	
Other (describe)		Heavy		Floating		White/gray	
						Orange/red	

Physical condition comments: [illegible] Recent rain!
recent rain

Estimate the % of your reach that is shaded	> 80	80 - 60	60 - 40	< 40
	Excellent	Good	Fair	Poor

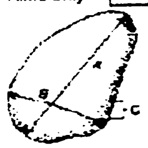
Circle your estimate

[...]omposition: You should always collect information about the composition of your reach. You can either [...] proportions or you use a **pebble count** for a more accurate measure of composition. At a minimum you [...]timate composition of the riffles within your reach. The size categories are determined by the intermediate axis [...] measured in millimeters.

[...]d you estimate [ ] or count [✓] ? Use the table below to record the data.

Silt/clay < 0.06 Very small; having a smooth slick feel	Sand 0.06 – 2 Very small, having a grainy feel	Gravel 2 – 64 Pea to tennis ball	Cobble 65 – 255 Tennis ball to basketball	Boulder 256 – 1096 Basketball to car size	Bedrock > 1096 Usually larger than a car; solid rock surface	Woody debris No size range Includes leaves, sticks, bark etc.	Other
卌 IIII	I	卌 卌 III	卌 卌 卌 I	卌 IIII 卌 卌	III	卌 卌 卌 卌 卌 卌 卌 卌	IIII

Riffle only [ ] Entire reach [✓]



(A) Long axis (Length)
(B) Intermediate axis (Width)
(C) Short axis (Height)

Pebble counts require two people, one in the stream and one on shore. The person in the stream walks upstream from bank to bank using a zigzag pattern. After each step the person reaches down without looking, picks up the first particle touched, and measures the intermediate axis with a ruler. The on-shore partner records the measurement. The process continues until 100 pebbles have been measured or the reach has been walked. **Note:** WV Save Our Streams recommends that a minimum of 50 be collected from the entire reach and 20 if collecting from riffles only.

Land use: Indicate the land uses that you believe may be having an impact on your stream station. Use the letters (S) streamside, (M) within ¼ mile and (W) somewhere in the watershed, to indicate the approximate location of the disturbance and the numbers (1) slight, (2) moderate or (3) high, to represent the level of disturbance.

Active construction	W	1	Pastureland	M	1	Single-family residences	M	1
Mountaintop mining	—		Cropland	W	1	Sub-urban developments		
Deep mining	—		Intensive feedlots	—		Parking lots, strip-malls etc.	—	
Abandoned mining	—		Unpaved Roads	W	1	Paved Roads	M	1
Logging	—		Trash dumps	—		Bridges	M	
Oil and gas wells	—		Landfills	—		Other (describe)		
Recreation (parks, trails etc.)	✓	1	Industrial areas	—				

Land use comments Small [illegible] apt/[illegible] near — mostly single family homes — most of creek has a good [illegible]

Pipes? Yes **No** ✓

Describe the types of pipes observed and indicate if there is any discharge from the pipes. Also describe the color and odor of the discharge. —

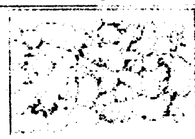
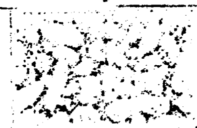
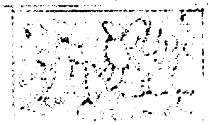
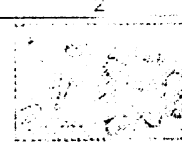
Photograph and sketch your study reach: Use the space below or a separate piece of paper to draw your study reach. Indicate the direction of flow, north, sample locations and important features of the reach. Photographs are an excellent method for tracking changes, especially changes related to the condition of the habitat. Choose a minimum of two permanent locations from which to take your photos. Submit your photos with your survey data sheet.

Date ______ Time ______

...h measurements. Record the wetted width and depth from at least one of the channel's habitats (riffle, ... Record the average depth from a minimum of five measurements (one of these should be from the deepest ... habitat). The width should be measured from the widest section of the feature. Be sure to indicate the type(s) ... that you have chosen. It is best to complete this task during your discharge measurements (see page 6)

1. Width (feet) ~~25'5"~~ 25'5" Depth (feet) ______ Riffle [ ] Run [✓] Pool ______
2. Width (feet) 15'10" Depth (feet) ______

Habitat conditions: Rate the habitat conditions by choosing the best description for the reach. Bank stability and riparian buffer width are assessed on both the **left** and **right** side of the stream. Indicate your choice by writing **O, S, M** or **P** in the spaces provided.

	8	6	4	2
Embeddedness				
	Fine sediments surrounds < 10% of the spaces between the gravel, cobble and boulders.	Fine sediment surrounds 10-30% of the spaces between the gravel, cobble and boulders.	Fine sediment surrounds 30-60% of the spaces between the gravel, cobble and boulders.	Fine sediment surrounds > 60% of the spaces between the gravel, cobble and boulders.
8	Optimal	Suboptimal	Marginal	Poor

Embeddedness should be evaluated in riffles/runs prior to or during your macroinvertebrate collections.

Sediment deposition	Little or no formation of depositional features < 20% of the reach affected. See below for examples	Some increase in depositional features; 20-40% of the reach affected.	Moderate amounts of depositional features, 40-60% of the reach affected.	Heavy amounts of deposition. > 60% of the reach affected.
4	Optimal	Suboptimal	Marginal	Poor

The next two conditions are evaluated on both the left and the right sides of the stream.

	4	3	2	1
Bank stability	Banks are stable; no evidence of erosion or bank failure; little or no potential for future problems. < 10% of the reach affected.	Banks are moderately stable; infrequent areas of erosion occur mostly shown by banks healed over; a few bare spots; 10-30 % of the reach affected.	Banks are moderately unstable; 30-60% of the reach has some areas of erosion; high potential for erosion during flooding events.	Banks are unstable; many have eroded areas (bare soils) along straight sections or bends; obvious bank collapse or failure; > 60% affected.
4	Optimal	Suboptimal	Marginal	Poor
Riparian buffer width	Mainly undisturbed vegetation > 60 ft; no evidence of human impacts such as parking lots, road beds, clear-cuts, mowed areas, crops, lawns, etc.	Zone of undisturbed vegetation 40-60 ft; some areas of disturbance evident.	Zone of undisturbed vegetation 20-40 ft; disturbed areas common throughout the reach.	Zone of undisturbed vegetation < 20 ft; disturbed areas common throughout the entire reach.
5	Optimal	Suboptimal	Marginal	Poor
Total	[illegible] (Optimal)	25 - [illegible] (Suboptimal)	18 - 12 (Marginal)	< 12 Poor

Habitat condition comments: ______

[illegible] cause the formation of [illegible] deposits, usually at the beginning of a [illegible] increases in size as the channel is diverted [illegible] or result in the filling of runs and pools [illegible] evident in areas that are [illegible] where the stream [illegible]

Date ______ Time ______

ve: Convert the abundance rating into numbers using this code: (A = 6; C = 3; R = 1). Follow the instructions le table below to complete all the necessary calculations.

Multiply the abundance number by the tolerance to calculate the tolerance score. Add the entire tolerance score column and the relative abundance column. Divide the total tolerance by the relative abundance total. This is calculation is called the **Biotic Index**.

2. Calculate the total number of kinds. This calculation is called the **Total Taxa**.
3. Calculate the total number of kinds from the **stoneflies, mayflies**, caddisflies and common netspinner groups by adding the kinds together. This calculation is called **EPT Taxa**.
4. You will determine a point value for three (metric) calculations by comparing your calculated value to the values in the table. The point values from each calculation are added together to determine your overall stream score and rating. [redacted] indicate that multiple kinds are possible within the group.

Benthic macroinvertebrates	Abundance	Tolerance	Tolerance Score	Number of Kinds (**Taxa**)
Insect Groups				
Stoneflies (Order Plecoptera)		2		[redacted]
Mayflies (Order Ephemeroptera)	1	3	3	[redacted]
Case-building caddisflies (Order Trichoptera)		3		[redacted]
Net-spinning caddisflies (Order Trichoptera)	3	4	12	[redacted]
Common netspinner (Family Hydropsychidae)		5		
Dragonflies (Order Odonata, sub-order Anisoptera)		4		[redacted]
Damselflies (Order Odonata, sub-order Zygoptera)		7		[redacted]
Riffle beetle (Family Elmidae)		4		
Water penny (Family Psephenidae)		3		
Other beetles (Order Coleoptera)		6		[redacted]
Fishfly/Helgrammite (Family Corydalidae)		3		
Alderfly (Family Sialidae)		6		
Non-biting midge (Family Chironomidae)		8		
Black fly (Family Simuliidae)		6		
Crane fly (Family Tipulidae)	2	4	8	
Watersnipe fly (Family Athericidae)		3		
Other true flies (Order Diptera)	1	6	6	[redacted]
Non-Insect Groups				
Water mite (Order Hydrachnida)		6		
Crayfish (Order Decapoda)		5		
Scud/Sideswimmer (Order Amphipoda)	2	5	10	
Aquatic sowbug (Order Isopoda)		7		
Operculate snails (Class Gastropoda, sub-class Prosobranchia)		4		[redacted]
Non-operculate snails (Class Gastropoda, sub-class Pulmonata)		7		[redacted]
Clams (Order Veneroida)		6		[redacted]
Mussel (Family Unionidae)		4		
Aquatic worm (Class Oligochaeta)		10		
Leech (Class Hirudinea)		10		
Flatworm (Class Turbellaria)		7		
Other invertebrates: _____	Total Abundance 9		Total Tolerance 3	**Total Taxa**

Metrics	Calculated Values	Point Values	8	6	4	2
Total Taxa			> 18	18 - 12	11 - 6	**< 6**
EPT Taxa			> 10	10 - 7	6 - 3	**< 3**
Biotic Index	1.3		< 4.0	4.0 – 5.2	5.3 – 6.5	**> 6.5**
	Total points					
	Rating Scale		> 20 Optimal	20 - 15 Suboptimal	**14 - 9 Marginal**	< 9 Poor

(b) Level one survey

Date _____ Time _____