

## Individual Permit In-Stream Monitoring Provisions for Resource Extraction in Non-OSRW Streams of the Eastern Kentucky Coalfields

### Pre-Mining, In-Stream Monitoring Provisions:

- 1) A one year, pre-mining biological community assessment and semi-monthly physico-chemical sampling is required for all individual permits before any land disturbance has occurred. Biological community assessment includes a macroinvertebrate (in streams with catchment areas of 200 square miles or less) or fish (in streams with catchment areas greater than 200 square miles) assessment, habitat assessment and photo-documentation for each in-stream sampling station.
- 2) Prior to onset of sampling, a comprehensive study plan shall be submitted to KDOW for review and approval. **This study plan must have all the requirements listed in the Quality Assurance Project Plan application (KDOW 2010).** Copies of Kentucky Department of Fish and Wildlife Resources and U.S. Fish and Wildlife Service collecting permits shall be included with the study plan.
- 3) In-stream habitat and biological monitoring protocols will follow those outlined in *Methods for Conducting Resource Extraction Individual Permit Intensive Surveys in Non-OSRW Streams of the Eastern Kentucky Coalfields (KDOW 2010b)*.
- 4) Macroinvertebrate and/or fish community data will be used as a description of baseline conditions for each potentially impacted watershed.
- 5) In-stream, physico-chemical parameters for pre-resource extraction and active resource extraction monitoring provisions are listed in the table below:

Characteristic	Analysis Method	Minimum	Average	Maximum	Sample Type
Flow (cfs)			Report	Report	Instantaneous
Dissolved Oxygen (mg/L)	SM 4500-O		Report	Report	Grab
Temperature (°F)	SM 2550		Report	Report	Grab
Conductivity (µS/cm)	SM 2510		Report	Report	Grab
Alkalinity (as mg/l CaCO <sub>3</sub> )	SM 2320		Report	Report	Grab
pH (standard units)	SM 4500-H+	Report		Report	Grab
Total Dissolved Solids (mg/l)	160.1		Report	Report	Grab
Total Suspended Solids (mg/l)	SM 2540		Report	Report	Grab

Characteristic	Analysis Method	Minimum	Average	Maximum	Sample Type
Sulfates (as mg/l SO <sub>4</sub> )	300.0		Report	Report	Grab
Chlorides (mg/l)	300.0		Report	Report	Grab
Total Calcium (µg/l)	200.7		Report	Report	Grab
Total Magnesium (µg/l)	200.7		Report	Report	Grab
Total Sodium (µg/l)	200.7		Report	Report	Grab
Total Potassium (µg/l)	200.7		Report	Report	Grab
Total Antimony (µg/l)	200.8		Report	Report	Grab
Total Arsenic (µg/l)	200.8		Report	Report	Grab
Total Beryllium (ug/l)	200.8		Report	Report	Grab
Total Cadmium (µg/l)	200.8		Report	Report	Grab
Total Copper (µg/l)	200.8		Report	Report	Grab
Total Chromium (ug/l)	200.8		Report	Report	Grab
Total Iron (µg/l)	200.7		Report	Report	Grab
Total Lead (µg/l)	200.8		Report	Report	Grab
Total Manganese (µg/l)	200.8		Report	Report	Grab
Total Mercury (µg/l)	1631E or 245.7		Report	Report	Grab
Total Nickel (µg/l)	200.8		Report	Report	Grab
Total Selenium (µg/l)	200.8		Report	Report	Grab
Total Silver (ug/l)	200.8		Report	Report	Grab
Total Thallium (µg/l)	200.8		Report	Report	Grab
Total Zinc (µg/l)	200.8		Report	Report	Grab
Hardness (as mg/l CaCO <sub>3</sub> )	SM 2340B		Report	Report	Grab

Water quality sampling sites shall be established on the main-stem between each tributary that shall be affected by the proposed project. A control site shall be included above all disturbances in the watershed. Each tributary shall also be monitored for water quality parameters. These sampling

sites shall coincide with the aquatic macroinvertebrate sites which shall be required. At least one of these sampling events shall be conducted during a rainfall event (> 1 inch of rain within a 24 hour period).

### **In-Stream Monitoring Program Provisions – through Phase 2 bond release**

- 1) Water Chemistry Characterization (monthly)
- 2) Habitat Assessment (yearly)
- 3) Macroinvertebrate Community Assessment (yearly)

### **Data Reporting Provisions:**

- 1) All quarterly reports shall be submitted to the Division of Water by the end of each quarter.
- 2) All quarterly reports will be compiled into a final calendar year report. The final year report shall be submitted to the Division of Water no later than February 15<sup>th</sup> of the following year.
- 3) All final reports will contain a yearly and seasonal comparison of all past reported data. This comparison will include but not limited to water quality data, habitat assessment and macroinvertebrate metric assessments or fish IBI scores and assessments.
- 4) All stations will be identified by latitude and longitude in decimal degrees. Mile points will also be given for each station.
- 5) The macroinvertebrate metrics that will be used to determine stream health will include but will not be limited the following metrics for macroinvertebrates: Taxa richness; Total Number of Individuals; EPT; m%EPT; mHBI; %Ephemeroptera; %Clingers; and %Chironomidae+Oligochaeta. For macroinvertebrates: calculation of the Macroinvertebrate Bioassessment Index (MBI) will be included in the report. The MBI template to be used is located in this website. For Fish: Index of Biotic Integrity (IBI) based on Kentucky Division of Water assessments and re-evaluations. The KIBI template to be used is located on this website.
- 6) A CD in an Excel Spreadsheet format shall be included with the aforementioned yearly report with all past pre-resource extraction sampling data included with the current sampling year's data. Subsequent data CD's will include only the current sampling year. Data that shall be included but not limited to: Date of sampling; Time of sampling; Station ID, Number and all pertinent site information; Sampler ID; Method of sampling; Macroinvertebrates, fish, and water quality data in separate files and associated metrics with each site; and habitat information sheets.

- 7) Examples of data analysis can be found in the following: *Methods for Conducting Resource Extraction Individual Permit Intensive Surveys in Non-OSRW Streams of the Eastern Kentucky Coalfields (KDOW 2010b)*.

**Required Standard Operating Procedures for Intensive Surveys:**

See: *Methods for Conducting Resource Extraction Individual Permit Intensive Surveys in Non-OSRW Streams of the Eastern Kentucky Coalfields (KDOW 2010b)*.

**Data Reporting Requirements:**

See: *Methods for Conducting Resource Extraction Individual Permit Intensive Surveys in Non-OSRW Streams of the Eastern Kentucky Coalfields (KDOW 2010b)*.

**REFERENCES**

Kentucky Division of Water. 2010a. Quality Assurance Project Plan Individual Coal Mining Permits - Focus Monitoring for Water Quality, Biological Communities and Habitat Conditions. Kentucky Department for Environmental Protection, Frankfort, KY.

Kentucky Division of Water. 2010b. Methods for Conducting Resource Extraction Individual Permit Intensive Surveys in Non-OSRW Streams of the Eastern Kentucky Coalfields. Kentucky Department for Environmental Protection, Frankfort, KY.