# World Water Monitoring Day™ Clark Fork Quality Assurance Plan 2008

prepared by the Clark Fork Watershed Education Program

This document outlines procedures that students, teachers and volunteers will follow when conducting a World Water Monitoring Day (WWMD) water monitoring project in the Upper Clark Fork Basin to ensure that data collected and analyzed is credible so that it may be used in future watershed studies.

**Project Organization:** World Water Monitoring Day™ in the Upper Clark Fork River Basin is coordinated by the Clark Fork Watershed Education Program (CFWEP) with support from the Montana Department of Environmental Quality (DEQ); monitoring is conducted by area students and teachers, with support from the CFWEP.

**Project Goals:** WWMD is an international education and outreach program that builds public awareness and involvement in protecting water resources around the world by engaging citizens to conduct basic monitoring of their local water bodies. The CFWEP fosters environmental stewardship and scientific decision-making through place-based learning.

The Upper Clark Fork Basin connects the nation's largest complex of Superfund environmental cleanup sites. Communities and ecosystems in the basin have been heavily impacted by over 100 years of mining, development and industry. The goals of ongoing water quality monitoring in the basin are to:

- Assess current environmental health
- Assess the effects of ongoing restoration
- Determine the continued impacts, if any, of historic environmental damages
- Promote the future health of the watershed

**Project Description:** During the timeframe of WWMD (Sept. 18-Oct. 18), interested teachers and students will sample 2 separate Clark Fork River (or associated tributary or other local water body) sites. Sampling will include measurements of pH, turbidity, water temperature, and dissolved oxygen using standardized equipment, as well as general qualitative assessments of each site. Students will conduct all monitoring tasks, with oversight and assistance from teachers, and, if needed, CFWEP staff and/or volunteer experts. Sampling at each site will occur on the same day. After sampling, collected data will be reviewed by students, teachers, CFWEP staff, and/or volunteer experts for quality assurance purposes. Data will then be entered into the WWMD online database (by students, teachers, or CFWEP staff). For additional information and details, refer to the CFWEP WWMD Lesson Plans.

**Training Requirements:** This project has been designed to require little training. However, teachers should review all CFWEP WWMD Lesson Plans and Curriculum Materials prior to undertaking a class water monitoring project. These materials provide all necessary background information. If additional information, training, or other assistance is required, teachers are encouraged to contact the CFWEP. All necessary training for students to conduct safe, successful water monitoring is delivered via the Lessons Plans and Curriculum Materials, primarily in Lesson 1.

**Documentation, Records & Data Management:** Upon completion of the monitoring project, the CFWEP will maintain hardcopies of all collected data (Data Sheets and Watershed Surveys). Students and teachers may also maintain copies, if desired. Data will also be entered into CFWEP databases, and the online WWMD database.

**Sampling Design and Requirements, Analytical Methods Requirements, and Quality Control Requirements:** For specific details, refer to the CFWEP WWMD Lesson Plans (particularly Lesson Plan 2 – Field Trip).

**Instrument/Equipment Testing, Inspection, Maintenance, and Calibration Requirements:** All necessary field equipment for monitoring projects can be obtained from the CFWEP. The CFWEP follows a regular schedule for equipment testing, inspection, maintenance and calibration.

## Data Collection Quality Objectives:

***Precision:*** Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. It tells you how consistent and reproducible your field or laboratory methods are by showing you how close your measurements are to each other. It does not mean that the sample results actually reflect the "true" value, but rather that your sampling and analysis are giving consistent results under similar conditions. Typically, precision is monitored through the use of replicate samples or measurements. Replicate samples are two or more samples taken from the same place at the same time.
*In the field, students will take several replicate samples at each site in order to ensure precision.*

***Accuracy:*** Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Measurement accuracy can be determined by comparing a sample that has a known value, such as a standard reference material or a performance evaluation sample, to a volunteer's measurement of that sample.
*In the first in-class Lesson, students honed their accuracy skills by measuring water samples and comparing their results to known values.*

***Representativeness:*** Representativeness is the extent to which measurements actually depict the true environmental condition or population you are evaluating. A number of factors may affect the representativeness of your data. For instance, are your sampling locations indicative of the waterbody? Data collected just below a pipe outfall is not representative of an entire stream. Minimizing the effects of variation is critical in the development of your sampling design.
*In the field, students will ensure representativeness by collecting data at two separate monitoring sites, and by observing and noting site-specific factors that may affect the representativeness of their data.*

***Completeness:*** Completeness is a measure of the number of samples you must take to be able to use the information, as compared to the number of samples you originally planned to take. Since there are many reasons why your volunteers may not collect as many samples as planned, as a general rule you should try to take more samples than you determine you actually need.
*In the field, students will promote completeness by taking more samples than are needed at each site.*

***Comparability:*** Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. For example, you may wish to compare two seasons of summer data from your project or compare your summer data set to one collected 10 years ago by state biologists. Using standardized sampling and analytical methods, units of reporting, and site selection procedures helps ensure comparability. However, it is important to keep in mind that some types of monitoring rely heavily on best professional judgment and that standard methods may not always exist.
*In the field, students will promote comparability by using standardized sampling and analytical methods, units of reporting, and site selection procedures.*

***Detection Limit:*** The term *detection limit* can apply to monitoring and analytical instruments as well as to methods. In general, detection limit is defined as the lowest concentration of a given pollutant your methods or equipment can detect and report as greater than zero. Readings that fall below the detection limit are too unreliable to use in your data set.

***Measurement Range:*** The *measurement range* is the range of reliable measurements of an instrument or measuring device. Preassembled kits usually come with information indicating the measurement range that applies. For example, you might purchase a kit that is capable of detecting pH falling between 6.1 and 8.1. However, pH can theoretically range from 0.0 to 14.00. If acidic conditions (below 6) are a problem in the waters you are monitoring, you will need to use a kit or meter that is sensitive to the lower pH ranges.