

**Kiskatinaw River Watershed Monitoring Network: Standard operating
guidelines (working document)**

Quality Assurance and Quality Control Guidelines

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This document is to accompany all surface water and piezometer data sets produced by UNBC as part of the Kiskatinaw River Watershed Research Program.

DISCLAIMER

This document is to accompany all Kiskatinaw River Monitoring Network data sets. It is advised that all data users read this document so to ensure proper data interpretation. Subsequent quality control and quality assurance procedures may result in differences between the current delivered data set and future data sets. It is the responsibility of all persons who use this data set to independently confirm the accuracy of the data, information, or results obtained through its use.

INTRODUCTION

The purpose of this document is to outline the quality assurance and quality control procedures that were taken during data collection and analysis of surface water and piezometer data. Detailed methodology of equipment installation is not discussed here but rather in other chapters of the Kiskatinaw Monitoring Network standard operating procedures. The following definitions were used as guidelines in forming these QA-QC procedures:

Quality Assurance: set procedures concerning data review. Conducted by personnel not directly involved with the data development process.

Quality Control: a system of routine technical activities that check data integrity, correctness and completeness. This also includes procedures to detect and address data errors.

QUALITY CONTROL: PRE-FIELD PROCEDURES

Training Requirements

Due to the complex nature of successful development of the monitoring network, specifically cross sections, subsequent rating curves and operation of capacitance water level recorders, all field personnel must be competent with the following material and associated field procedures: BC hydrometric standards, Sontek acoustic Doppler training video and user's manual, Sontek's software, Odyssey capacitance water level user's manual and software. Field personnel must also adhere to and be competent with all requirements listed under the Kiskatinaw Watershed Safety Plan.

General

- Ensure up-to-date software is installed on all primary and back up field computers.
- Original software installation disks should be copied and one copy should accompany staff into the field.
- All equipment is inspected prior to departure for damage and battery life.
- Extra capacitance data loggers, batteries and user manuals always accompany staff into the field.

QUALITY CONTROL: FIELD PROCEDURES

| General |
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| Detailed site notes recorded for each cross section indicating channel morphology, cross section location and other visual observations. All measurements taken and recorded within an instruments internal memory bank must also be recorded in field notebook. |
| Capacitance water probes are calibrated at least once per year. |
| All gauges and piezometers are surveyed in with 3 benchmarks. Survey to be verified at least once per year. |
| All capacitance probes are removed from casings and capacitance cables are cleaned from excess sediment/dirt buildup. |
| Silica gel moisture packets in Odyssey data logger housing must be changed during each site visit. |
| Grease sealant must be applied to threads of data logger housing during each site visit. |

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| Data logger battery voltage must be checked during each site visit and battery replaced if voltage is below 6.8 volts. |
| Data logger trace mode should be run for each logger to ensure proper functioning. |
| Thought should be given to the channel characteristics and data logger time interval should be set such that peaks in water level are captured. |
| Surface Water |
| Sontek flow tracker - always run qa/qc test on flow tracker prior to commencing cross section - individual discharge measurements are repeated if large SNR variance, large velocity error or poor boundary conditions. - upon completion of cross section, data review on flow tracker is necessary to ensure depths, velocities and discharges do not exceed the prescribed limits. |
| Evaluation of cross section location to examine change in morphology and representation of site. |
| Piezometers |
| Manual water level and inside casing depth is measured during each site visit. |
| Piezometers are only installed if hyporheic zone is reached. In case of East Headwater left bank and West Headwater right bank no piezometers were installed as groundwater was not reached. |

QUALITY CONTROL: POST FIELD PROCEDURES

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| General | |
| At the end of each field day all recorded data and pictures must be downloaded and backed-up. | |
| Data Management | |
| Raw data files must be saved according to site file, date and time. | |
| Routine back up of data must be completed. | |
| Data Rationalization for data loggers - general | |
| All data logger calibration values will be entered and graphed against raw capacitance values. Calibrated water level values will be calculated (for verification of Odyssey software calibrated output). | |
| Calibrated data values are compared with manual field measurements for accuracy. | |
| Data is reviewed, graphed and inspected for spikes and suspect values. | |
| In the case of data spikes, capacitance values will be shifted down or up for the value and range of the spike. | |
| In the case of single spike values or obvious capacitance jumps for minimal time stamps, the average water level will be used in replacement of the spiked values. | |
| For instream piezometers and water gauges data spikes from wave action are smoothed. | |
| Data Coding | |
| f | Flood conditions |
| i | Ice conditions |
| e | Estimated data value: discharge exceeds that of measured value or spike in data and average value used. |
| m | Data missing: due to logger error or physical damage of logger from flood or animal |
| s | Data shift: shifted due to logger spike or data drift was greater than 5 units. |
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| Data Rationalization-Surface Water Rating Curve Development |
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| Rating curve was only developed if a minimum of 5 cross sections were completed during stable channel condition. Beaver dams at Oetata and East Headwater caused a shift in the rating curve and further data collection is required. |
| Discharge-stage relationship above the highest measured value must be estimated using an extrapolation method: the area-velocity method, Manning's formula and possible modeling using available software. |
| Discharge values calculated above the highest measured value are always considered and marked as estimated values. |
| Annual hydrographs must be verified by plotting against measured discharge values. |
| Data Rationalization - Piezometers |
| The water table must be calculated using the inside piezometer water depths. Water table is defined as the distance below the ground surface in which water is present. The ground surface is considered zero so water table values will be negative. |

QUALITY ASSURANCE PROCEDURES

| General |
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| An external reviewer should go over data sets and data rationalization procedures to ensure accurate data compilation and rationalization |
| Data is checked for transcription errors |
| Data is compiled and graphed for visual observation of any spikes, outliers |
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| Surface Water |
| Review of discharge data and comparison of reaches and stream orders. Ensure that corresponding discharge aligns with associated stream order and overall hierarchy in watershed. |
| In case of sudden rise in water level, compare across all gauges in watershed to see if similar rise/spike was experienced. |
| Review precipitation data around times of water level spike. |

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