United States Department of the Interior
U.S. GEOLOGICAL SURVEY
Reston, Virginia 20192

In Reply Refer To:
Mail Stop 415

April 1, 2014

MEMORANDUM

OFFICE OF SURFACE WATER TECHNICAL MEMORANDUM 2014.04

SUBJECT: Quality Assurance Checks of Acoustic Doppler Current Profilers

The purpose of this memorandum is to establish policy regarding routine ADCP Quality Assurance (AQA) checks on SonTek[1] RiverSurveyors and Teledyne-RDI (TRDI) Acoustic Doppler Current Profilers (ADCPs) used for making velocity and discharge measurements in the Water Mission Area (WMA) of the U.S. Geological Survey (USGS). This memorandum states the policy and provides a description of how the AQA program will work.

Although this memo is specific to the SonTek and TRDI ADCPs, it is the intent of the Office of Surface Water and the Hydrologic Instrumentation Facility to expand this program to include other ADCPs as they become available and more widely used throughout the WMA. Separate guidance will be issued to cover other meters as they are added to the program; the purpose and structure of the overall program will remain the same regardless of manufacturer.

ADCP Quality Assurance Program Policy

Beginning in fiscal year 2014, the OSW is implementing an ADCP Quality Assurance program for checking the beam alignment and documenting the performance of all ADCPs used in the USGS WMA programs. Every bottom tracking ADCP used for making velocity and discharge measurements in the USGS WMA will be required to be checked by the Hydrologic Instrumentation Facility's Hydraulic Laboratory (HIF-HL) at least once every three years.

As a part of this program, every bottom tracking ADCP used in the USGS WMA is required to be registered and tracked in a database maintained by the HIF. USGS Water Science Centers (WSC) will be notified when an ADCP is due for an AQA check based on the information in the database. ADCPs selected for AQA checks will be sent to the HIF-HL. The HIF-HL will check the meter's ability to 1) measure the distance made good (DMG) over a fixed distance within the manufacturer's specifications; 2) measure the temperature within ± 2 degrees Celsius of a National Institute of Standards and Technology (NIST) traceable reference thermometer; and 3) pass the ADCP diagnostic self-check tests (TRDI ADCP Test or SonTek Self-Test). ADCPs passing the AQA check will be shipped back to the WSC along with a

[1] Any use of trade, product, or firm names in this document is for descriptive purposes only and does not imply endorsement by the U.S. Government.

summary report of its performance. Meters failing the AQA check will, at the WSC's option, be sent directly to the manufacturer for repairs and rechecked by HIF-HL, or removed from service. The repair costs will be the responsibility of the WSC.

In addition to AQA checks on existing ADCPs, all new ADCPs purchased directly from the manufacturer and/or meters sent to the HIF or the manufacturer for repair, must be AQA checked in the HIF-HL before being placed into service for the first time or back in service. Meters purchased through the HIF will be AQA checked as part of the HIF's standard QA/QC process.

How the AQA Program Will Work

Registration of ADCPs: ADCPs in use by the USGS must be registered in a central database developed and maintained by the HIF. Data entry into the ADCP database will be made using a web-based user interface. The URL for the registration interface is http://1stop.usgs.gov/ADCP/. After the user logs into the interface using their USGS Active Directory ID, the following information needs to be entered to register each meter:

1. Meter serial number;
2. Primary contact name and email address;
3. Secondary contact name and email address;
4. Office location (the WSC is automatically included in the database based on the user ID of the person entering the meter information); and
5. The date of purchase.

Additional information will be required for the TRDI ADCPs:

ADCP	Additional Information Required
TRDI StreamPro	StreamPro probe serial number
	Probe length (standard, 2 ft., or extended)
	Compass installed (Y or N)
	GPS option (Y or N)
TRDI RiverRay	Vertical beam (Y or N)
TRDI Rio Grande	Acoustic frequency (1200 kHz or 600 kHz)

The OSW is requesting that all ADCPs be registered by May 1, 2014. The completion of registration by this date will allow the AQA checking to start during the third quarter of Fiscal Year 2014.

Notification that AQA check is due and scheduling: Like with the FlowTracker QA program, the HIF will send an email to the primary and secondary contacts listed in the ADCP database and the Data Chief of the WSC, requesting that the office contact the HIF-HL to schedule the AQA check of their meter. The AQA checks will be spread out over the entire fiscal year to distribute the workload at the HIF-HL. The number of meters scheduled for AQA checks from any one office in any one year will not exceed 1/3 + 1 of the meters registered at the WSC office. Following the AQA check and any associated updates to firmware, the meter will be returned to its owner. If meters are scheduled 1 to 2 weeks ahead of time with the HIF-HL, it is anticipated that turnaround time will be less than 5 working days.

The AQA check program will be phased in over the next year starting with the TRDI StreamPro meter. Existing registered meters may continue in use until they are scheduled for an AQA check sometime during the first 3 years.

AQA check at HIF-HL: When a meter arrives at the HIF-HL it will be inspected for physical damage. The meters will have either an ADCP test (TRDI), or self-test (SonTek), conducted and recorded to verify the meter is working correctly. The temperature probe will then be checked against a NIST traceable thermometer. Finally, the meter will be towed over a fixed distance 16 times, 8 forward and 8 reverse, with beam 1 orientated 0 degrees to the towing direction (4 tows); turned 45 degrees to the towing direction (4 tows); turned 90 degrees to the towing direction (4 tows); and turned 135 degrees to the towing direction (4 tows). The report describing a summary of the meter's performance during the AQA check will be emailed to the contacts in the database and the WSC Data Chief. An electronic copy of the AQA report will be accessible from the database once the meter has been checked. The meter's AQA check data files will be archived at the HIF and will be available upon request by the WCS.

If electronic or physical problems are found with the meter, the WSC office will be contacted and given the option to remove the meter from service or have the HIF send the meter to the manufacturer for repair at the expense of the WSC. Repaired meters will have the AQA checks repeated by the HIF-HL before return to the WSC.

WSC Costs

The cost to the WSCs for the AQA check of their ADCPs will be the cost of shipping the meters to the HIF-HL using a track-able method and any repair costs that may be required. The cost of the ADCP AQA check and return shipping will be covered by the OSW.

It is possible that a WSC may want to have an ADCP AQA checked outside of the normal 3-year cycle outlined in this memorandum. This may be necessary as a result of the meter being physically harmed in some way or because the routine field diagnostic self-check tests show a problem. If a WSC wishes to have an ADCP AQA checked they can contact the HIF and schedule the meter for the AQA check. The cost for AQA checking of a meter is currently $400.00 per meter (subject to change).

Additional Information

If you have any questions regarding the ADCP database, you can contact Karen Ray at ktray@usgs.gov (228-688-1528). If you have any questions regarding the AQA program, please contact Kirk Thibodeaux at kgthibod@usgs.gov (228-688-1508).

/signed/
Robert R. Mason, Jr.
Deputy Chief, Office of Surface Water

Distribution: GS-W All