



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

In Reply Refer To:
Mail Stop 411

September 12, 2017

MEMORANDUM

OFFICE OF GROUNDWATER TECHNICAL MEMORANDUM 2017.04

SUBJECT: Policy and Procedures for Processing and Publishing Discrete Groundwater-Level Records

Purpose and Scope

[Office of Groundwater Policy 2017.03](#) describes procedures for processing and publishing time-series groundwater-level records. The process is similar for groundwater, surface-water and water-quality time-series data, so joint Technical Memoranda were released. Differences among the way groundwater, surface-water, and water-quality discrete measurements are processed necessitated a separate policy memorandum for discrete groundwater-level records.

This memorandum defines the procedural steps for processing and publishing discrete groundwater-level records. Explicit guidelines, including a station analysis template and approval guidance, are provided to help satisfy the requirements for records processing at routine discrete-only data sites. The scope of this policy includes discrete groundwater-level measurements collected and stored in the National Water Information System (NWIS) for all U.S. Geological Survey (USGS) programs and projects regardless of data source (e.g., USGS collected or furnished data). Routine discrete measurements from multiple-year project, regular network, or synoptic wells and measurements collected as part of a routine water-quality sampling event are the focus of this policy. Discrete calibration measurements collected during a continuous or real-time site visit must be processed, reviewed, and approved in the same manner as records from discrete-only sites, but the calibration measurements can be managed with the times-series records as described in [Office of Groundwater Policy 2017.03](#).

Introduction

All discrete water-level measurements, regardless of purpose described above, are part of the water-level record for a site. Because of the importance in maintaining high standards of data for internal and external users, it is important for USGS Water Science Centers (WSCs) to have formal procedures for review, approval, and publication of discrete water-level records.

Current policies ([Office of Groundwater Technical Memorandum 2015.01](#) and [WRD Policy Memorandum 2010.02](#)) define timelines for continuously processing and approving both discrete and continuous records throughout the year, but procedures for meeting these goals are inconsistent across and within WSCs, often varying greatly between studies and data programs. In order to help WSCs work more efficiently and to provide consistency in workflow, guidelines and procedures were developed with more clearly defined roles and expectations. Fully implementing the use of the Water Mission Area supported site information management system and records management system will help ensure that all who have a responsibility for water-level records have the necessary supporting documents to effectively review them and document records processing.

Guidelines and procedures outlined in this policy will help Centers work in a consistent manner and in a way that will make the transition easier as NWIS modernization products and AQUARIUS software enhancements for discrete groundwater record management become available.

Policy

The workflow terminology for discrete groundwater records processing and publication has been revised to be descriptive, precise, and consistent with time-series records. The new internal data states for discrete groundwater-level data are *working*, *analyzed*, and *approved*. The data processing roles in the records management system are Operator, Analyst, and Approver. The Operator is the person assigned to make site visits and collect field data and often serves as the Analyst. Records will be analyzed for discrete periods of time by a hydrographer (the Analyst); more than one Analyst may be needed in some situations. A second hydrographer (the Approver) will examine the analysis and either approve the record, or return it to the Analyst, informing them of what needs to be resolved in order for the records to be approved. The WSC Director or designee will assign the appropriate individuals to the data processing roles based on experience in collecting and processing groundwater data. After data are approved, any additional examination of groundwater-level records will be considered an audit. Routine audits are not required for discrete groundwater-level records, but WSCs may elect to perform audits at regular intervals to verify the effectiveness of the approval process. Non-routine audits may occur at any time and on any aspect of an approved record that needs to be re-examined. The audit is documented with a description of what was examined, why it was examined, and the outcome of the examination. Errors found during audits are subject to defined error threshold criteria for revisions as defined in [Office of Groundwater Technical Memorandum 2017.02](#). Documentation of the analysis, approval, and any audits is required to be done in the Water Mission Area supported records management system. No discrete groundwater level-data stored in NWIS may be published unless they have been processed following these procedures. When followed, this policy meets the requirements of the USGS Fundamental Science Practices for review and release of scientific data on the National Water Information System Web Interface (NWISWeb) as described in Survey Manual (SM) [Chapter 502.8](#).

Currently (2017), discrete groundwater-level records are stored in the Groundwater Site Information System (GWSI) where the data aging codes are: 'In Review, presumed satisfactory' (S), 'Reviewed and Accepted, approved' (R), and 'Rejected' (Q). While groundwater-level records are stored in GWSI, records should remain coded as 'In Review', equivalent to the new 'working' state, until they have been analyzed according to guidelines and they are either approved or rejected.

Data states for discrete groundwater-level records will follow the same definitions as time-series data:

1. **Working:** Raw data collected and entered into NWIS are in the working data state. These data are as accurate as possible following current best practices and in compliance with Technical Office and Water Mission Area policies for collection and database entry. Working data are shown in GWSI as "In Review" and displayed on NWISWeb as "Provisional".
2. **Analyzed:** The analyzed state is defined as fully processed data following current guidelines. Analysis of the data should begin as soon as practical after the field visit. If, during the analysis of a period, it is determined that there are insufficient data to complete the analysis, the data state will remain as working until issues are resolved. Analyzed records must have a complete station analysis for the analysis period for routine discrete water-level sites. Synoptic network sites measured once annually or less often do not require a station analysis when there is an interpretive product documenting the evaluation of the water-level measurements. A separate station analysis is not required for the discrete calibration measurement collected at a continuous record site; instead, the analysis summary for both types of records can be combined in the time series station analysis. Analyzed data are labeled as such in the records management system, shown in GWSI as "In Review", and displayed on NWISWeb as "Provisional".
3. **Approved:** The approved data state is defined as completely analyzed water-level data, including examination for errors and proper interpretation. Following full resolution of any problems identified, the record is set to Approved by a second hydrographer. Approved data are labeled as such in the records management system, shown in GWSI as "Reviewed and Accepted, approved", and displayed on NWISWeb as "Approved" and are considered "published".

Guidelines for Processing Records

Explicit guidance on the tasks required to achieve the analyzed and approved data states for groundwater-level records at discrete-only sites is provided at <https://water.usgs.gov/ogw/policy/discrete-data-guidance/>. These documents may be updated when new software developments impact workflow. They include:

Process of Analyzing, Approving, and Auditing Discrete Groundwater-Level Records

This document describes tasks and procedures for consistent processing of discrete water-level records. Documentation for these water-level records at discrete-only sites is maintained in the site and records management systems.

Station Analysis Template for Discrete-Only Groundwater-Level Sites

The station analysis provides a basis for review and serves as a reference in the event that questions arise about the records in the future. It is used to document anomalies in the record (deviation from expected behavior); changes in site conditions over time that may help explain the record; and non-standard activity at the site during data collection that might affect the record or interpretation of the record. The Water Mission Area supported records management system has been updated to manage the station analysis for discrete water-level records.

Approval Guidance for Discrete-Only Groundwater-Level Sites

This document contains a list of tasks that a data approver should include in the approval process. A brief summary addressing any issues should be written in the approval summary in the records management system for routine discrete sites.

REFERENCES

U.S. Geological Survey, 2010, Continuous Records Processing of all Water Time Series Data, Water Resources Discipline Policy Memorandum 2010.02 (available online at <http://water.usgs.gov/admin/memo/policy/wrdpolicy10.02.html>)

Office of Groundwater, 2014, Update of Policies on Storage, Review, and Publication of Discrete Groundwater-Level Data, Office of Groundwater Technical Memorandum 2015.01 (available online at <https://water.usgs.gov/admin/memo/GW/gw2015.01.pdf>)

U.S. Geological Survey Manual Chapter 502.8 – Fundamental Science Practices: Review and Approval of Scientific Data for Release, updated 01/13/2017 (available online at <https://www2.usgs.gov/usgs-manual/500/502-8.html>)

Office of Groundwater, 2017, Procedures for Identifying and Documenting Revisions to USGS Water Data, Office of Groundwater Technical Memorandum 2017.02 (available online at <https://water.usgs.gov/admin/memo/GW/gw2017.02.pdf>)

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