

ABSTRACT

The Automated Data Processing System (ADAPS) was developed for the processing, storage, and retrieval of water data, and is part of the National Water Information System (NWIS) developed by the U.S. Geological Survey. NWIS is a distributed water database in which data can be processed over a network of computers at U.S. Geological Survey offices throughout the United States. NWIS comprises four subsystems: ADAPS, the Ground-Water Site Inventory System (GWSI), the Water-Quality System (QWDATA), and the Site-Specific Water-Use Data System (SWUDS).

This section of the NWIS User's Manual describes the automated data processing of continuously recorded water data, which primarily are surface-water data; however, the system also allows for the processing of water-quality and ground-water data.

This manual describes various components and features of the ADAPS, and provides an overview of the data processing system and a description of the system framework. The components and features included are: (1) data collection and processing, (2) ADAPS menus and programs, (3) command line functions, (4) steps for processing station records, (5) postprocessor programs control files, (6) the standard format for transferring and entering unit and daily values, and (7) relational database (RDB) formats.

1 INTRODUCTION

by Scott D. Bartholoma, James R. Kolva and Joseph P. Nielsen

The U.S. Geological Survey (USGS) is the principal Federal water-data agency in the United States and as such collects data on the occurrence, quantity, quality, distribution, and movement of surface and ground water that constitute the Nation's water resources. The USGS collects and disseminates data to state, local, and other Federal agencies, who use the data to develop and manage the Nation's water resources. For example, data are used to determine the adequacy of water supplies; design dams, bridges, and flood control projects; allocate irrigation water; locate pollution sources; and plan for energy development. Most water data collected by the USGS are in the public domain.

The USGS developed a large-scale computerized system, collectively known as the National Water Information System (NWIS), to process, store, and disseminate the water data collected by the agency. NWIS is a distributed database in which data are processed on the network of USGS computers throughout the United States. The NWIS system comprises the Automated Data Processing System (ADAPS), the Ground-Water Site Inventory System (GWSI), the Water-Quality System (QWDATA), and the Site-Specific Water-Use Data System (SWUDS). ADAPS, GWSI, and QWDATA are all built on the UNIX operating system. SWUDS is built on a personal-computer operating system. The entire NWIS system is interconnected using local-area network and wide-area network technology.

This manual describes ADAPS. The manual provides an overview of the data processing steps including transmitting data to the computer, editing the data, and storing

the data in the database. This manual explains the capabilities and provides step-by-step instructions for using the various components of ADAPS. The system is available, with limitations, to other Federal agencies and to selected cooperators of the USGS who are authorized to use ADAPS.

1.1 System Overview

ADAPS consists of a collection of computer programs, files, and a relational database that comprises a comprehensive system of standardized water-data procedures. This manual addresses version 4.3 of the ADAPS software.

In each office of the USGS where ADAPS is used, there is a designated local administrator and/or database manager. These people usually are responsible for installing and maintaining the system software and hydrologic data files, as well as performing additional tasks necessary for efficient operation of the system. The system is designed to run interactively with multiple users.

ADAPS operates day-to-day as an online system. The system is large enough to accommodate data processing capabilities including graphics, various types of application programs, and routine water-data record computations. The interactive method of processing data in ADAPS allows the user to assemble and set up the information needed to compute streamflow, reservoir, or other types of hydrologic records on a variable time basis. Information or commands generally are entered through the terminal keyboard.

1.2 Purpose and Scope

The purpose of the User's Manual is to serve as a reference document and to aid the user in the operation of ADAPS programs. The manual is divided into sections that discuss or describe the system framework, data collection and processing, and the menus and associated programs.

The principal components and features described in this manual are (1) data collection and processing, which include requirements to establish and configure a data collection site for processing, entry, and computation of data, and explanation of system concepts; (2) ADAPS menus and programs, which include a common startup when entering any program in the system; (3) command line functions; (4) steps for processing station records; (5) postprocessor programs control files; (6) the standard format for transferring and entering unit and daily-values; and (7) relational database (RDB) formats.

1.3 Changes for ADAPS Versions 4.2 and 4.3

A number of changes and enhancements have been made to the ADAPS software. New features in ADAPS versions 4.2 and 4.3 include the following:

Data Organization

- Most of the data are in a relational database and are stored in **tables** rather than files. The data in these tables can be queried from outside the ADAPS menus using Structured Query Language (SQL).
- There are new types of Unit Values (UVs) in addition to the Edited and the Computed values, and include:
 - **Measured** – the raw data as initially entered. These UVs cannot be edited.
 - **Edited** – the UVs used for records computation. The UVs can be edited by the user using Hydra (TS_EDIT) or UV_EDIT.
 - **Data correction**– the UV of the correction applied to each Edited Unit Value. These UVs are interpolated from the data corrections.
 - **Shift correction**– the UV of a stage shift correction used to compute discharge. These UVs are interpolated from the entered shift corrections.
 - **Computed**– the UVs after the data corrections and/or shifts are applied in the records computation process.

**For data that are stored using a conversion of input rating, measured UVs are available both with the rating applied or without ("raw"). The measured UVs themselves are stored in the "raw" form.*

Time

- All data are stored in Coordinated Universal Time (UTC) but are retrieved, by default, in the local time for the site as specified in the site file.
- Midnight now conforms to International Standard (ISO) and is stored at time 0000 of the following day rather than 2400 of the preceding day.

Transport Codes

- All UVs have a transport code associated with them based on the type of instrument used to collect the values and how the UVs were entered into the database. There may be several **measured** data streams for a single data descriptor, each designated by a different **transport code**. Thus, data for a given instrument that is sent via the Data Collection Platform (DCP), downloaded via telephone, or manually recovered from the instrument memory, can all coexist under the same data descriptor differentiated by the transport code.
- One transport code is given precedence as the default source of Edited Unit Values for a given data descriptor and is referred to as **preferred input**.

Location

- The **Location** of each data source at a site can be specified.

Data Descriptors (DD)

- All data descriptors (DDs) have a *location* associated with them.
- There can only be one data descriptor flagged as primary for each parameter at each location.
- Processors are stored under the data descriptor of the computed data descriptor, not the input data descriptor (i.e., discharge, and not gage height).
- Processors are marked as *working*, *in-review*, and *approved*.
- User-specified, data descriptor-specific text has been added to the screening thresholds.

Editing Unit Values

- Bulk editing of UVs in Hydra using the Zoom Window has been disabled as a data protection measure. UV editing is allowed only through the control window.
- New UV remark codes that emphasize marking UVs as affected or erroneous, instead of changing or deleting them, have been added. These remark codes screen data from further processing and/or flag daily value flags as appropriate.
- A new UV flag has been added that indicates when USGS personnel have screened the data. This flag can be set in Hydra or in a Web-flag editing utility.
- Hydra can restore original edited UVs using the “*revert to measured*” option.
- Numerous Hydra bugs have been corrected.

Data Corrections

- Data correction curves can have one, two or three points.
- Up to three sets of data corrections can be defined and applied simultaneously.
- Data corrections have end dates that can be turned off without the entry of a null correction.
- Data corrections can include comments.

Ratings

- Ratings are stored under the computed parameter data descriptor, and not the input parameter data descriptor (i.e. discharge, and not gage height).
- Ratings have both starting and ending dates. Multiple sets of dates are possible.
- Rating dates can include comments.
- Ratings are now protected by data aging.

Shifts

- Shifts are used only for stage-discharge computation.
- Shifts are tied to a specific rating.
- Shift curves can have one, two or three points.
- Shifts have end dates that can be turned off without the entry of a null period.
- Shifts can include comments.

Primary Computation

- The Primary computation program and Primary reports have been improved.
- Tide computations are now part of the Primary program.
- A new diagnostic report is available for more detail on UV processing within Primary.
- Primary can be run using a *report only* option that does not save the recomputed record.

Editing of Daily Values

- Hydra can directly access the original computed daily values as a reference curve even after the values have been edited (estimated) or deleted.
- Daily values are flagged as *affected* if they are computed from UVs flagged with one of the *affected* remark codes.

Data Aging

- Records are now set as *working*, *in-review*, or *approved* rather than as *provisional* or *final*.
- In addition to daily and UVs, the new *data aging* system also locks down data corrections, shifts, rating dates, peaks, and statistics. Rating approval is handled separately.
- Upon approval, consistency between the unit and daily values, correction tables, and ratings is ensured.

Program and Menus

- All menus have been rearranged to better follow data processing flow.
- There is a new program to produce a Station Analysis Report using the information and comments stored within ADAPS.
- End-of-year summary can be run from either the input or the output parameter.
- Graphics have been improved.
- ADAPS documentation is available via a Web interface.

Transfer Issues

- Rounding unit and daily-values may change on transfer from ADAPS version 4.1 to versions 4.2 and 4.3.
- Data corrections in version 4.1 transfer to Data Correction, Set 1 in version 4.2.
- Shifts in version 4.1 for parameters other than those used for the stage/discharge computation transfer to Data Correction, Set 2 in version 4.2.
- Base datum corrections in version 4.1 transfer to Data Correction, Set 3 in version 4.2.

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