

## 6 ATTACHMENTS

### 6.1 Steps for Processing Station Records

This chapter presents the steps involved in processing hydrologic data (station records) from each of the different types of data-collection stations. The steps for each type of station are presented in logical order to allow for correct processing of time-series data in ADAPS.

#### 6.1.1 Introduction

*by Glenn B. Engel*

Time-series water-data record processing at different stations can involve different computational methods depending on the type of hydrologic data being collected, the different instruments that are used to record and transmit the data, and the desired final product resulting from the data processing. Each computation method involves a series of steps for processing the data collected at the station to produce final products of publication quality Unit or Daily-Values. Succeeding sections of this chapter present the basic steps involved in processing station records for nine types of data-collection stations. They are: stage-discharge, stage-only, stage-fall (slope-discharge), velocity-index/deflection-meter, reservoir, tidal, water-quality monitor, ground-water observation well and precipitation station.

To process records the user should be familiar with ADAPS functions and terminology as discussed in [Chapter 3](#) of this ADAPS User's Manual, Overview Of Data Processing. Chapter 3 includes descriptions of data storage formats, ratings, correction values, and other items used in the processing of records. Also included are schematic diagrams in Figures 5 through 9 indicating the path of data processing which should be particularly useful. The ADAPS programs used to process station records are presented in detail in [Chapter 4](#) of this ADAPS User's Manual.

The user should also have a basic understanding of the interrelation of the Site record, Location record, Data Descriptor record, Processor record, and the DECODES program as described in [Chapter 3.2](#) and which are referred to in the following sections as necessary parts in the processing of data. These records can be created and updated only by a person with high level (SYST or ADBA) user access and are presented in detail in the ADAPS Administrator's Manual.

#### 6.1.2 Stage-Discharge Station

*by James M. Caldwell*

To process time-series stage-discharge data using NWIS-ADAPS, the site is first established in the GWSI Site File, and then all support files in ADAPS necessary to define the data being stored in ADAPS are defined. The following steps are an overview of the navigation-path through the stage-discharge time-series data processing functionality of ADAPS:

## **1. Establish the Site**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the stage-discharge site in the NWIS Site File using GWSI. Refer to the [\*NWIS-GWSI User's Manual\*](#) to obtain the information required to establish this site in the database. If the site already exists in the Site File, verify that the Site File information has been updated to document the existence of stage equipment at the site.

## **2. Create the Sensor Locations for the Site (Optional)**

This step is not necessary if one sensor location is used at the site. (Locations other than the “default location” are needed only if there are sensors at multiple locations, e.g. sensors at different depths or at multiple points in the cross-section.)

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the site. Data collected for one parameter from multiple locations using the same data descriptor (DD) can be stored. With one data-descriptor (DD) for each measured parameter at a site, use of the location description will further differentiate the data collected by each sensor.

The sensor locations have to be established prior to setting up the data descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

## **3. Create or Update the Data Descriptors**

Data descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish a data descriptor (DD) for each parameter by selecting “Update Data Descriptor” (DD\_EDIT) in the SU sub-menu. Define the parameters for each DD, assign a location to the DD based on the locations, create the processor record for the DD, and define the screening thresholds for the DD. The input DD, gage height, has to be established first so that the computed DD, discharge, can be established from it, when the processor record is created. If only one location is used, the location will automatically be set to “default.”

#### **4. Create Decodes Site-Device Files (Optional—Needed for Edls)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level.

See the NWIS Site or ADAPS database administrator (ADBA) to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument that is recording Unit-Values electronically and is storing and/or transmitting the values from the site for entry into ADAPS. Please refer to the DECODES manual for instructions on writing an SDF to process the data.

#### **5. Create or Update the Instrument File (Optional)**

Instrument file editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

The Instrument File is only needed for ADR instruments. In this step, the user may establish or update an ADR instrument at the site. In the SU sub-menu, select the menu option, “Update ADR Instrument Information” (IN\_EDIT) to create or update the instrument for the Stage-Discharge station.

#### **6. Select the Preferred Input**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), a “preferred input” transport code is assigned using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). There may be multiple instruments collecting stage data at a site, or one instrument collecting, storing and transmitting data from the site into ADAPS using multiple transport methods, for example, a GOES data-collection platform (DCP) and an electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

ADAPS stores measured Unit-Values from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input.” To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport code “s”(GOES DCP), or the transport code “e” (telemetered EDL data). NWISWeb retrieves data from the edited Unit-Values file for display on the Web. The edited Unit-Values file is automatically populated during the data-conversion process with the measured Unit-Values from the preferred-input sensor. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled.

**\*\*Important note:** The real-time data coming into ADAPS are displayed to the public via NWISWeb. Real-time data should be reviewed on a regular basis.

## **7. Data Input**

This step is not necessary for real-time transmitted data. Real-time data are transmitted and stored automatically as measured Unit-Values and edited Unit-Values. Data collected in any other manner will need to be processed by the user. Electronic data collected on laptop from an EDL or DCP should be converted to standard input files using DECODES (see DECODES). In ADAPS, choose the IN sub-menu and option “Process WRD standard input data” (STD\_STOR). The input program will ask for the file name for processing. These data will be stored as measured Unit-Values and tagged with a transport code (listed in step 6 above). If real-time data does not exist at the site this transport method should be assigned as the preferred input (step 6). Then the data also will be stored as edited Unit-Values and will be tagged with a transport code (listed in step 6 above).

For data entry from the ADRs, use the sub-menu IN, “Read ADR Tape Data (TP\_READ),” and store with the option “Edit And Store ADR Tape Data (TP\_EDIT)” in this same sub-menu. These programs require a paper tape-reader.

For data entry from charts or from observations, entry is initiated in the sub-menu IN, “Enter Unit-Values from Digitizer/Keyboard (UV\_ENTER).” The Digitizer option requires a digitizer interfaced to the system. The keyboard option prompts the user for yyyyymmdd.hhmmss of the observation and the value of the observation.

## **8. Review and Edit Time-Series Unit-Values**

Review the edited Unit-Values of gage height record in HYDRA. Choose sub-menu PR and “Edit Time Series Data using HYDRA –” (TS\_EDIT). Any missing record can be pulled in as a reference curve from the backup measured Unit-Values (see HYDRA section). If changes are made to the data in this program, answering yes to “Compute the record?” when closing will compute the entire record and update the database and

NWISWeb. Answering no will save the changes but will not compute the record or update the database or Web.

HYDRA is used to verify that quality data are being broadcast to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user will be setting the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the data have been viewed using NWISWeb and edits do not need to be made to the data, the user may set the Web-display status flag on the data to “checked” using the UT menu-option “Set the Edited UV ‘checked’ Status,” (SET\_CHECKFLAG).

## **9. Data Corrections**

Apply any data corrections using the PR sub-menu, “Update/Display Data corrections” (DC\_EDIT), see figure below. Up to three separate corrections can be made and each of the corrections can be prorated over time. The three data corrections are:

- Gage Height corrections
- Datum corrections from levels
- Other

Gage height corrections are entered to account for instrument errors, instrument drift, or instrument calibration. Datum Corrections are entered to correct for changes to the base datum at the station, documented when running levels. Other corrections can be, for example, a correction applied to the datum of the gage to avoid negative gage heights. Up to three separate correction diagrams can be entered and each of the correction diagrams can have one, two, or three points and will be prorated over time.

Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is strongly recommended as these comments can be used in a draft of the station analysis.

Answering “yes” to “Compute the record?” when closing this program will compute the entire record and update the database and Web if any changes are made that will affect the data. Answering “no” will save the changes but will not compute the record or update the database or Web.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM ADAPS)  |
|  REVISION NWIS 4.2+20020205      Feb 13, 2002 14:51:24 Wednesday |
|  (PR) SUB-MENU : Primary Data Processing                          |
*****

1 -- Update Data Descriptor Thresholds      9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra      10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections        11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables           12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars         13 -- Peak Flow Entry and Retrieval
6 -- Update/Display Shifts (SV_EDIT)       14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)        15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary            16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation      PGM -- Display program_names
QU -- Exit to previous menu                EX -- Exit to Unix

```

## **10. Measurements**

All measurements for the Water Year should be stored using the sub-menu IN, "Enter/Update/Display Measurements" (MS\_EDIT). Review all measurements and note deviation from the rating. Displaying the measurements in this same sub-menu is a useful tool.

## **11. Ratings**

Review the rating. To display the expanded rating table choose the sub-menu DI, "Display Ratings (RT\_DISPLAY)." After choosing the station, choose DISCHARGE as the data descriptor (DD). In the rating display window enter the options desired, then carriage return [CR] to produce output.

If necessary, update the rating or enter a new rating using the sub-menu PR "Update/Display Rating Tables." Choose Type 1 rating, Standard discharge rating (gage height versus discharge). It may be necessary to use a Type 0 rating (Conversion of Input) using the gage-height DD if an ADR is in use, to convert dial readings to gage height in feet.

The data descriptor (DD) entry is based on the DISCHARGE. Ratings are stored in the rating tables either as equations or as tables. The active rating is designated (\*). Options to enter new ratings are:

- Linear
- Log
- Equation

If entering a new rating for a stage-discharge station, choose the Log option. After entering the rating choose the effective dates for that rating. Choices are:

- "AP" to append a new rating date
- "ED" to edit a rating date
- "RM" to remove a rating date
- "SA" to save modifications and return to rating menu
- "RE" to return to rating menu without saving modifications

Comments can be added to explain development of ratings and rating dates. Use of this function is strongly recommended as these comments can be used to draft a station analysis.

## **12. Shifts**

Shifts are applied to ratings to compensate for changes in the stage-discharge relation caused by changes in the river environment. Shifts to the rating are entered in sub-menu PR, "Update/Display Shifts" (SV\_EDIT). The data descriptor (DD) used is DISCHARGE. The entry input points are gage heights, see shift-correction menu below.

```

EDIT SHIFTS FOR RATING # 5.0  TYPE: stage-discharge
USGS 01010000  St. John River at Ninemile Bridge, Maine
DISCHARGE, in CFS  WATER YEAR: 2000
DATES VALID FROM: 10/01/1999 00:00 TO 09/30/2000 23:59
LAST POSSIBLE CORRECTION FOR WATER YEAR ADDED - ADD MODE EXITED.
*****
START DATE TIME ZONE INPUT SHIFT INPUT SHIFT INPUT SHIFT
END DATE TIME ZONE COMMENT
PRV:1992/10/01 0000 EDT 0.00 -0.11 0.80 -0.11 4.00 0.00
 /_/_/_/_

1:1999/10/01 0100 EDT 0.00 -0.11 0.80 -0.11 4.00 0.00
 1999/10/15 1600 EDT 0.00 -0.11 0.80 -0.11 4.00 0.00
2:1999/10/15 2100 EDT 0.00 -0.20 0.80 -0.20 4.00 0.00
 2000/09/30 2359 EDT 0.00 -0.20 0.80 -0.20 4.00 0.00
3: /_/_/_/_

"Q"= quit (no save) "E"= exit (no save) "A"= add to end of list
"F"= forward 1 page "M"= down 1 line "D"= delete line "C"= change line
"B"= backward 1 page "U"= up 1 line "I"= insert line "S"= save and quit
    
```

**SHIFT CORRECTION MENU**

**"AD"** - **ADD** correction values  
**"CH"** - **CHANGE/update** correction values  
**"DL"** - **DELETE** entire selected record  
**"VI"** - **VIEW** correction values  
**"LI"** - **LIST** selection on screen/printer  
**"ID"** - **Return** to set ID screen  
**"US"** - **Return** to USer information screen

Shifts are linked to specific ratings and are in effect only within the time frame of the ratings. Shifts can be carried forward across one water-year boundary without re-entering the correction. The option to compute the record is available after shifts are entered. Comments can be added to explain use or distribution of shifts. Use of this function is strongly recommended as these comments can be used to draft a station analysis.

**13. Primary Computations**

Final values are computed in the sub-menu PR, "Primary computation" (PRIMARY), although values may have been computed prior depending on how re-compute options were chosen. The primary program calculates the discharge based on the gage-height Unit-Values, the rating and applicable corrections and shifts and stores the Unit and Daily-Values for each day. A primary report is generated with all the computed values, statistics, mean, and maximum and minimum Daily-Values. An optional diagnostic report can be produced also to help in the review of the computations.

**14. Review Daily-Values**

Review the Daily-Values of discharge record in HYDRA. Choose sub-menu PR and "Edit Time-Series Data using HYDRA" (TS\_EDIT). Reference curves of the Unit-Values from the same station and Daily-Values from other stations can be used to help estimate any periods of missing, ice-affected, or erroneous record.

**15. Daily-Values Tables**

Prepare Daily Value tables using sub-menu DI, "Daily-Values Tables (DVTABLE)." Choose table type (TY option) #1.

**16. Manage Record Data Aging Status**

A record can be set to "In Review" after the data editing process. In the sub-menu PR choose "Manage Record Data Aging Status" (SETSTATUS). After the change to "in-review," all changes to the data will be prohibited. DBA access is required to change



data aging back to “working.” If this is necessary see the NWIS administrator. The ADBA should set the data to “Approved” after the review is completed and the record is acceptable.

## **Hydrographs**

Hydrographs are valuable tools for reviewing either edited or computed data. Select PR or DI sub-menu, “Plot Time-Series Data” (PLOTWAT) to view Unit or Daily-Values. Select DI sub-menu, “Plot Hydrographs,” (HYDROGRAPH) to plot a hydrograph of Daily-Values to screen or printer.

### **6.1.3 Records Processing in ADAPS for a Stage-Only Station**

To process time-series stage data using NWIS-ADAPS, the site is first established in the GWSI Site File, and then all support files in ADAPS necessary to define the data being stored in ADAPS are defined. The following steps are an overview of the navigation-path through the stage time-series data processing functionality of ADAPS:

#### **1. Establish the Site**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the stage-only site in the NWIS Site File using GWSI. [\*Refer to the NWIS-GWSI User’s Manual\*](#) to obtain the information required to establish this site in the database. If the site already exists in the Site File, verify that the Site File information has been updated to document the existence of stage equipment at the site.

#### **2. Create the Sensor Locations for the Site (Optional)**

This step is not necessary if one sensor location is used at the site. (Locations other than the “default location” are needed only if there are sensors at multiple locations, e.g. sensors at different depths or at multiple points in the cross-section.)

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the site. Data collected for one parameter from multiple locations using the same data descriptor (DD) can be stored. With one data descriptor (DD) for each measured parameter at a site, using the location description will further differentiate the data collected by each sensor.

The sensor locations have to be established prior to setting up the data descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

### **3. Create or Update the Data Descriptors**

Data descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish a data descriptor (DD) for each parameter by selecting “Update Data Descriptor” (DD\_EDIT) in the SU sub-menu. Define the parameters for each DD, assign a location to the DD based on the locations, create the processor record for the DD, and define the screening thresholds for the DD. If only one location is used, the location will automatically be set to “default.”

### **4. Create Decodes Site-Device Files (Optional—Needed for EDLS)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level.

See the NWIS Site or ADAPS database administrator (ADBA) to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument that is recording Unit-Values electronically and is storing and/or transmitting the values from the site for entry into ADAPS. Please refer to the DECODES manual for instructions on writing an SDF to process the data.

### **5. Create or Update the Instrument File (Optional)**

Instrument file editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

The Instrument File is only needed for ADR instruments. In this step, the user may establish or update an ADR instrument at the site. In the SU sub-menu, select the menu option, “Update ADR Instrument Information” (IN\_EDIT) to create or update the instrument for the Stage-Discharge station.

### **6. Select the Preferred Input**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), a “preferred input” transport code is assigned using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). There may be multiple instruments collecting stage data at a site, or one instrument collecting, storing and transmitting data from the site into ADAPS using multiple transport methods, for

example, a GOES data-collection platform (DCP) and an electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

ADAPS stores measured Unit-Values from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input. To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport code “s”(GOES DCP), or the transport code “e” (telemetered EDL data). NWISWeb retrieves data from the edited Unit-Values file for display on the Web. The edited Unit-Values file is automatically populated during the data-conversion process with the measured Unit-Values from the preferred-input sensor. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled.

**\*\*Important note:** The real-time data coming into ADAPS are displayed to the public via NWISWeb. Real-time data should be reviewed on a regular basis.

## **7. Data Input**

This step is not necessary for real-time transmitted data. Real-time data are transmitted and stored automatically as measured Unit-Values and edited Unit-Values. Data collected in any other manner will need to be processed by the user. Electronic data collected on laptop from an EDL or DCP should be converted to standard input files using DECODES (see DECODES). In ADAPS, choose the IN sub-menu and option “Process WRD standard input data” (STD\_STOR). The input program will ask for the file name for processing. These data will be stored as measured Unit-Values and tagged with a transport code (listed in step 6 above). If real-time data does not exist at the site this transport method should be assigned as the preferred input (step 6). The data will be stored as edited Unit-Values and will be tagged with a transport code (listed in step 6 above).

For data entry from the ADRs, use the sub menu IN, option “Read ADR Tape Data (TP\_READ),” and store with the option “Edit And Store ADR Tape Data (TP\_EDIT)” in this same sub-menu. These programs require a paper tape-reader.

For data entry from charts or from observations, entry is initiated in the sub-menu IN with option “Enter Unit-Values from Digitizer/Keyboard (UV\_ENTER).” The Digitizer option requires a digitizer interfaced with the data system. The keyboard option prompts the user for yyyyymmdd.hhmmss of the observation and the value of the observation.

## **8. Review and Edit Time-Series Unit-Values**

Review the edited Unit-Values of gage-height record in HYDRA. Choose sub-menu PR and option “Edit Time-Series Data using HYDRA” (TS\_EDIT). Any missing record can be pulled in as a reference curve from the backup measured Unit-Values (see HYDRA section). If changes are made to the data in this program, answering “yes” to “Compute the record?” when closing will compute the entire record and update the database and NWISWeb. Answering “no” will save the changes but will not compute the record or update the database or Web.

HYDRA is used to verify that quality data are broadcast to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user will be setting the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the data have been viewed using NWISWeb and no edits are made to the data, the Web-display status flag on the data may be set to “checked” using the UT menu-option “Set the Edited UV ‘checked’ Status,” (SET\_CHECKFLAG).

## **9. Data Corrections**

Apply any data corrections using the PR sub-menu option, “Update/Display Data Corrections” (DC\_EDIT), see figure below. Three separate types of corrections can be made and each of the corrections can be prorated over time. The three data corrections are:

- Gage Height corrections
- Datum corrections from levels
- Other

Gage height corrections are entered to account for instrument errors, instrument drift, or instrument calibration. Datum Corrections are entered to correct for changes to the base datum at the station, documented when running levels. Other corrections can be, for example, a correction applied to the datum of a gage to avoid negative gage heights. Up to three separate correction diagrams can be entered and each of the correction diagrams can have one, two, or three points and will be prorated over time. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is strongly recommended as these comments can be used in a draft of the station analysis.

Answering “yes” to “Compute the record?” when closing this program will compute the entire record and update the database and Web if any changes are made that will affect the data. Answering “no” will save the changes but will not compute the record or update the database or Web.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)  |
| REVISION NWIS 4.2+20020205      Feb 13, 2002 14:51:24 Wednesday |
|      (PR) SUB-MENU : Primary Data Processing      |
*****

1 -- Update Data Descriptor Thresholds      9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra     10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections       11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables         12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars        13 -- Peak Flow Entry and Retrieval
6 -- Update/Display Shifts (SV_EDIT)      14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)      15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary          16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation      PGM -- Display program_names
QU -- Exit to previous menu                EX -- Exit to Unix

```

## **10. Primary Computations**

Final values are computed in the sub-menu PR option “Primary computations” (PRIMARY). The primary program generates computed gage-height Unit-Values and gage-height Daily-Values, even though they may have been computed prior, depending on responses to “compute” options in HYDRA and DC\_EDIT. A primary report also is generated with the hourly computed values, mean, maximum and minimum Daily-Values. An optional diagnostic report can be produced also to help in the review of the computations.

## **11. Review Daily-Values**

Review the Daily-Values of the gage-height record in HYDRA. Choose sub-menu PR option “Edit Time-Series Data using HYDRA” (TS\_EDIT).

## **12. Daily-Values Tables**

Prepare Daily-Value tables using sub-menu DI, option “Daily-Values Tables (DVTABLE).” Choose table type (TY option) #1.

### **13. Manage Record Data Aging Status**

A record can be set to “In Review” after the data editing process. In the sub-menu PR choose “Manage Record Data Aging Status” (SETSTATUS). After the change to “in-review,” all changes to the data will be prohibited. DBA access is required to change data aging back to “working.” If this is necessary, see the NWIS site or database administrator. The ADBA should set the data to “Approved” after the review is completed and the record is acceptable.

#### **6.1.4 Records Processing in ADAPS for a Stage-Fall (Slope) Station**

*by Timothy C. Stamey*

To process time-series Stage-Fall (Slope) Station data using NWIS-ADAPS, the site needs to be established in the GWSI Site File, and then the necessary support files created in ADAPS to define the data that are being stored in ADAPS. Once these support files are established, the user will be able to process the time-series data collected and to produce the final publication output Unit and Daily-Values of stage and discharge data. The following steps are an overview of the navigation-path through the Stage-Fall (Slope) Station time-series data processing functionality of ADAPS.

##### **1. Create or Update the Site File**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS-ADAPS Site or database administrator to make this entry or update.

Establish the Stage-Fall (Slope) Station site(s) in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this type of site in the database. If the site already exists in the Site File, verify that the Site File information has been updated. Site Files will be needed for both the Base Gage and Auxiliary Gage if data are to be entered under different station numbers. (See note below in step 3.)

##### **2. Create or Update the Sensor Locations for the Site (Optional)**

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

**This step may be skipped if there is only one sensor-location at the site (this is the default sensor location setup).** Locations other than the “default location” are needed only if there are sensors at multiple locations at the site, e.g. sensors at different depths or at multiple points in the cross-section.

If there are multiple sensor locations, it is imperative that the sensor locations are established in ADAPS prior to setting up the data-descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the Stage-Fall (Slope) Station site. In the 4.2 version of ADAPS, data collected for one parameter from multiple locations can be stored using the same data-descriptor (DD). Since there is only one data-descriptor (DD) for each measured parameter at a site, the use of the location description will further differentiate the data collected by each sensor.

### **3. Create or Update the Data Descriptors**

Data-descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In this step, a data-descriptor (DD) is entered or updated for each parameter that is measured at the site. In the SU sub-menu, select the menu option, “Update Data Descriptor” (DD\_EDIT) to create or update the data-descriptors for the Stage-Fall (Slope) Station. In this step, define the parameters for each DD and assign a location to the DD based on multiple locations – (if they were created in the previous step). Next create the processor record for the DD and define the screening thresholds for the DD. If only one location is used, the location will automatically be set to “default” in this step.

**Note:** If the Auxiliary Gage is to be entered as a different station number, it is necessary to **first** create the DD and Processor entries for the Auxiliary Gage so that the proper responses to the setup prompts during the Base Gage entries for stage and discharge will be possible. The entries needed for the Auxiliary Gage are the DD/Processor records for the gage-height parameter code (00065). When setting up the Auxiliary GH DD use option 2 (stage only computation) to create the processor and review and change as needed the options in the succeeding menu displays (the starting date is critical). No other processing is required for the Auxiliary Gage.

The entries needed for the Base Gage are the DD/Processor records for the gage-height parameter code (00065) and the DD/Processor records for the discharge parameter code (00060). While creating the gage-height DD, the creation of the GH Processor is optional for the Base Gage. Daily-Value tables of GH can be defined as part of the creation of the output DD, if desired. If the user creates a GH DD processor, option 2 should be used (stage only computation) for the processor. The input DD, gage height, has to be established first so that the computed DD, discharge, can be established from it, when the processor record is created. When creating the discharge processor file, be sure to select the computation method option “Slope-discharge Computation,” and answer the subsequent self-explanatory options to complete the Discharge Processor record setup or update.

### **4. Create DECODES Site-Device Files (Optional - Needed for EDLS)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level. See the NWIS site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument recording Unit-Values electronically and is storing and/or transmitting the values for entry into ADAPS. Please refer to the DECODES manual for instructions on creating an SDF to process the data.

### **5. Create or Update the Instrument File (Optional)**

Instrument file editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

The Instrument file is only needed for ADR instruments. In this step, the user may establish or update an ADR instrument at the site. In the SU sub-menu, select the menu option, “Update ADR Instrument Information” (IN\_EDIT) to create or update the instrument for the Stage-Fall (Slope) Station.

### **6. Manage the Preferred Input Transport Code**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), a “preferred input” transport code needs to be assigned using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). At a site, there may be multiple instruments collecting gage-height data for use in Slope computations, or one instrument may be collecting, storing and transmitting data from the site into ADAPS with multiple transport methods used; for example - a GOES data-collection platform (DCP) and an electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options are currently not implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

The data from each transport method for each data-descriptor are stored as measured Unit-Values. ADAPS stores measured Unit-Values from each transport method for a



DD, identifying the transport method and identifying which method is the “preferred input.” To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport-code “s”(GOES DCP), or the transport-code “e” (telemetered EDL data). NWISWeb retrieves data from the computed Unit-Values tables for display on the Web. The computed Unit-Values table is automatically populated during the SATIN/SENTRY data-conversion process and ADAPS correction processes using the measured Unit-Values from the preferred-input sensor. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled. EDL data that are retrieved manually can only be used as the preferred input if no real-time data are to be served on the Web, or if separate data processing streams with separate data-descriptors (DD) are established.

**\*\*Important note:** The real-time data coming into ADAPS are displayed to the public via NWISWeb. It is imperative that the real-time data be checked and corrected each day using HYDRA to verify that erroneous data are not being broadcast to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user will be setting the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the data have been viewed using NWISWeb and no edits need to be made to the data, the Web-display status flag may be set to “checked” on the data using the UT menu option “Set the Edited UV ‘checked’ Status,” (SET\_CHECKFLAG). The data also could be edited using the UT menu-option uv\_edit “Edit Unit-Values.”

## **7. Methods for Translating, Entering, and Storing Measured Unit Value Gage-Height Data**

If data are being transmitted to ADAPS via a GOES DCP, it will be the preferred input method and the data will be automatically processed through the SATIN/SENTRY programs and no further input is required.

Translation and data entry into ADAPS from a Stage-Fall (Slope) Station can be accomplished from at least three other possible pathways or procedures:

### **a. ADR Paper-tape**

Translate the Base and Auxiliary gage ADR paper tapes for the desired period(s) using the TP\_READ program or by selecting the ADAPS IN menu option “Read ADR Tape Data.” The translations are done based on the setup of each station. (Note: If this option is used there must be a conversion of input rating in ADAPS before this step can be successfully completed. See Step 9 below for Type 0 and Type 20 ratings).

Edit and store the translated Base and Auxiliary gage-height data using the TP\_EDIT program or by selecting the ADAPS IN menu option “Edit And Store ADR Tape Data.”

The data are stored as two input files based on the Base and Auxiliary Site ID and DDs. The data must be time corrected and verified before it is stored. If the Historic Type Primary is selected, the Historic Time Correction Method should be used. If the Standard Type Primary is selected, the Standard Time Correction Method should be used.

### **b. Electronic Data Logger (EDL)**

A DECODES site-device file (SDF) will need to be created for each instrument transmitting or recording Unit-Values from the site for entry into ADAPS. Please refer to the DECODES manual for instructions on writing an SDF to do this. Translate the Base and Auxiliary gage data using DECODES Site-Device Files (SDF) for data from an EDL using the STD\_STOR program, or from the IN menu in ADAPS select, “Process WRD Standard Input Data.” Data entry into ADAPS from an EDL can be done through automatic processing setups using SATIN/SENTRY programs but for the most part these programs are for data being transmitted via GOES DCP.

### **c. Other common methods of inputting data into ADAPS**

Process ADR card-image data by using the CD\_READ program or by selecting the ADAPS IN sub-menu option “Process ADR Card-Image Data.” These data are equivalent to measured Unit Value data as if obtained from a digital tape or equal time-step data from a strip chart.

Direct entry of Unit Value data by using the UV\_EDIT program or by selecting the ADAPS UT sub-menu option “Edit Unit-Values.”

Process Unit Value card image data by using the UV\_STORE program or by selecting the ADAPS IN sub-menu option “Process UV Card-Image Data.” These data are in usually in B-Card format.

Process digitized data by using the UV\_ENTER program or by selecting the ADAPS IN sub-menu option “Enter Unit-Values from Digitizer/Keyboard.”

As the data are entered into ADAPS as measured Unit-Values, they are tagged with their appropriate transport code. For the preferred input transport code, the data also are automatically entered into the edited Unit-Values table. The other measured Unit-Value data can be used in HYDRA as backup data, if needed.

## **8. Screen and Edit Input Gage-Height Data**

The input Unit-Value data from the Base and Auxiliary Gages will need to be screened for any obvious erroneous values such as spikes or other inconsistent data. This

screening and editing process is done using HYDRA (TS\_EDIT) or from the PR menu in ADAPS, select the option “Edit Time-Series Data Using HYDRA.” If the data are transmitted as real-time, they can be viewed on NWISWeb. HYDRA allows the user to make immediate corrections to the edited Unit-Value data, including the pasting or substituting of data from backup sources, if they exist. The use of HYDRA will also allow the user to flag the data as “checked” for properly displaying data on NWISWeb. If the real-time data are screened from NWISWeb, those data can be flagged as “checked” by using SET\_CHECKFLAG or from the UT menu in ADAPS by selecting, “Set Edited UV ‘checked’ Status Flag.”

## **9. Process Base and Auxiliary Data for Time-Series Computation of Discharge**

Enter or update Rating(s), if necessary, using RT\_EDIT program or in the PR menu of ADAPS, select menu option “Update/Display Rating Tables.” **Note:** Rating entries for Slope stations are entered based on the Base and Auxiliary Gage site ID and DDs. Applicable rating types that may be entered into ADAPS for the Base and Auxiliary gage-height DD are given below:

- MEAS: Conversion of input – only used for conversion of gage-height data (parameter code 00065) from ADR (dial readings) to gage-height in feet. This used to be Type 0 rating in previous versions of ADAPS.

**Note:** All other rating entries for the Slope stations should be entered under the Base Gage discharge ID and DD (parameter code 00060).

Applicable rating types that may be entered into ADAPS for the Base Gage Discharge DD are given below:

- STGQ: Standard discharge rating (gage-height versus discharge); this used to be Type 1 rating in previous versions of ADAPS.
- FALL: Stage-Fall rating; (If this rating does not exist, the processing assumes that the rating fall is equal to 1); this used to be Type 2 rating in previous versions of ADAPS.
- FLFC: Fall/discharge ratio rating (fall-factor); (If this rating does not exist, the processing assumes that the discharge ratio is equal to the square root of the fall ratio). This used to be Type 3 rating in previous versions of ADAPS.
- MEAS: Conversion of Auxiliary gage-height data (only used for conversion of gage-height data (parameter code 00065) from ADR (dial readings) to gage-height in feet). This used to be Type 20 rating in previous versions of ADAPS.

Use of some of these ratings is optional, and the user must select the appropriate rating types for use with the station being processed. Comments can be added to explain development of ratings and rating dates. Use of this function is strongly recommended as these comments can be used to draft a station analysis.

Enter Data Corrections for the Base and/or Auxiliary Gage-height DDs, if needed, using DC\_EDIT or in the PR menu of ADAPS, select menu option “Update/Display Datum Corrections.” Data correction entries are based on the Site ID and gage-height DDs for the Base and Auxiliary Gages. Data corrections can be labeled to distinguish between instrument, datum, and other types of data corrections and can be applied separately over time. Data corrections are applied by prorating over time. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is strongly recommended as these comments can be used in a draft of the station analysis. The option is available to compute the record at this point.

Enter shifts for the Base Gage under the Discharge DD, if any, to be applied by using stage-variation diagrams using the SV\_EDIT program or in the PR menu of ADAPS, select menu option “Update/Display Shifts.” The shifts are entries based in the discharge DD for the Base Gage. Comments can be added to explain the use or distribution of shifts. Use of this option is strongly recommended as these comments can be used to draft a station analysis. The option is available to compute the record at this point.

Perform Primary Slope Computations interactively or in batch mode by using the primary program or in the PR menu of ADAPS, select menu option “Primary Computations.” The Primary Computations for Slope Station should be run using the processors in the Base Gage Discharge ID/DD. A primary report can be generated with all the computed values and with statistics indicated in the processor record. An optional diagnostic report can be produced also, to help in the review of the complex computations.

## **10. Review the Primary Computations**

To eliminate errors in the data, use the following ADAPS programs to assist in finding and resolving the errors:

- Display and edit Unit-Value data using the TS\_EDIT program (**HYDRA**) or from the ADAPS PR menu, select “Edit Time-Series Data Using HYDRA;”
- Display and edit Unit-Values data using the UV\_EDIT program or from the ADAPS UT menu “Edit Unit-Values;”
- Display edited and computed Unit-Values using the UV\_TABLE program or from the ADAPS PR menu, select “Print/Display Unit-Values Tables;”
- Display and edit the Daily-Values using the TS\_EDIT program (**HYDRA**) or from the ADAPS PR menu, select “Edit Time-Series Data Using HYDRA;”
- Estimate missing or erroneous Daily-Values using the TS\_EDIT program (**HYDRA** and **MISTE**) or from the ADAPS PR menu, select “Edit Time-Series Data Using HYDRA;”

- Display and edit the Daily-Values using the DV\_EDIT program or from the ADAPS UT menu, select “Edit Daily-Values;”
- Display the Daily-Values for a selected period of interest using the DVTABLE program or from the ADAPS PR menu, select “Daily-Values Tables.”

Other programs in ADAPS that are helpful in further or final review and processing of Slope Station data are:

- Review/Delete Digital Tape Temporary Files using the program drfiles or from the ADAPS IN menu, select “Review/Delete Digital Tape Temporary Files;”
- Copy a Rating using the program RT\_COPY or from the ADAPS PR menu, select “Update Display Rating Table;”
- Display Rating Table Dates using the program RT\_DATES or from the ADAPS PR menu, select “Display Rating Table Dates;”
- Plot Rating(s) using the RATPLOT program or from the ADAPS DI menu, select “Plot Ratings;”
- Plot Time Series Data using PLOTWAT or from ADAPS PR menu, select “Plot Time-Series Data;”
- Compute Shift Analysis and Plot Shift Bars using the SHIFT\_ANLY program or from ADAPS PR menu, select “Shift Analysis and Error Bars;”
- Display Expanded Shifts and Data Corrections using SHFT\_TABLES or from the ADAPS PR menu, select “Display Expanded Shifts/Corrections;” and
- End-of-Year Summary using the program EOYSUMM or from the ADAPS PR menu, select “End-of-Year Summary.”

## **11. District QA/QC**

Follow District quality-assurance procedures when using the Data Aging programs in ADAPS for final review and approval of the Unit-Value and Daily-Value records. After the Stage-Fall (Slope) station data have been analyzed and are ready for publication, the user should use the SETSTATUS program or from the ADAPS menu, select “Manage Record Data Aging Status.” At this point, set the status from “Working” to “In Review.” This will not allow any further changes to the data and indicates that the records are ready for review prior to final approval. If any further editing is needed after the data has been set to “In Review,” see the District ADBA to reset the status to “Working” (see Chapter 3 for additional data aging details). Once the data are reviewed and are acceptable for publication, the ADBA should set the record flags to “Approved” for transmittal to the NWISWeb database.

### 6.1.5 Records Processing in ADAPS for a Velocity-Index or Deflection Meter Station

To process time-series Velocity-Index or Deflection Meter Station data using NWIS-ADAPS, the user should establish the site in the GWSI Site File, and then create the support files in ADAPS necessary to define the data being stored in ADAPS. Once these support files are established, the user will be able to process the time-series data that is collected and produce the final publication output Unit and Daily-Values of stage and discharge data. The following steps are an overview of the navigation-path through the Velocity-Index or Deflection Meter Station time-series data processing functionality of ADAPS. These steps are also used for a point velocity or an acoustic velocity-meter station.

#### **1. Create or Update the Site File**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See your NWIS-ADAPS Site administrator to make this entry or update.

Establish the Velocity-Index or Deflection Meter Station site(s) in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this type of site in the database. If the site already exists in the Site File, verify that the Site File information has been updated.

#### **2. Create or Update the Sensor Locations for the Site (Optional)**

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

**This step may be skipped if there is only one sensor-location at the site** (this is the default sensor location setup). Locations other than the “default location” are needed only if there are sensors at multiple locations at the site, e.g. sensors at different depths or at multiple points in the cross-section.

**If the user has more than one sensor location, it is imperative that he or she establish the sensor locations prior to setting up the data-descriptor for a parameter.** The location for the DD will be set to “default (0)” if no location is specified in this step.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the Velocity-Index or Deflection Meter Station site. In the 4.2 version of ADAPS, the user can store data collected for one parameter from multiple locations using the same data-descriptor (DD). Since the user has only one data-descriptor (DD) for each measured parameter at a site, using the location description will further differentiate the data collected by each sensor.

### **3. Create or Update the Data Descriptors**

Data-descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the ADAPS Site administrator to make this entry or update.

In this step, the user is entering or updating a data-descriptor (DD) for each parameter measured at the site. In the SU sub-menu, select the menu option, “Update Data Descriptor” (DD\_EDIT) to create or update the data-descriptors for the Velocity-Index or Deflection Meter Station. In this step, the user defines the parameters for each DD and assigns a location to the DD based on multiple LOCATIONS – (if these were created in the previous step). Next create the processor record for the DD, and define the screening thresholds for the DD. If only one location is used, it will automatically be set to “default” in this step.

**NOTE:** It is necessary to first create the DD/Processor entries for the velocity data so that the proper response to the setup prompts during the entries for stage and discharge DDs will be possible. The files needed for the velocity input data are the DD/Processor records for the velocity parameter code (00055). No other processing is required for the velocity.

The files needed for the input values of stage are the DD/Processor records for the gage-height parameter code (00065) and the DD/Processor Records for the discharge parameter code (00060). While creating the gage-height DD, the creation of the GH Processor is optional. Daily-Value tables of GH can be defined as part of the creation of the output DD, if desired. If the user creates a GH DD processor, use option 2 (stage only computation) for the processor. The input DDs, velocity and gage height, have to be established first so that the computed DD, discharge, can be established from it, when the processor record is created. When creating the discharge processor record be sure to select the computation method option “Velocity/Deflection Discharge Computation,” and answer the subsequent self-explanatory options to complete the Discharge Processor Record setup or update.

### **4. Create DECODES Site-Device Files (Optional—Needed for EDLS)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level. See the NWIS Site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument recording Unit-Values electronically and is storing and/or transmitting the values for entry into ADAPS. Please refer to the DECODES manual for instructions on creating an SDF to process the data.

## **5. Create or Update the Instrument File (Optional)**

Instrument file editing is only authorized at the ADAPS database administrator (ADBA) level. See the ADAPS Site administrator to make this entry or update.

The Instrument File is only needed for ADR instruments. In this step, the user may establish or update an instrument (IN) at the site. In the SU sub-menu, select the menu option, “Update Instrument File” (IN\_EDIT) to create or update the instrument for the Velocity-Index or Deflection Meter Station.

## **6. Manage the Preferred Input Transport Code**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the ADAPS Site administrator to make this entry or update.

For each input data-descriptor (DD), the user needs to assign a “preferred input” transport code using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). At a site, the user may have multiple instruments collecting gage-height data for use in Velocity-Index computations, or one instrument may be collecting, storing and transmitting data from the site into ADAPS using multiple transport methods; for example - a GOES data-collection platform (DCP) and electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options are currently not implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

The data from each transport method for each data-descriptor are stored as measured Unit-Values. ADAPS stores measured Unit-Values from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input.” To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport-code “s”(GOES DCP), or the transport-code “e” (telemetered EDL data). NWISWeb retrieves data from the computed Unit-Values file for display on the Web. The computed Unit-Values file is automatically populated during the data-conversion process with the measured Unit-Values from the preferred-input sensor and the SATIN/SENTRY programs. If the District wishes to



serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled. EDL data that are retrieved manually can only be used as the preferred input if no real-time data are to be served on the Web, or if separate data processing streams with separate data-descriptors (DD) are established.

**\*\*Important note:** The real-time data coming into ADAPS are displayed to the public via NWISWeb. It is imperative that the user checks and corrects the real-time data each day using HYDRA to verify that erroneous data is not broadcasted to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user will be setting the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the data is viewed using NWISWeb and no edits to the data are needed, the user may set the Web-display status flag on the data to “checked” using the UT menu-option “Set the Edited UV ‘checked’ Status,” (SET\_CHECKFLAG).

## **7. Methods for Translating, Entering, and Storing Measured Unit Value Gage-Height and Velocity Data**

Translation and data entry into ADAPS from a Velocity-Index or Deflection Meter Station can be accomplished from at least three possible pathways.

- a. Translate the gage-height and velocity ADR paper tapes for the desired period(s) using the TP\_READ program or by selecting in the IN ADAPS menu option “Read ADR Tape Data.”** The translations are done based on the setup of each station. (**Note:** If this option is used there must be a conversion of input rating in ADAPS before this step can be successfully completed. See Step 9 below for MEAS ratings).

Edit and store the translated gage-height and velocity data using the TP\_EDIT program or by selecting in the IN ADAPS menu option “Edit And Store ADR Tape Data.”

The data are stored based on the Site ID and DDs. The data must be time-corrected and verified before it is stored. If the Historic Type Primary is selected, the Historic Time Correction Method should be used. If the Standard Type Primary is selected, the Standard Time Correction Method should be used.

- b. The user will need to create a DECODES site-device file (SDF) for each instrument transmitting Unit-Values from the site into ADAPS.** Please refer to the DECODES manual for instructions on writing an SDF to do this. Translate the gage-height and velocity data using DECODES Site-Device Files (SDF) for data from and EDL involves using the STD\_STOR program, or from the IN menu in ADAPS select, “Process WRD Standard Input Data.” Data entry into ADAPS from an EDL can be done through automatic processing setups using SATIN/SENTRY programs but for the most part are for data being transmitted via GOES DCP.

A DECODES SDF can only be created at the administrator level. See the NWIS Site administrator to make this entry or update.

**c. Other common methods of inputting data into ADAPS include:**

**i. ADR card-image data from CD\_READ program or selecting in the ADAPS IN menu “Process ADR Card-Image Data.”** These data are equivalent to measured Unit-Value data as if obtained from a digital tape or choosing equal time step data from a strip chart.

**ii. Direct entry of Unit-Value data using the UV\_EDIT program or selecting in the ADAPS UT menu “Edit Unit-Values.”**

**iii. Unit-Value card image data using UV\_STORE program or selecting in the ADAPS IN menu “Process UV Card-Image Data.”** These data are in usually in B-Card format.

**iv. Digitized data using the UV\_ENTRY program or selecting in the ADAPS IN menu “Enter Unit-Values from Digitizer/Keyboard.”**

As the data are entered into ADAPS as measured Unit-Values, they are tagged with their appropriate transport code. For the preferred input transport code the data are automatically entered into the edited Unit-Values table. The other measured Unit-Value data can be used in HYDRA as backup data, if needed.

## **8. Screen and Edit Input Gage-height and Velocity Data**

The gage-height and velocity input Unit-Value data will need to be screened for any obvious erroneous values such as spikes or other inconsistent data. This screening and editing process is done using HYDRA (TS\_EDIT) or from the PR menu in ADAPS, select the option “Edit Time-Series Data Using HYDRA.” If the data are transmitted as real-time, they can be viewed on NWISWeb. HYDRA allows the user to make immediate corrections to the edited Unit-Value data, including the pasting or substituting of data from backup sources, if they exist. The use of HYDRA will also allow the user to flag the data as “checked” for properly displaying data on NWISWeb. If the real-time data are screened from NWISWeb, those data can be flagged as “checked” by using SET\_CHECKFLAG or from the UT menu in ADAPS by selecting, “Set Edited UV ‘checked’ Status Flag.”

## **9. Steps for Processing Gage-height and Velocity data for Time-Series Computation of Discharge**

**a. Enter or update Rating(s), if necessary, using RT\_EDIT program or in the PR menu of ADAPS, select menu option “Update/Display Rating Tables.”**

**Note:** All rating entries for Velocity-Index or Deflection Meter stations entered are based on the site ID and DDs. Applicable rating types that may be entered into ADAPS for the gage-height DD are given below:

- MEAS: Conversion of input – only used for conversion of gage-height and velocity data (parameter codes 00065 and 00055) from ADR (dial readings) to real numbers. This used to be Type 0 rating in previous versions of ADAPS.

**Note:** All other rating entries for the Velocity-Index or Deflection Meter stations should be entered under the Discharge DD (parameter code 00060).

Applicable rating types that may be entered into ADAPS for the Discharge DD are given below:

- STAR: Stage-area rating is a **MANDANTORY** rating for standard cross-section. (Cross-sectional area is not stored or used in ADAPS with an assigned parameter code); this used to be Type 4 rating in previous versions of ADAPS.
- STCO: Stage-Velocity correction factor rating. This rating is used to correct the output from the rating VELO, if needed. (If this rating does not exist, the processing assumes that the velocity from the deflection-velocity rating VELO is the mean cross-sectional velocity); this used to be Type 5 rating in previous versions of ADAPS.
- VELO: Deflection-Velocity Rating. This rating is used to convert instantaneous deflection readings, point velocities, or velocities obtained at a vertical in the cross-section to a cross-sectional mean velocity. This rating type is also used for an acoustic velocity-meter station to convert an instantaneous horizontal line velocity to a cross-sectional mean velocity. (This is a **MANDANTORY** rating unless regression equation is used). This used to be Type 6 rating in previous versions of ADAPS.

**Note:** The output computed velocity stored in ADAPS is the velocity resulting from using rating VELO and then multiplying by the velocity factor determined from rating STCO.

- MEAS: Conversion of Velocity data. Can be used for conversion of gage-height data (parameter code 00065) from ADR (dial readings) to gage-height in feet, or velocity data (parameter code 00055) from ADR (dial readings) to feet per second or other intermediate value. This used to be Type 20 rating in previous versions of ADAPS.

Use of these ratings is optional, except for rating STAR and VELO, and the user must select the appropriate rating types for use with the station being processed.

**(Note:** If the regression equation method is approved for use by OSW, the equation will take the place of ratings STCO and VELO). The form of the regression equation is:

$$V_{\text{mean}} = X \cdot V_{\text{index}} + Y \cdot V_{\text{index}} \cdot \text{STAGE} + C$$

**where:**

**$V_{\text{mean}}$  = mean velocity in cross section**

**$V_{\text{index}}$  = shifted index velocity**

**STAGE = Gage height**

**X, Y, and C are coefficients derived by regression analysis.**

Comments can be added to explain development of ratings and rating dates. Use of this function is strongly recommended as these comments can be used to draft a station analysis.

**2. Enter Data Corrections for either or both the gage-height and velocity data, if needed, using DC\_EDIT or in the PR menu of ADAPS, select menu option “Update/Display Datum Corrections”.** Data corrections entries are based on the Site ID and gage-height DDs. Data corrections can be labeled to distinguish between instrument, datum, and other types of data corrections and can be applied separately over time. Data corrections are applied to the GH DD or velocity DD by prorating over time. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is strongly recommended as these comments can be used in a draft of the station analysis.

**The option is available to compute the record at this point.**

**3. Enter shifts for Velocity under the Discharge DD, if any, to be applied by using stage-variation diagrams using SV\_EDIT program or in the PR menu of ADAPS, select menu option “Update/Display Shifts”.** The shifts are based on entries in the Discharge DD (Shifts can only be applied to velocity).

Comments can be added to explain the use or distribution of shifts. Use of this option is strongly recommended as these comments can be used to draft a station analysis. The option is available to compute the record at this point.

**4. Perform Primary Velocity-Index or Deflection Meter Computations interactively or in batch mode by using the primary program or in the PR menu of ADAPS, select menu option “Primary Computations”.** The Primary Computations for Velocity-Index or Deflection Meter Station should be run using the processors in the Discharge DD. A primary report can be generated with all the computed values and with statistics indicated in the processor record. An optional diagnostic report can be produced also to help in the review of the complex computations.

## **10. Review the Primary Computations**

If any errors are evident, use the following ADAPS programs to assist in finding and resolving the errors:

- Display and edit Unit-Value data using the TS\_EDIT program (**HYDRA**) or from the ADAPS PR menu, select “Edit Time-Series Data Using HYDRA.”
- Display and edit Unit-Values data using the UV\_EDIT program or from the ADAPS UT menu “Edit Unit-Values.”
- Display edited and computed Unit-Values using the UV\_TABLE program or from the ADAPS PR menu, select “Print/Display Unit-Values Tables.”
- Display and edit the Daily-Values using the TS\_EDIT program (**HYDRA**) or from the ADAPS PR menu, select “Edit Time-Series Data Using HYDRA.”
- Estimate missing or erroneous Daily-Values using the TS\_EDIT program (**HYDRA and MISTE**) or from the ADAPS PR menu, select “Edit Time-Series Data Using HYDRA.”
- Display and edit the Daily-Values using the DV\_EDIT program or from the ADAPS UT menu, select “Edit Daily-Values.”
- Display the Daily-Values for a selected period of interest using the DVTABLE program or from the ADAPS PR menu, select “Daily-Values Tables.”
- Other programs in ADAPS that are helpful in further or final review and processing of Velocity-Index or Deflection Meter Station data are:
  - Review/Delete Digital Tape Temporary Files using the program DRFILES or from the ADAPS IN menu, select “Review/Delete Digital Tape Temporary Files.”
  - Copy a Rating using the program RT\_COPY or from the ADAPS PR menu, select “Update Display Rating Table.”
  - Display Rating Table Dates using the program RT\_DATES or from the ADAPS PR menu, select “Display Rating Table Dates.”
  - Plot Rating(s) using the RATPLOT program or from the ADAPS DI menu, select “Plot Ratings.”
  - Plot Time-Series Data using PLOTWAT or from ADAPS PR menu, select “Plot Time-Series Data.”

- Display Expanded Shifts and Data Corrections using SHFT\_TABLES or from the ADAPS PR menu, select “Display Expanded Shifts/Corrections.”
- End-of-Year Summary using the program EOYSUMM or from the ADAPS PR menu, select “End-of-Year Summary.”

## **11. District QA/QC**

Follow District quality-assurance procedures when using the Data Aging programs in ADAPS for final review and approval of the Unit-Value and Daily-Value records. After the Velocity-index station data have been analyzed and are ready for publication, the user should use the SETSTATUS program or from the ADAPS menu, select “Manage Record Data Aging Status.” At this point, set the status from “Working” to “In Review.” This will not allow any further changes to the data and indicates that the records are ready for review prior to final approval. If any further editing is needed after the data has been set to “In Review,” see the District ADBA to reset the status to “Working” ([see Chapter 3](#) for additional data aging details). Once the data are reviewed and are acceptable for publication, the ADBA should set the record flags to “Approved” for transmittal to the NWISWeb database.

### **6.1.6 Records Processing in ADAPS for a Reservoir Station**

*by Glenn B. Engel*

To process time-series reservoir data using NWIS-ADAPS, the user needs to establish the site in the GWSI Site File, then create the support files in ADAPS necessary to define the data being stored in ADAPS. Once these support files are established, the user will be able to process the time-series data that is collected to produce the final products of publication-quality Unit and Daily-Values of reservoir data. The following steps are an overview of the navigation-path through the reservoir station time-series data processing functionality of ADAPS:

#### **1. Establish the Site**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the reservoir station site in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this site in the database. If the site already exists in the Site File, verify that the Site File information such as gage-height sensing equipment is up-to-date.

#### **2. Create the Sensor Locations for the Site (Optional)**

**Skip this step if there is only one sensor-location at the site.** (Locations other than the “default location” are needed only if there are sensors at multiple locations at the site, e.g. sensors at different depths or at multiple points in the cross-section.)

If there are multiple sensor locations, it is imperative that the sensor locations are established in ADAPS prior to setting up the data-descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the reservoir site. In the 4.2 version of ADAPS, the user can store data collected for one parameter from multiple locations using the same data-descriptor (DD). Since there is only one data-descriptor (DD) for each measured parameter at a site, using the location description will further differentiate the data collected by each sensor.

### **3. CREATE OR UPDATE THE DATA DESCRIPTORS**

Data-descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In this step, a data-descriptor (DD) is established for each parameter measured at the site. In the SU sub-menu, select the menu option, “Update Data Descriptor” (DD\_EDIT) to create or update the data-descriptors for each parameter measured at the reservoir site. In this step, the user defines the parameters for each DD; assigns a location to the DD based on the LOCATIONS created in the previous step, if necessary; creates the processor record for the DD, and defines the screening thresholds for the DD. If only one location is used, the location will automatically be set to “default” in this step. The input DD, gage height, has to be established first so that the computed DD, generally reservoir contents, can be established from it, when the processor record is created.

### **4. Create DECODES Site-Device Files (Optional—Needed for EDLS)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level. See the NWIS Site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument recording Unit-Values electronically and is storing and/or transmitting the values for entry into ADAPS. Please refer to the DECODES manual for instructions on creating an SDF to process the data.

## **5. Create the Instrument File (Optional - Only Needed for ADRS)**

Instrument editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the “SU” sub-menu of ADAPS, select the menu option “Update ADR Instrument Information” (IN\_EDIT). This program is used to enter information about reservoir stations that have recorded readings using an Analog Digital Recorder (ADR) and binary paper-tape media.

## **6. Manage the Preferred Input**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), the user needs to assign a “preferred input” transport code using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). At a site, multiple instruments may be collecting elevation data, or one instrument may be collecting, storing and transmitting data from the site into ADAPS using multiple transport methods, for example, a GOES data-collection platform (DCP) and electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

The data from each transport method for each data-descriptor are stored as measured Unit-Values. ADAPS stores measured Unit-Values from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input.” To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport-code “s”(GOES DCP), or the transport-code “e” (telemetered EDL data). NWISWeb retrieves data from the computed Unit-Values tables for display on the Web. The edited Unit-Values tables are automatically populated during the SATIN/SENTRY data-conversion process with the measured Unit-Values from the preferred-input sensor, then the computed Unit-Values tables are created/updated automatically during the data correction/computation



processes in ADAPS. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled. EDL data that are retrieved manually can only be used as the preferred input if no real-time data are to be served on the Web, or if a separate data-processing stream with separate data-descriptors (DD) is established.

**\*\*Important note:** The real-time data after being processed through ADAPS are displayed to the public via NWISWeb. It is imperative that the real-time data be checked and corrected each day using HYDRA to verify that erroneous data are not being broadcast to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user sets the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the user has viewed the data using NWISWeb and does not need to make any edits to the data, the Web-display status flag on the data may be set to “checked” using the UT menu-option “Set the Edited UV ‘checked’ Status”, (SET\_CHECKFLAG).

## **7. Input Data**

Data entry into ADAPS from a reservoir station will be from three general pathways:

- A GOES DCP
- An EDL
- Other (ADR, chart, or observer)

**GOES DCP:** Data from the GOES data-collection platform (DCP) typically are tagged as the preferred-input transport method. These data are transmitted to ADAPS and are entered automatically into the measured unit-values table and the edited unit-values table. The data also are processed through the ADAPS correction and computation processes and entered automatically into the computed Unit-Values tables, which are displayed on NWISWeb. There is no need to enter additional data from a DCP so proceed to Step 8, “SCREEN AND EDIT DATA.”

**Electronic Data Logger (EDL):** Data from an EDL must first be converted to standard-input format using the DECODES program which is run outside of the ADAPS menu (see DECODES manual for detailed instructions of this process). Once these data have been converted, they are entered into ADAPS using the “Process WRD standard input data” program (STD\_STOR) from the “IN” sub-menu, are entered into the measured unit-values table, and are available as back-up record. An EDL may be a preferred input if no DCP is used at the site. If the EDL data are the preferred input, these data will be written to both the measured and edited unit-values tables in this step.

**Other Methods (ADR, Chart, Observer):** Data from ADRs are entered into ADAPS using the IN (Input) sub-menu option “Read ADR Tape Data” (TP\_READ). This program requires a paper tape-reader interfaced to the data system. Once these data are read, they are stored in the measured Unit-Values table using the program “Edit and

Store ADR Tape Data” (TP\_EDIT). If the ADR is the preferred-input transport method the data also will be stored in the edited Unit-Values tables.

For data from charts or observations, entry is through the ADAPS IN sub-menu option “Enter Unit-Values from Digitizer/Keyboard” (UV\_ENTER). The Digitizer option requires a digitizer interfaced to the data system. The keyboard option prompts the user for yyyyymmdd.hhmmss of the observation and the value of the observation.

ADR card-image data can be entered using the ADAPS IN sub-menu option “Process ADR Card Image Data” (CD\_READ). Unit-Values card image data can be processed using ADAPS IN sub-menu option “Process Unit-Values Card Image Data” (UV\_STORE) and direct entry of Unit-Values can be made using the ADAPS IN sub-menu option “Edit Unit-Values” (UV\_EDIT).

The data are entered into ADAPS as measured Unit-Values and tagged with a transport method code. For the preferred input, the data are also automatically entered into the edited Unit-Value table.

## **8. Screen and Edit Data**

After input, the data need to be screened for obvious erroneous values such as spikes or stuck instruments. Select PR (Primary Data Processing) sub-menu option “Edit Time Series Data using HYDRA” (TS\_EDIT). HYDRA allows the user to make immediate corrections to the data including pasting in data from backup data sources, and also marks the data as “checked.” HYDRA works on edited Unit-Values. Real-time data can also be viewed on NWISWeb. If real-time data is screened on the Web, which are computed Unit-Values, the data can be flagged as checked using the sub-menu UT (Miscellaneous Utility Functions), option “Set edited UV “checked” Status Flag” (SET\_CHECKFLAG). The Unit-Values also may be edited by using the ADAPS UT sub-menu option “Edit Unit-Values” (UV\_EDIT).

## **9. Apply Data Corrections**

Select ADAPS sub-menu PR (Primary Data Processing), option “Update/Display Data Corrections (DC\_EDIT)” to apply data corrections to the reservoir gage heights/water levels. Three different types of corrections can be entered into this program:

- Gage height/Elevation Corrections
- Datum Corrections from Levels
- Other

Gage height/Elevation corrections are instrument errors caused by drift, mis-calibration or malfunction, etc. Datum Corrections from Levels are due to changes in the station reference gages or orifice, documented by levels run at the station. Other corrections can be, for example, a correction applied to the datum of the gage to avoid recording negative gage heights/elevations.

The DC\_EDIT program creates data correction curves, which generate correction Unit-Values, which are then applied to the edited Unit-Values to generate computed Unit-Values of gage height/elevation. There can be three separate data correction curves applied to one time segment of Unit-Values and ADAPS will add the corrections together for one total data correction. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is strongly recommended as these comments can be used in a draft of the station analysis. The user has a choice of running (yes) or not running (no) computations at this point to produce computed Daily-Values of reservoir gage height/elevation.

## **10. Enter Ratings**

In the PR (Primary Data Processing) sub-menu of ADAPS, select menu option “Update/Display Rating Tables” (RT\_EDIT) to enter rating input points or to review previously entered ratings. Because ratings are tied to the output DD, a number of ratings are possible to compute different outputs from the same input DD (gage height/elevation); for example, reservoir contents from gage height or surface area from gage height, etc.

It is also possible to enter an input conversion rating in RT\_EDIT tied to the input DD if input data needs to be converted prior to storage. If the reservoir water level is recorded as gage height, it should be converted to elevation by an input rating, especially if data is going to the Web. The transport code is chosen and then a choice of linear table, log table, or equation can be entered. Comments can be added to explain development of ratings and rating dates. Use of this function is strongly recommended as these comments can be used to draft a station analysis.

## **11. Compute Time Series Data**

In the PR sub-menu of ADAPS, select menu option “Primary Computations” (PRIMARY). The PRIMARY program calculates and stores computed Unit-Values of gage height/elevation, computed Unit-Values of output (usually reservoir contents), and computed Daily-Values of both input (gage height/elevation) and output (usually reservoir contents) and generates a report. Usually computed Unit-Values and also computed Daily-Values of both the input and output parameters have been produced during earlier processes such as HYDRA and DC\_EDIT if the user had picked “yes” to compute. The PRIMARY needs to be run, if computations have not been run earlier, in order that any changes made to the data are reflected in the computed values. The output DD, such as contents, is used to run PRIMARY. Options are available to choose Historical or Standard output, or report with no computation, if computations had already been done earlier. The PRIMARY program produces a report showing daily mean elevation and daily mean contents as well as daily maximum and minimum values of reservoir elevation and reservoir contents with times of occurrence. If the daily maximum and minimum values are to be stored, the processor record would have to be set up to do that.

An optional diagnostic report can be produced also to help in the review of the computations.

## **12. Review Computations**

Computed Daily-Values can be viewed on the PRIMARY report or by requesting a Daily-Values table by selecting ADAPS PR sub-menu option “Daily-Values Tables” (DVTABLE). Select ADAPS PR sub-menu, option HYDRA (TS\_EDIT) to edit computed Daily-Values of elevation and computed Daily-Values of contents to produce final Daily-Values. Daily-Values also may be edited by selecting ADAPS UT sub-menu option “Edit Daily-Values” (DV\_EDIT). Other programs may be helpful in analyzing the Daily-Values such as “Plot Time Series Data” (PLOTWAT) and “Plot Hydrographs” (HYDROGRAPH).

## **13. Process End-Of-Year Summary**

Select ADAPS PR sub-menu option “End-of-Year Summary” (EOYSUMM) to print out maximum and minimum elevation and contents for the water year.

## **14. Perform Quality-Assurance Procedures**

Perform required District quality-assurance procedures such as checking of record, printing of required tables and plots from ADAPS (data corrections, Daily-Values tables, hydrographs, etc.) and writing the station analysis.

## **15. Manage Data Aging**

Once the data have been edited and checked, the user can select ADAPS PR sub-menu option “Manage Record Data Aging Status” (SETSTATUS) to set record from “Working” to “In Review.” No changes can be made to the record at this point and it is indicated that the record is ready for review prior to approval. If edits need to be made to the record after it has been set to “In Review,” the ADBA can set the status back to “Working.” Once the data are reviewed and are acceptable for publication, the ADBA should set the status to “Approved.”

### **6.1.7 Records Processing in ADAPS for a Tidal Monitoring Station**

*by James R. Kolva*

To process time-series tidal monitoring data using NWIS-ADAPS, the user needs to establish the site in the GWSI Site File, then create the support files in ADAPS necessary to define the data that will be stored in ADAPS. Once these support files are established, the user will be able to process the time-series data that is collected in order to create the final products of publication-quality Unit and Daily-Values for a tidal monitoring station. The following steps are an overview of the navigation-path through the tidal monitoring time-series data processing functionality of ADAPS:

## **1. Establish the Site**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the tidal monitoring site in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this site in the database. If the site already exists in the Site File, verify that the Site File information has been updated to document the existence of tidal monitoring equipment at the site.

## **2. Create the Sensor Locations for the Site (Optional)**

**This Step May Be Skipped If There Is Only One Sensor-Location At The Site.**

(Locations other than the “default location” are needed only if there are sensors at multiple locations at the site, e.g. sensors at different depths or at multiple points in the cross-section.)

It is imperative that the sensor locations are established in ADAPS prior to setting up the data-descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the tidal monitoring site. In the 4.2 version of ADAPS, the user can store data collected for one parameter from multiple locations using the same data-descriptor (DD). Since there is only one data-descriptor (DD) for each measured parameter at a site, use of the location description will further differentiate the data collected by each sensor.

## **3. Create or Update the Data Descriptors**

Data-descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In this step, a data-descriptor (DD) is established for each parameter measured at the site. In the SU sub-menu, select the menu option, “Update Data Descriptor” (DD\_EDIT) to create or update the data-descriptors for the tidal monitoring site. In this step, the user defines the parameters for each DD; assigns a location to the DD based on the LOCATIONS created in the previous step, if necessary; creates the processor record for the DD; and defines the screening thresholds for the DD. If only one location is used, the location will automatically be set to “default” in this step.

“Tidal Stage Computation” should be selected as the processing method for the parameter “Gage Height.” This automatically selects computation and storing of the four tidal statistics (00021,00022,00023 and 00024) tidal high, tidal high-low, tidal low-high, and tidal low for each day as well as a mean Daily-Value for the day.

#### **4. Create DECODES Site-Device Files (Optional—Needed for EDLs)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level. See the NWIS Site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument recording Unit-Values electronically and is storing and/or transmitting the values for entry into ADAPS. Please refer to the DECODES manual for instructions on creating an SDF to process the data.

#### **5. Create the Instrument File (Optional—Only Needed For ADRS)**

Instrument editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the “SU” sub-menu of ADAPS, select the menu option “Update ADR Instrument Information” (IN\_EDIT). This program is used to enter information about tidal monitoring sites where data is recorded using an Analog Digital Recorder (ADR) and binary paper-tape media.

#### **6. Manage the Preferred Input**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), the user needs to assign a “preferred input” transport code using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). At a site, the user may have multiple instruments collecting tidal data, or one instrument may be collecting, storing and transmitting data from the site into ADAPS using multiple transport methods, for example, a GOES data-collection platform (DCP) and electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**

- r\* -Radio telemetry data**
- o -Observation data**

**\* These options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

The data from each transport method for each data-descriptor are stored as measured Unit-Values. ADAPS stores measured Unit-Values from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input.” To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport-code “s”(GOES DCP), or the transport-code “e” (telemetered EDL data). NWISWeb retrieves data from the computed Unit-Values table for display on the Web. The computed Unit-Values table is automatically populated during the SATIN/SENTRY data-conversion process and the correction/computation processes in ADAPS using the measured Unit-Values from the preferred-input sensor. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled. EDL data that are retrieved manually can only be used as the preferred input if no real-time data are to be served on the Web, or if a separate data-processing stream with separate data-descriptors (DD) is established.

## **7. Enter Data**

Tidal monitoring data is entered into ADAPS by using one or more of the options in the IN sub-menu. Data entry into ADAPS from a tidal monitoring station will be from three possible pathways:

- A GOES DCP
- An EDL
- Other (ADR, Chart, or Observer)

For data from the GOES DCP, entry is automatic through the SATIN/SENTRY programs. The user can go directly to the Data Screening step.

For data from the EDL, entry is through the IN (Input) sub-menu option “Process WRD standard input data” (STD\_STOR), after the data is processed through DECODES to create a standard format file. The input program asks for the file name for processing.

For other data from ADRs, entry is through the IN (Input) sub-menu option “Read ADR Tape Data” (TP\_READ) and then stored with the option “Edit and Store ADR Tape Data” (TP\_EDIT). These programs require a paper tape-reader interfaced to the data system.

For other data from charts or observations, entry is through the IN (input) sub-menu option “Enter Unit-Values from Digitizer/Keyboard” (UV\_ENTER). The Digitizer option requires a digitizer interfaced to the data system. The keyboard option prompts the user for `yyyymmdd.hhmmss` of the observation and the value of the observation.

The data are entered into the measured Unit-Values table and tagged with a transport code. For the preferred input, the data also are entered automatically into the edited Unit-Value table.

## **8. Screen and Edit Data**

After input, the data need to be screened for obvious erroneous values such as spikes or stuck instruments. This screening can be done using the HYDRA program (PR sub-menu option “Edit Time-Series Data using HYDRA” (TS\_EDIT)) or by viewing real-time data on NWISWeb. HYDRA allows the user to make immediate corrections to the data including pasting in data from backup data sources, and also marks the data as “checked.” HYDRA works on the edited Unit-Values. The option is available to compute the record at this point. If real-time data is screened on the Web, the data can be flagged as checked using the UT (utility) sub-menu “Set Edited UV ‘checked’ Status Flag” (SET\_CHECKFLAG).

**\*\*Important note:** The real-time data coming into ADAPS are displayed to the public via NWISWeb. It is imperative that the real-time data be checked and corrected each day to verify that erroneous data are not being broadcast to the public.

## **9. Apply Data Corrections**

Data corrections to the gage height data are applied next by the PR (Primary Data Processing) sub-menu option “Update/Display Data Corrections” (DC\_EDIT). Three different types of corrections can be entered into this program:

- Gage Height Corrections
- Datum Corrections from Levels
- Other

Gage Height Corrections are instrument errors caused by drift, mis-calibration, or malfunction, etc. Datum Corrections from Levels are due to changes in the station or orifice, documented by levels run at the station. Other corrections can be, for example, a correction applied to the datum of the gage to avoid recording negative gage heights.

The DC\_EDIT program creates data correction curves, which can include three points each, that produce correction Unit-Values, which are then applied to the edited Unit-Values to generate computed Unit-Values of gage height. There can be three separate data correction curves applied to one time segment of Unit-Values and ADAPS will add the corrections together for one total data correction. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is



strongly recommended as these comments can be used in a draft of the station analysis. Correction entry and editing are also done in the DC\_EDIT program. Screening thresholds flags are also applied and stored with the computed Unit-Values. The option is available to compute the record at this point.

## **10. Compute Time-Series Data**

The tidal statistics are computed by the PR sub-menu option “Primary Computations” (PRIMARY). The Primary program calculates the High-high, High-low, Low-high and Low-low tide extremes for each day. It also calculates and stores the maximum, minimum, and mean daily gage height values for each day if so instructed in the DD processor information. A tidal primary report is generated listing each of the statistics along with the associated time, the mean tide level for the day, the maximum and minimum gage height data corrections used for each day, and the computed Unit-Values for each hour of the day. Any threshold screening flags are also displayed. An optional diagnostic report can be produced also to help in the review of the computations.

## **11. Analyze, Edit, and Display Data**

The tidal data can now be analyzed or used in a variety of program options such as “Daily-Values Manipulation” (DV\_MANIP), “End-of-year Summary” (EOYSUMM), “Plot Time-Series Data” (PLOTWAT), “Plot Hydrographs” (HYDROGRAPH), “Daily-Values Monthly and Annual Statistics” (DVMAS) or “Daily Duration and N-Day Low/High Value Analysis” (DVSTAT). The data can be displayed using “Print/Display Unit-Values” (UV\_TABLE) or “Daily-Values Tables” (DVTABLE). The use of these program options is discussed elsewhere in this manual.

Computed Daily-Values can be edited using the option “Edit Time-Series Data using HYDRA” (TS\_EDIT). HYDRA can edit the Daily-Values either graphically or through a table. All Daily-Values changed in HYDRA are flagged as estimated in the computed Daily-Values table.

## **12. Managing Data Aging**

After the tidal data have been analyzed and are ready for publication, the user should enter the PR sub-menu option “Manage Record Data Aging Status” (SETSTATUS) and change the status from “Working” to “In Review.” This will lock any changes to the data and indicate that the record is ready for review prior to approval. The ADBA should set the status to “Approved” when data is acceptable for publishing.

## 6.1.8 Records Processing in ADAPS for a Water Quality Monitor Station

by Susan C. Grams

To process time-series water-quality data using NWIS-ADAPS, the user needs to establish the site in the GWSI Site File then create the support files in ADAPS necessary to define the data being stored in ADAPS. Once these support files are established, the user will be able to process the time-series data that is collected to produce the final products of publication-quality Unit and Daily-Values of water-quality data. The following steps are an overview of the navigation-path through the water-quality (QW) time-series data processing functionality of ADAPS:

### **1. Establish the Site**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the continuous water-quality monitoring site in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this QW site in the database. If the site already exists in the Site File, verify that the Site File information has been updated to document the existence of QW monitoring equipment at the site.

### **2. Create the Sensor Locations for the Site (Optional)**

Skip this step if there is only one sensor-location at the site. (Locations other than the “default location” are needed only if there are sensors at multiple locations at the site, e.g. sensors at different depths or at multiple points in the cross-section.)

If there are multiple sensor locations, it is imperative that the sensor locations are established in ADAPS prior to setting up the data-descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the “SU” sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the water-quality (QW) monitoring site. In the 4.2 version of ADAPS, the user can store data collected for one parameter from multiple locations using the same data-descriptor (DD). Since there is only one data-descriptor (DD) for each measured parameter at a site, using the location description will further differentiate the data collected by each sensor.

```

*****
US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)
REVISION NWIS 4.2+20020205
(SU) SUB-MENU : Update Support Files/Record Flags
*****
1 -- Update Location File
2 -- Update Data Descriptor File
3 -- Update Instrument File
4 -- Manage preferred input
5 -- Edit public access flags
6 -- Manage Record Data Aging Status

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation   PGM -- Display program_names
QU -- Exit to previous menu             EX -- Exit to Unix

Select desired menu option or program_name ([CR] for menu):

```

#### ADAPS "SU" Sub-Menu

### **3. Create or Update the Data Descriptors**

Data-descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In this step, a data-descriptor (DD) is established for each parameter measured at the site. In the SU sub-menu, select the menu option, "Update Data Descriptor" (DD\_EDIT) to create or update the data-descriptors for each water-quality (QW) parameter measured at the site. In this step, the user defines the parameters for each DD; assigns a location to the DD based on the LOCATIONS that were created in the previous step, if necessary; creates the processor record for the DD, and defines the screening thresholds for the DD. If only one location is used, the location will be set automatically to "default" in this step.

### **4. Create Decodes Site-Device Files (Optional—Needed for EDLS)**

DECODES SDFs can only be created at the ADAPS administrator level. See the NWIS site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument recording Unit-Values electronically and storing and/or transmitting the values for entry into ADAPS. Please refer to the DECODES manual for instructions on creating an SDF to process the data.

### **5. Create The Instrument File (Optional—Only Needed for ADRS)**

Instrument editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS site or ADAPS database administrator to make this entry or update.

In the “SU” sub-menu of ADAPS, select the menu option “Update ADR Instrument Information” (IN\_EDIT). This program is used to enter information about QW monitors that record their readings using an Analog Digital Recorder (ADR) and binary paper-tape media.

## **6. Manage the Preferred Input**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), the user needs to assign a “preferred input” transport code using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). At a site, there may be multiple instruments collecting water-quality (QW) data, or one instrument may be collecting, storing and transmitting data from the site into ADAPS using multiple transport methods; for example, a GOES data-collection platform (DCP) and electronic data-logger (EDL).

The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a File**
- c -Digitized analog Chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

The data from each transport method for each data-descriptor are stored as measured Unit-Values. ADAPS stores measured Unit-Values (UVs) from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input”. To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport-code “s”(GOES DCP), or the transport-code “e” (telemetered EDL data). NWISWeb retrieves data from the computed Unit-Values table for display on the Web. The edited and computed Unit-Values tables are automatically produced during the SATIN/SENTRY data-conversion process and the data correction/computation processes in ADAPS using the measured Unit-Values (UVs) from the preferred-input sensor. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be assigned to the real-time transport method, even if the instrument is not USGS-owned or USGS-controlled.

EDL data that are retrieved manually can only be used as the preferred input if no real-time data are to be served on the Web, or if a separate data-processing stream with separate data-descriptors (DD) is established.

**\*\*Important note:** The real-time data, after being processed through ADAPS, are displayed to the public via NWISWeb. It is imperative that the real-time data be checked and corrected each day using HYDRA to verify that erroneous data are not being broadcast to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user sets the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the user has viewed the data using NWISWeb and does not need to make any edits to the data, the Web-display status flag on the data may be set to “checked” using the UT menu option “Set the Edited UV ‘checked’ Status”, (SET\_CHECKFLAG).

Now that the site has been established in GWSI and ADAPS, transmissions of the water-quality (QW) data can be received, data can be stored in ADAPS, corrections can be applied to the data based upon the calibration information and site-visit notes, and the Unit and Daily-Value record can be computed that will be published for that site. Further information on the field operation of water-quality monitors may be found in “Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Site Selection, Field Operation, Calibration, Record Computation and Reporting”; Wagner, et al; U.S. Geological Survey, Water-Resources Investigations Report 00-4252: 2000, 53p.

One typical USGS water-quality monitor configuration collects data for the four parameters: water temperature, specific conductance, pH, and dissolved oxygen. When data enter ADAPS from the QW monitor from the preferred-input sensors for each of these parameters, the data are written to both the Measured Unit-Values table and the Edited Unit-Values table for each of the specified data-descriptors (DDs). If these data are recorded on a backup recording device, the backup recorder becomes an alternate transport method for the data. These Unit-Values from the other transport methods used at the site are written to measured Unit-Values tables for their respective data-descriptors/transport methods and can be called up in the time-series edit program (TS\_EDIT, “HYDRA”) as reference-curves and may be used to fill in gaps or to correct erroneous UVs that are stored in the edited Unit-Values table from the preferred-input sensors. In ADAPS 4.2, only one data-descriptor exists for each parameter at a specified location for which the monitor is collecting data; the data recorded on different recording devices for each data-descriptor (DD) are distinguished in the measured Unit-Values table by the transport method that had been specified in the section on “Manage The Preferred Input.”

## **7. Enter QW Time-Series Data**

**a. GOES DCP:** Data from the GOES data-collection platform (DCP) typically are tagged as the preferred-input transport method. These data are transmitted to ADAPS and are entered automatically into the measured Unit-Values table and the edited Unit-Values table. If data from the DCP are the only data to be transported to ADAPS from the QW monitor, there is no need to enter data, so proceed to Step 8, “Screening Time-Series QW Data.”

**b. Electronic Data Logger (EDL):** Data from an EDL must first be converted to standard-input format using the DECODES program which is run outside of the ADAPS menu (see DECODES manual for detailed instructions of this process). Once these data have been converted, they are entered into ADAPS using the “Process WRD standard input data” program (STD\_STOR) from the “IN” sub-menu, are entered into the measured Unit-Values table, and are available as backup record. An EDL may be a preferred input if no DCP is used at the site. If the EDL data are the preferred input, these data will be written to both the measured and edited Unit-Values tables in this step.

**c. ADR Paper-tape\*\*:** Should there be QW monitor data recorded on binary paper-tape using an ADR, these data are entered into ADAPS via a tape-reader using the program “Read ADR Tape Data” (TP\_READ), in the ADAPS “IN” sub-menu. Once these data are read, they are stored in the measured Unit-Values table using the program “Edit And Store ADR Tape Data” (TP\_EDIT). If the binary paper-tape data are the preferred input, these data will be written to both the measured and edited Unit-Values tables in this step. An instrument record is required in addition to data descriptors to process this type of data. Creating an instrument record in ADAPS 4.2 is only authorized at the database administrator (DBA) level.

**d. Other Data Input\*\*:** Data from observations or charts are entered into ADAPS using the program UV\_ENTER in the “IN” sub-menu. Unit-Values may be entered into ADAPS from the “IN” sub-menu using UV card images input via the program UV\_STORE.

**\*\*Data input from the GOES DCP or EDL typically are transmitted in the engineering units of the parameter, or in “real values”. Should the data be collected in some format requiring conversion to engineering units, a conversion-of-input rating must exist in ADAPS prior to transporting the data. Conversion-of-input ratings are discussed in Chapter 4.**

```

*****
US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)
REVISION NWIS 4.2+20020205
(IN) SUB-MENU : Data Input |
*****

1 -- Read ADR Tape Data (TP_READ)
2 -- Process ADR Card-Image Data (CD_READ)
3 -- Edit And Store ADR Tape Data (TP_EDIT)
4 -- Review/Del. Dig. Tape Temp. Files (DRFILES)
5 -- Process UV Card-Image Data (UV_STORE)
6 -- Enter Unit-Values from Digitizer/Keyboard (UV_ENTER)
7 -- Process Daily-Values Card-Image Data (DV_STORE)
8 -- Process WRD standard input data (STD_STOR)
9 -- Enter/Update/Display Measurements (MS_EDIT)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation   PGM -- Display program_names
QU -- Exit to previous menu             EX -- Exit to Unix

Select desired menu option or program_name ([CR] for menu):

```

#### ADAPS "IN" Sub-Menu

### **8. SCREEN THE TIME-SERIES QW DATA**

TS\_EDIT, or "HYDRA", found in the ADAPS "PR" sub-menu (below) is the tool of choice to screen the Unit-Value data. The Unit-Value data seen when HYDRA is invoked for a station/data-descriptor are the edited Unit-Values from the preferred-input sensor. HYDRA allows the user to:

- View these edited Unit-Values
- Edit these edited Unit-Values
- Set the Web-flag to "checked" for these edited Unit-Values

In this step, delete erroneous preferred-input Unit-Values or replace erroneous preferred-input Unit-Values with the measured Unit-Values from an alternate transport method for the same data-descriptor which can be brought into HYDRA as a reference curve. HYDRA allows the user to "cut and paste" Unit-Values from the reference curve onto the preferred-input curve and then save the Unit-Values from the modified preferred-input curve to the edited Unit-Values table.

Data synchronization in ADAPS is key to maintaining the integrity of the data and of the data displayed on NWISWeb. After editing the Unit-Values in HYDRA, the user has the option of computing the record. It is recommended that the answer "yes" be chosen to compute the record so that the computed Unit-Values table and the computed Daily-Values table reflect the changes made in the edited Unit-Values table in this step.

If the data are screened using NWISWeb *and no editing is required*, set the status flag for the data to “checked” for Web display using the “Set Edited UV ‘checked’ Status Flag” (SET\_CHECKFLAG) program in the “UT” sub-menu. Unit-Values also may be edited at this point using the uv\_edit program in ADAPS UT menu “Edit Unit-Values”.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)  |
| REVISION NWIS 4.2+20020205                                         |
| (PR) SUB-MENU : Primary Data Processing                             |
*****

1 -- Update Data Descriptor Thresholds          9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra         10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections           11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables              12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars             13 -- Peak Flow Entry and Retrieval
6 -- Update/Display Shifts (SV_EDIT)           14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)           15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary                16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation      PGM -- Display program_names
QU -- Exit to previous menu                EX -- Exit to Unix

Select desired menu option or program_name ([CR] for menu):

```

#### ADAPS “PR” Sub-Menu

### 9. Apply Data Corrections

Once the Unit-Values have been viewed and edited in HYDRA, data corrections can be applied to the Unit-Values based on calibration notes and other site-inspection information.

**Shifts are no longer used to correct water-quality data in ADAPS 4.2.** Shifts are tied to ratings and are exclusive to the stage-discharge computation. Use data corrections (DC\_EDIT) to correct time-series water-quality data. The old functionalities of “datum correction,” “shift-by-time” and “variable shift” of QW data are not lost; these functionalities are now present in the form of the three (3) data-correction curves that can coincide for one time-period and one data-descriptor (DD).

Apply data corrections to correct the edited Unit-Values for problems associated with sensor-fouling, calibration-drift, or instrument-error, by using the DC\_EDIT program in the “PR” sub-menu. In ADAPS 4.2, there can be up to three (3) data-correction curves applied to one time-segment of edited Unit-Values data, and each of these data-correction curves can be a one-, two-, or three-point curve. It is strongly recommended, beginning with the 4.2 version of ADAPS, that data correction set 1 be used to correct for sensor fouling, data correction set 2 be used for calibration drift, and data correction set 3 be used for “other” types of corrections.



Once the data corrections have been entered, ADAPS will compute the corrections prorated over the specified time period and apply them to the edited Unit-Values. If multiple data-correction curves exist that are coincident in time, ADAPS computes the combined correction for the time period and applies that combined correction to the data. View the actual Unit-Values of correction by running the “Print/Display Unit-Values Tables” (UV\_TABLE) program and selecting the option, “Correction Unit-Values” to specify that type of UV output. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. This is strongly recommended as these comments can be used in a draft of the station analysis.

Data synchronization in ADAPS is key to maintaining the integrity of the data and of the data displayed on NWISWeb. After the data-correction curves are entered or edited in DC\_EDIT, the user has the option of computing the record. It is recommended that the answer “yes” be picked to compute the record so that the computed Unit-Values table and the computed Daily-Values table reflect the corrections applied to the edited Unit-Values table in this step.

## **10. Time-Series QW Data Computations**

If the record was not computed in Steps 8 and/or 9, this step is MANDATORY to maintain data synchronization and to obtain a report of the record computations.

### **PRIMARY**

After reviewing and editing the edited Unit-Values and entering the data corrections based on the site inspections, time-series QW monitor data are computed using the “Primary Computations” (PRIMARY) program in the “PR” sub-menu. If the QW time-series data was processed upon exiting HYDRA and/or DC\_EDIT, the data are consistent in the database, however a primary report of the data will not be available to review. Running PRIMARY is the only way to generate a PRIMARY report. If data synchronization has been maintained in previous steps and only a PRIMARY report is needed, this program can be run to only generate the PRIMARY report without recomputing the record.

If the record has NOT been recomputed in previous steps, running the PRIMARY program is required to update the computed Unit and Daily-Values of the QW monitor data to reflect any changes made to the edited Unit-Values table or to the data correction curves. An optional diagnostic report can be produced also to help in the review of the computations.

## **11. Review and Edit Data**

As the PRIMARY program is run, the selected Daily-Value statistics of the time-series QW data are computed and stored. These computed Daily-Values can be viewed either on the PRIMARY report, or by requesting a Daily-Values table by running the “Daily-Values Tables” (DVTABLE) program in the “PR” sub-menu. If the Daily-Values require editing, use the program “Edit Time-Series Data using HYDRA” (TS\_EDIT) to

make these corrections. The Daily-Values that result from this editing process are the final Daily-Values of the record.

While **not recommended** as the main editing procedures, Unit Value editing and Daily Value editing can still be accomplished by using the UV\_EDIT programs and the DV\_EDIT programs in the “UT” sub-menu of ADAPS 4.2.

## **12. Manage Data Aging**

Follow the District quality-assurance processes for final review and approval of the Unit and Daily-Value records. Once the data have been edited and reviewed, the user can set the status of the data from “Working” to “In Review” using the “Manage Record Data Aging Status” (SETSTATUS) program in the “PR” sub-menu. When this is done, the data are marked ready for the review process and no changes may be made to the Unit-Values, Daily-Values or corrections in ADAPS. If edits to the data need to be made after it is set to “In Review,” please see the ADBA to reset the status to “Working.” Once the data are reviewed and are acceptable for publication, the ADBA should set the status of the data from “In Review” to “Approved.”

### **6.1.9 Records Processing in ADAPS for a Ground-Water Observation Well Site**

*by Sarah E. Giffen*

To process time-series ground-water data using NWIS-ADAPS, first establish the site in the GWSI Site File and create the support files in ADAPS necessary to define the data. Next, process the time-series data in order to create the final products of publication-quality Unit and Daily-Values. The following steps outline these processes in more detail.

#### **1. Establish Site**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the ground-water site in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this ground-water site in the database. If the site already exists in the Site File, verify that the Site File information is correct and up to date.

#### **2. Create Sensor Locations for the Site (Optional)**

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

To enter information about the physical locations of the sensor(s) at a site, select “Update Location File” (LOC\_EDIT) from the SU sub-menu. If there is only one sensor location at the site, this step may be skipped and the location will automatically be set to “default

(0).” Locations other than the “default location” are needed only if there are multiple sensor locations at the site, e.g. at different depths or at multiple points in the cross-section. With one data-descriptor (DD) for each measured parameter at a site, using the location descriptor will differentiate the data collected by each sensor.

### **3. Create or Update Data Descriptors**

Data-descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish a data-descriptor (DD) for each parameter by selecting “Update Data Descriptor” (DD\_EDIT) in the SU sub-menu. Define the parameters for each DD; assign a location to the DD; create the processor record for the DD; and define the screening thresholds for the DD.

### **4. Create Decodes Site-Device Files (Optional—needed for EDLS)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level. See the NWIS Site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) must be created for each instrument recording Unit-Values electronically and is storing and/or transmitting the Unit-Values to be stored in ADAPS. Please refer to the DECODES manual for instructions on writing an SDF to process the data.

### **5. Create the Instrument File (Optional—Only needed for ADRs)**

Instrument editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS site or ADAPS database administrator to make this entry or update.

In the “SU” sub-menu of ADAPS, select the menu-option “Update ADR Instrument Information” (IN\_EDIT). This program is used to enter information about ground-water monitors that record readings using an Analog Digital Recorder (ADR) and binary paper-tape media.

### **6. Select Preferred Input**

Managing the preferred input is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

There may be multiple instruments collecting ground-water data at a site, or one instrument collecting more than one set of data. For example, a ground-water site with real-time data capabilities that transmits DCP data as well as stores EDL data that are

retrieved manually in the field. The values resulting from these different collection methods or paths are all stored in ADAPS as measured Unit-Values under the same DD and are differentiated from one another by a transport code. The transport codes that ADAPS uses to identify the origin of measured Unit-Values are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**
- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**Note: \* Indicates that these options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

For each data-descriptor (DD), one transport method is identified as the preferred input path using the SU sub-menu option “Managing preferred input” which runs the program PFIN\_EDIT. Measured Unit-Values from the preferred input path are also stored as the edited Unit-Values in ADAPS. If the site has real-time data capabilities, the preferred input path must be set to the real-time DCP data path.

## **7. Input Data**

The data input step is not necessary for real-time transmitted data. Real-time transmitted data are identified as the preferred data input stream in step 6. “Manage the Preferred Input” and are automatically processed through ADAPS by means of the SATIN/SENTRY programs. These data are stored in tables as measured Unit-Values and as the edited Unit-Values. The computed Unit-Values produced by ADAPS from the edited Unit-Values are displayed on NWISWeb.

EDL data are loaded into ADAPS as standard input files (which are the output from DECODES). Standard input files are loaded into ADAPS by choosing “Process WRD Standard input data” (STD\_STOR) from the IN sub-menu (shown in the figure below). These data are stored in ADAPS as measured Unit-Values and are distinguished from the other measured Unit-Values, under the same DD, by a transport code. If there is no real-time transmitted data, then these data are likely the preferred input and have been identified as such in step 6.

ADR data are read using the “Read ADR Tape Data (TP\_READ)” from the IN sub-menu, and are stored with the option “Edit And Store ADR Tape Data (TP\_EDIT)” in this same sub-menu. These programs require a paper tape recorder.

Data from charts or observations are loaded into ADAPS through, “Enter Unit-Value from Digitizer/Keyboard (UV\_ENTER)” from the IN sub-menu. This process requires a

digitizer interfaced with the data system. The keyboard option prompts the user for yyymmdd.hhmmss of the observation and the value of the observation.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)  |
| REVISION NWIS 4.2+20020205          |
|          (IN) SUB-MENU : Data Input          |
*****

-- Read ADR Tape Data (TP_READ)
-- Process ADR Card-Image Data (CD_READ)
-- Edit And Store ADR Tape Data (TP_EDIT)
-- Review/Del. Dig. Tape Temp. Files (DRFILES)
-- Process UV Card-Image Data (UV_STORE)
-- Enter Unit-Values from Digitizer/Keyboard (UV_ENTER)
-- Process Daily-Values Card-Image Data (DV_STORE)
-- Process WRD standard input data (STD_STOR)
-- Enter/Update/Display Measurements (MS_EDIT)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation   PGM -- Display program_names
QU -- Exit to previous menu             EX -- Exit to Unix

Select desired menu option or program_name ([CR] for menu):

```

Data Input Figure

## **8. Review Edited Unit-Values**

Edited Unit-Values can be displayed by creating a Unit-Value inventory table (“Print/Display Unit-Values Tables” in the PR sub-menu) or by using PLOTWAT (“Plot Time-Series Data” in the PR sub-menu). Edited Unit-Values are modified and reviewed in “Edit Time-Series Data using HYDRA” in the PR sub-menu (shown below).

HYDRA allows the user to make immediate corrections to the edited Unit-Values by deleting erroneous values, pasting in data from backup data sources, etc. HYDRA is used to verify that quality data are being broadcast to the public. By using HYDRA to view or correct data and then selecting “save and exit,” the Web-flag on that data will be changed to and displayed on NWISWeb as “checked.” If the data is viewed using NWISWeb and does not need to be edited, the Web-display status flag can be set to “checked” using “Set the Edited UV ‘checked’ Status” (SET\_CHECKFLAG) from the UT sub-menu.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)  |
| REVISION NWIS 4.2+20020205      Feb 13, 2002 14:44:58 Wednesday |
| (PR) SUB-MENU : Primary Data Processing                          |
*****

1 -- Update Data Descriptor Thresholds      9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra     10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections       11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables          12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars        13 -- Peak Flow Entry and Retrieval
6 -- Update/Display Shifts (SV_EDIT)      14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)       15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary           16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation    PGM -- Display program_names
QU -- Exit to previous menu              EX -- Exit to Unix
Review Edited Unit Values Figure

```

#### Primary Data Processing Sub-Menu

When exiting HYDRA, answering “yes” to “compute (Y/N),” will compute the entire record and update the Web. Answering “no,” will save the changes to the edited Unit-Values but will not compute the rest of the record and will not update the Web.

### **9. Apply Data Corrections**

Data corrections are applied to edited Unit-Values by choosing “Update/Display Data Corrections (DC\_EDIT)” from the PR sub-menu (see figure below). Three types of data corrections can be applied to edited Unit-Values: gage height corrections (instrument errors caused by drift, incorrect calibration, or malfunction), datum corrections (changes to the elevation of the measuring point, documented by levels run at the station), and other corrections. These three types of corrections are entered into the data corrections table separately and each of these three types can be a diagram consisting of one, two, or three points. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. Use of this feature is recommended as it will help in analysis and review of the record.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)
|  | REVISION NWIS 4.2+20020205      Feb 14, 2002 09:22:01 Thursday
|  | (PR) SUB-MENU : Primary Data Processing
*****

1 -- Update Data Descriptor Thresholds    9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra    10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections      11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables         12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars        13 -- Peak Flow Entry and Retrieval
6 -- Update/Display Shifts (SV_EDIT)      14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)      15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary           16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation    PGM -- Display program_names
QU -- Exit to previous menu              EX -- Exit to Unix

```

**Data Corrections Figure**

When exiting DC\_EDIT, answering “yes” to “compute (Y/N),” will apply the data corrections to the entire record and update the Web. Answering “no,” will save the changes to the data corrections table but will not apply them to the rest of the record and will not update the Web.

**10. Primary Computations**

Computed values are generated from the edited Unit-Values by running “Primary Computations (PRIMARY)” from the PR sub-menu (see figure below). Running “Primary Computations” applies any changes made in HYDRA and/or DC\_EDIT to the edited Unit-Values in order to produce both the computed Unit-Values and the computed Daily-Values, although computed values may have been produced prior depending on the pick of “compute” options available. Running “Primary Computations” also produces a report of these computed values. An optional diagnostic report can be produced to help in the review of the computations.

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)
|  | REVISION NWIS 4.2+20020205      Feb 14, 2002 09:22:01 Thursday |
|  | (PR) SUB-MENU : Primary Data Processing |
*****

1 -- Update Data Descriptor Thresholds    9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra    10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections      11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables         12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars        13 -- Peak Flow Entry and Retrieval (PE
6 -- Update/Display Shifts (SV_EDIT)      14 -- Manage Record Data Aging Status (
7 -- Primary Computations (PRIMARY)       15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary          16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation    PGM -- Display program_names
QU -- Exit to previous menu              EX -- Exit to Unix

```

Primary Computations Figure

**11. Review Computed Daily-Values**

Review and make any changes to the computed Daily-Values with “Edit Time-Series Data using HYDRA” from the PR sub-menu. Other data can be brought into HYDRA as reference curves in order to evaluate and/or modify the computed Daily-Values. After computed Daily-Values have been reviewed and/or modified in HYDRA, they are referred to as final Daily-Values.

**12. Review Final Daily-Values**

To Review final Daily-Values select “Daily-Values Table” from the PR sub-menu (shown in the figure below) and review the table. It is customary to check the final Daily-Values table against the primary report for verification purposes.



```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM
|    (ADAPS) REVISION NWIS 4.2+20020205 Feb 14, 2002 09:22:01 Thursday |
|    (PR) SUB-MENU : Primary Data Processing |
*****

1 -- Update Data Descriptor Thresholds    9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra    10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections      11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables         12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars        13 -- Peak Flow Entry and Retrieval (PE
6 -- Update/Display Shifts (SV_EDIT)     14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)      15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary          16 -- Show Site Information (SHOWSITE)

```

Final Daily-Values Figure

**13. Manage Record Data Aging Status**

A record can be set to “Working,” “In Review,” or “Approved” at any point in the data editing process. The record status is set in “Manage Record Data Aging Status” in the PR sub-menu (shown in the figure below). Follow the District quality-assurance procedures for the final review and approval of the Unit and Daily-Value records. Once the data have been edited and are considered “final,” the user can set the data from “Working” to “In Review.” No changes can be made to the data at this point. After District formal review and data is acceptable for publication, the ADBA should set the status of the data to “Approved.”

```

*****
|  US. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)
|    | REVISION NWIS 4.2+20020205           Feb 14, 2002 09:22:01 Thursday |
|    (PR) SUB-MENU : Primary Data Processing |
*****

1 -- Update Data Descriptor Thresholds    9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra    10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections      11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables         12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars        13 -- Peak Flow Entry and Retrieval
6 -- Update/Display Shifts (SV_EDIT)     14 -- Manage Record Data Aging Status
7 -- Primary Computations (PRIMARY)      15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary          16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation    PGM -- Display program_names
QU -- Exit to previous menu              EX -- Exit to Unix

```

### 6.1.10 Records Processing in ADAPS for a Precipitation Station

by Joseph P. Nielsen

To process time-series precipitation data using NWIS-ADAPS, the site is first established in the GWSI Site File, and then all support files in ADAPS necessary to define the data being stored in ADAPS are defined.

Precipitation data processing can take one of three paths in ADAPS, depending on the form of the measured Unit-Values:

1. **Measured Unit-Values as the cumulative amount of precipitation since the last time the recorder was reset.** This type of Unit-Value can be recorded by weighing bucket, float, or tipping bucket precipitation systems. In this chapter this is referred to as *cumulative* Unit-Values.
2. **Measured Unit-Values as the incremental precipitation during the recording period (often 15 minutes or an hour, for example).** This type of Unit-Value is most often recorded using a tipping bucket precipitation system. In this chapter this is referred to as *incremental* Unit-Values.
3. **Measured Unit-Values of a constant volume (often 0.01 in.) at a variable time step.** In this chapter this is referred to as *event* Unit-Values.

In each of these three cases, the form of the *computed* Unit-Values will always be incremental precipitation over the recording period.

The following steps are an overview of the navigation-path through the precipitation time-series data-processing functionality of ADAPS:

#### **1. ESTABLISH THE SITE**

Site File editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish the precipitation site in the NWIS Site File using GWSI. Refer to the [NWIS-GWSI User's Manual](#) to obtain the information required to establish this site in the database. If the site already exists in the Site File, verify that the Site File information has been updated to document the existence of precipitation equipment at the site.

#### **2. CREATE THE SENSOR LOCATIONS FOR THE SITE (OPTIONAL)**

This step is not necessary if one sensor location is used at the site. (Locations other than the “default location” are needed only if there are sensors at multiple locations, e.g. sensors at different depths or at multiple points in the cross-section.)

Location editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

In the SU sub-menu of ADAPS, select the menu option “Update Location File” (LOC\_EDIT). This program is used to enter information into the system about the physical location of the sensor, or sensors, at the site. Data collected for one parameter from multiple locations using the same data descriptor (DD) can be stored. With one data-descriptor (DD) for each measured parameter at a site, using the location description will further differentiate the data collected by each sensor.

The sensor locations have to be established prior to setting up the data descriptor for a parameter. The location for the DD will be set to “default (0)” if no location is specified in this step.

### **3. CREATE OR UPDATE THE DATA DESCRIPTORS**

Data descriptor editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

Establish a data descriptor (DD) for each parameter by selecting “Update Data Descriptor” (DD\_EDIT) in the SU sub-menu. Define the parameters for each DD; assign a location to the DD based on the locations; create the processor record for the DD; and define the screening thresholds for the DD. If only one location is used, the location will automatically be set to “default.”

For precipitation data, the following should be in the setup of the DD:

**Parameter Code:** The use of parameter code 45 is highly recommended. The use of any other parameter code will not allow for the display of precipitation data on NWISWeb, and will support other primary processing options dealing with precipitation data.

**Computed DV statistic:** Sum (6).

**Minimum threshold:** (Only available for rainfall difference computations.) The minimum valid precipitation unit value. Computed Unit-Values below this threshold will be set to zero and marked with the “F” remark. This threshold is used where the edited Unit-Values record cumulative precipitation (rather than incremental or event) and small variations are often not caused by actual precipitation.

**First-last threshold:** (Only available for rainfall difference computations.) The minimum valid daily sum for precipitation, as computed by subtracting the last edited Unit-Value for the day from the first edited Unit-Value for the day. All Unit-Values during the day will be set to zero and marked with the “F” remark code during primary processing when this threshold is not met. This threshold is used where the edited Unit-Values record cumulative precipitation (rather than incremental or event) and small variations are often not caused by actual precipitation.

Two primary computation types are available in the processor setup for precipitation:

- Direct Daily-Values computation. This computation type should be used for incremental and event measured Unit-Values.
- Rainfall difference computation. This computation type should be used for cumulative measured Unit-Values.

#### **4. Create Decodes Site-Device Files (Optional – needed for EDLs)**

**Note:** Either a DECODES site device file or an instrument file needs to be established. See Instruction 5 below if an ADR is used for instrumentation.

DECODES SDFs can only be created at the administrator level.

See the NWIS Site or ADAPS database administrator to make this entry or update.

A DECODES site-device file (SDF) needs to be created for each instrument recording Unit-Values electronically and is storing and/or transmitting the Unit-Values at the site for entry into ADAPS. Please refer to the DECODES manual for instructions on writing an SDF to process the data.

#### **5. Create or Update the Instrument File (Optional)**

Instrument file editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS site or ADAPS database administrator to make this entry or update.

The Instrument File is only needed for ADR instruments. In this step, the user may establish or update an ADR instrument at the site. In the SU sub-menu, select the menu option, “Update ADR Instrument Information” (IN\_EDIT) to create or update the instrument for the precipitation station.

#### **6. Select the Preferred Input**

Preferred-input editing is only authorized at the ADAPS database administrator (ADBA) level. See the NWIS Site or ADAPS database administrator to make this entry or update.

For each input data-descriptor (DD), a “preferred input” transport code is assigned using the SU sub-menu option “Managing Preferred Input” (PFIN\_EDIT). There may be multiple instruments collecting precipitation data at a site, or one instrument collecting, storing and transmitting data from the site into ADAPS using multiple transport methods, for example, a GOES data-collection platform (DCP) and an electronic data-logger (EDL). The transport method codes are:

- s -GOES DCP (data-collection platform)**
- e -EDL (electronic data-logger)**
- a -ADR binary digital paper tape**
- f\* -Data input from a file**

- c -Digitized analog chart**
- p\* -Telephone telemetry data**
- r\* -Radio telemetry data**
- o -Observation data**

**\* These options cannot be implemented in ADAPS 4.2. EDL data telemetered by telephone or radio are flagged with the transport code “e.”**

ADAPS stores measured Unit-Values from each transport method for a DD, identifying the transport method and identifying which method is the “preferred input.” To serve real-time data on the Web, the preferred-input must be set to the real-time transport code.

Real-time data are the data from either the transport code “s”(GOES DCP), or the transport-code “e” (telemetered EDL data). NWISWeb retrieves data from the edited Unit-Values file for display on the Web. The edited Unit-Values file is automatically populated during the data-conversion process with the measured Unit-Values from the preferred-input sensor. If the District wishes to serve real-time data via NWISWeb, the preferred-input for a data-descriptor (DD) must be set to the real-time transport code, even if the instrument is not USGS-owned or USGS-controlled.

**\*\*Important note:** The real-time data coming into ADAPS are displayed to the public via NWISWeb. Real-time data should be reviewed on a regular basis.

## **7. DATA INPUT**

This step is not necessary for real-time transmitted data. Real-time data are transmitted and stored automatically as measured Unit-Values and edited Unit-Values. Data collected in any other manner will need to be processed by the user. Electronic data collected on laptop from an EDL or DCP should be converted to standard input files using DECODES (see DECODES). In ADAPS, choose the IN sub-menu and option “Process WRD standard input data” (STD\_STOR). The input program will ask for the file name for processing. These data will be stored as measured Unit-Values and tagged with a transport code (listed in step 6 above). If real-time data does not exist at the site this transport method should be assigned as the preferred input (step 6). The data will be stored as edited Unit-Values and will be tagged with a transport code (listed in step 6 above).

For data entry from the ADRs, use the sub-menu IN, option “Read ADR Tape Data (TP\_READ),” and store with the option “Edit And Store ADR Tape Data (TP\_EDIT)” in this same sub-menu. These programs require a paper tape-reader.

For data entry from charts or from observations, entry is initiated in the sub-menu IN with option “Enter Unit-Values from Digitizer/Keyboard (UV\_ENTER)”. The Digitizer option requires a digitizer interfaced with the data system. The keyboard option prompts the user for yyyyymmdd.hhmmss of the observation and the value of the observation.

## **8. Review and Edit Time-Series Unit-Values**

Review the edited Unit-Values of precipitation record in HYDRA. Choose sub-menu PR and option “Edit Time-Series Data using HYDRA” (TS\_EDIT). Any missing record can be pulled in as a reference curve from the backup measured Unit-Values (see HYDRA section). If changes are made to the data in this program, answering “yes” to “Compute the record?” when closing will compute the entire record and update the database and NWISWeb. Answering “no” will save the changes but will not compute the record or update the database or Web.

HYDRA is used to verify that quality data are broadcast to the public. By invoking HYDRA on a segment of data, viewing the data, correcting the data if necessary, then selecting “save and exit,” the user will be setting the Web-flag on that data to “checked” and it will be displayed as such on NWISWeb. If the data have been viewed using NWISWeb and no edits are made to the data, the Web-display status flag on the data may be set to “checked” using the UT menu option “Set the Edited UV ‘checked’ Status,” (SET\_CHECKFLAG).

While **not recommended** as the main editing procedures, Unit-Value editing can still be accomplished by using the UV\_EDIT program in the “UT” sub-menu of ADAPS 4.2.

## **9. Data Corrections**

Once the Unit-Values have been viewed and edited in HYDRA, data corrections can be applied to the Unit-Values based on calibration notes and site-inspection information. Shifts are not used to correct precipitation data in ADAPS 4.2.

Apply data corrections to correct the edited Unit-Values for problems associated with instrument-error or calibration by using the PR sub-menu option, “Update/Display Data Corrections” (DC\_EDIT), see figure below. Although not likely to be needed for precipitation data, up to three separate corrections can be applied for any given time period. If multiple data-correction curves exist for the same period, ADAPS computes the combined correction for the time period and applies that combined correction to the data. Each of the corrections can have one, two, or three points and can be prorated over time. Also, comments can be added to explain how the data correction was determined or why it needs to be applied. Use of this feature is recommended, as it will help in analysis and review of the record.

Answering “yes” to “Compute the record?” when closing this program, will compute the entire record and update the database and Web if any changes are made that will affect the data. Answering “no” will save the changes but will not compute the record or update the database or Web.

Once the data corrections have been entered, ADAPS will compute the corrections prorated over the specified time period and apply them to the edited Unit-Values. View the actual Unit-Values of correction by running the “Print/Display Unit-Values Tables”

(UV\_TABLE) program and selecting the option, “Correction Unit-Values” to specify that type of UV output.

```

*****
U.S. GEOLOGICAL SURVEY AUTOMATED DATA PROCESSING SYSTEM (ADAPS)
| REVISION NWIS 4.2+20020205      Feb 13, 2002 14:51:24 Wednesday |
|      (PR) SUB-MENU : Primary Data Processing      |
*****

1 -- Update Data Descriptor Thresholds      9 -- Daily-Values Manipulation (DV_MANIP)
2 -- Edit Time-Series Data using Hydra      10 -- Print/Display Unit-Values Tables
3 -- Update/Display Data Corrections        11 -- Daily Values Tables (DVTABLE)
4 -- Update/Display Rating Tables          12 -- End-of-Year Summary (EOYSUMM)
5 -- Shift Analysis and Error Bars         13 -- Peak Flow Entry and Retrieval (PE
6 -- Update/Display Shifts (SV_EDIT)       14 -- Manage Record Data Aging Status (
7 -- Primary Computations (PRIMARY)       15 -- Plot Time-Series Data (PLOTWAT)
8 -- Edit DV Statistical Summary           16 -- Show Site Information (SHOWSITE)

FROM THE PREVIOUS MENU -- IN, PR, AP, DI, RT, SU, MA, PD, UT, LA,

DOC menu_opt -- Display documentation      PGM -- Display program_names
QU -- Exit to previous menu                EX -- Exit to Unix

```

#### Primary Data Processing Sub-Menu

### 10. Primary Computations

Final values are computed in the sub-menu PR option “Primary computations” (PRIMARY). The primary program generates computed precipitation Unit-Values and daily sum values, even though they may have been computed prior depending on responses to “compute” options in HYDRA and DC\_EDIT. A primary report also is generated with the hourly computed incremental values (if using the historic primary), the daily maximum and minimum incremental values, and the daily precipitation sum values.

There are several differences between precipitation primary processing and other data types, including:

- The hourly computed incremental values shown on the historic primary report for precipitation are for the times 0100 to 2400 for each day instead of the usual times shown on other primaries of 0000 to 2300 because the midnight value, which is a sum, belongs with the day preceding the value.
- A midnight value is **never** interpolated during precipitation primary processing. To do so would cause erroneous totals when processing incremental data.
- For cumulative primary processing there are two versions of the computed Unit-Values. The first are the cumulative values after any data corrections are applied. The second are the incremental Unit-Values after the difference

computation of the original computed Unit-Values. Only the second are saved as the final computed Unit-Values. The max and min of the corrected cumulative Unit-Values can be seen for every day on a standard primary report (as opposed to a historical primary report).

It should be noted that the instantaneous values on the historic primary computations report for precipitation are the on-hour incremental values only. Thus, unless the recorder is set for an hourly time interval, there will be precipitation that is not shown in the incremental values on the primary. The daily sum as shown in the primary will be correct, but it will often not match a hand-computed total of the incremental values shown. If there is a gap in the record, the primary program will compute the incremental difference across the gap between successive Unit-Values irrespective of the dv\_abort limit set for the data descriptor, so that the precipitation total will be correct, although the exact timing will be unknown. **An optional diagnostic report can be produced also to help in the review of the computations.**

### **11. Review Daily-Values**

Review the Daily-Values of the precipitation record in HYDRA. Choose sub-menu PR option “Edit Time-Series Data using HYDRA” (TS\_EDIT). While **not recommended** as the main editing procedure, Daily-Value editing can still be accomplished by using the DV\_EDIT program in the “UT” sub-menu of ADAPS 4.2.

### **12. Daily-Values Tables**

Prepare Daily-Value tables using sub-menu DI, option “Daily-Values Tables (DVTABLE).” Choose table type (TY option) #1. Change the statistics code from 3 (mean) to 6 (sum).

### **13. MANAGE RECORD DATA AGING STATUS**

A record can be set to “In Review” after the data editing process. In the sub-menu PR choose “Manage Record Data Aging Status” (SETSTATUS). After the change to “In-Review,” all changes to the data will be prohibited. ADBA access is required to change data aging back to “Working.” If this is necessary, see the NWIS Site or ADAPS database administrator. The data should be set to “Approved” by the ADBA when the record has been completely reviewed and is acceptable for publishing.