

9 GROUND-WATER HYDROGRAPH PROGRAM

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The Ground-Water Hydrograph program produces hydrographs using water-level data stored in GWSI. The hydrograph program currently uses the TKG2 graphics software.

9.1 Introduction

The Ground-Water Hydrograph program generates hydrographs of water-level data for selected sites specified in an input file. The input file may be created outside the hydrograph program using an editor, from a GWSI water-level retrieval, or generated from within the hydrograph program using Option **E** from the hydrograph menu. One or two hydrographs per page may be displayed on the user's terminal or sent to a designated printer; hydrograph format specifications are entered in response to prompts while running the program. The file containing the list of sites is in the following format:

```

USGS 383838104282801
USGS 363636107121201
      .
      .
      .
USGS 350202105444402
    
```

USGS or other agency codes are entered in columns 1 through 5, and the site ID is entered, left-justified, in columns 6 through 20.

9.2 Program Operation

Select **Option 16: Plot Hydrographs from the GWSI Main Menu**{ XE "GWSI Utilities Menu" }. The program displays the following:

```

*****
*           HYDROGRAPH PROGRAM VERSION NWIS_ [yyyymmdd]
*
*  WARNING: To generate data for the hydrographs, you need a file
*           containing site id's. See option E.
*****
  C = Continue. (Create a GWSI hydrograph.)
  E = Display an example of a file containing siteid's, with an
option
      to create or edit a file.

  L = List the current directory
  Q = Quit the program.

Enter C, E, L, or Q:
    
```

The Hydrograph program requires an input file containing a list of sites. Select **C** if you have a file that contains a list of sites ready. Select **E** if you do not have a file that contains a list of sites, but wish to create one. When **E** is selected, the program will display an example and prompt the user whether a file should be created; if the user replies with a **Y**, the user's default editor will be initiated, and the desired site(s) may be entered. If the user types **N**, the initial hydrograph menu will be displayed. Select **L** if you wish to display the contents of the working directory to search for an existing input file. Select **Q** to exit the Hydrograph program.

To begin processing one or more hydrographs, type **C**; the program prompts the user for the name of the file that contains the list of sites. After the program verifies that the file exists, it prompts for information that will specify the format of the data to be plotted on the hydrograph:

BEGINNING DATE: The default for the beginning date is 01/01/1900. This date may be changed.

ENDING DATE: The default for the ending date is the current date. This date may be changed, but a date later than the current date may not be specified.

WATER-LEVEL TYPE: Specify the type of water-level data that is to be plotted. The current water-level types include:

- LSD - Depth from Land Surface Datum (**Default**)
- MP - Depth from Measuring Point
- MSL - Mean Sea Level elevation

The water-level type specified pertains to **ALL** sites in the input file. Only the water levels that are the specific type chosen will be plotted. If other water-level types should be plotted, they will need to be converted to water-level type specified. See the **WATER-LEVEL CONVERSION**: section below. Computed water levels of other water-level types will automatically be included in the tabled results in the specified format. The type of water level will be displayed in the heading of the table of water levels.

DATUM: Specify the datum to which the water levels are to be plotted. Conversions are generally available within the lower 48 states and are provided by the North American Datum Conversion. The datums currently supported by NWIS are:

- NGVD1929 (**Default**)
- NAVD1988

The Datum will be displayed on the right vertical scale of the hydrograph. The datum will also be displayed in the water-level table if specified. Datum will be displayed next to the site altitude in the table heading, if available, and in the table heading for water levels referenced to Mean Sea Level.

WATER-LEVEL CONVERSION: Specify whether or not to convert water levels to the specified water-level type. No conversion, option 1, will only display those water levels stored as the water-level type specified. Conversion, option 2, will display all water-level types converted to the water-level type specified.

WATER-LEVEL STATUS CODES: Specify whether water-level records with status codes are to be plotted. Historically, water levels with status populated were not plotted on hydrographs. The default is 'N': do not plot water levels with status code. Once these specifications have been entered, the program retrieves water levels for those sites specified in the input file. **Note: there is no notification that a site does not contain water-level data.**

Once the water-level data have been retrieved, the program prompts the user for specifications that will determine the appearance of the hydrograph(s) on the screen and/or at the printer:

VERTICAL SCALE: The vertical scale is automatically set by the graphics program to allow sufficient room for the range of water-level data to be plotted. The format of the scales differ according to the type of water level that is plotted:

- LSD
 - Left Scale displays water level in feet below land surface datum.
 - Right Scale displays water-level altitude, IF altitude of land surface is available at the site.
- MP
 - Left and Right Scales display water-level altitude.
- MSL
 - Left and Right Scales display water-level altitude.

Altitude scales will be displayed either in NGVD29 (default) or NAVD88 vertical datum according to what was specified in DATUM. The scale description will indicate the datum used.

PLOT FORMAT: The graph can appear in several different forms. **Note: The default settings should be used if the multiple hydrograph on one plot (see Number of plots per frame) is selected.**

The program first prompts the user whether symbols for each point should be plotted; the default for this prompt is 'Y'. If the user selects 'N', symbols will not be plotted on the graph.

If symbols are specified, the program next prompts the user for the appearance of the symbol. The default is a cross (+). If the user wishes to specify a different symbol, 'Y' should be typed at the prompt and an alternate symbol selected from the displayed menu of symbols. If the user specified no symbols, this prompt is skipped.

The program next prompts the user if the symbols are to be connected; the default for this prompt is 'Y'. If the user specified no symbols, the points are automatically connected.

NUMBER OF PLOTS PER FRAME: Hydrographs may be plotted individually on one or two graphs per screen, or two hydrographs may be plotted on one graph per screen. The user is prompted for plotting specifications as shown below:

One or two plots per frame, or two traces on one plot (3).
Enter 1, 2, or 3. <cr>=2:

If the user selects option 1, one plot containing one hydrograph will be displayed on the screen, or sheet if output to a printer. If the user selects option 2 (default) or hits the carriage return <CR>, two plots containing one hydrograph per plot will be displayed on the screen, or sheet if output to a printer. Hydrographs will be displayed in the order found in the input file.

If the user selects option 3, two hydrographs will be displayed on one plot per screen or page (depending on the destination of the output). The hydrographs will be identified by two different symbols, as long as symbols have not been toggled off at the prompt “Do you want this symbol drawn?” Hydrographs will be displayed in the order found in the input file, **by twos**. Sites 1 and 2, 3 and 4, 5 and 6, etc., will be plotted in pairs in the order found in the input file.

DESTINATION OF PLOT: The hydrographs may be sent to a user-designated printer or it may be displayed on the user’s monitor (default).

HORIZONTAL SCALE: The date scale can be displayed in two formats:

- **Option 1:** Auto (default) plots EACH hydrograph to a horizontal scale that will conform to the retrieved data available for each individual site.
- **Option 2:** specifies a range of dates that will accommodate the range of dates for all sites; the scale for all plotted hydrographs will be the same on all screens. This specification is useful when comparisons between plotted hydrographs are desired.

Once the specifications are complete, the plot will be sent to the designated printer, or displayed on the user’s monitor. If the plot is directed to the user-designated printer, all plots will go directly to the printer; hydrographs will not be displayed on the monitor screen. After the last hydrograph has been displayed on-screen or sent to the printer, the program will allow the user to create, print, and save a table of all available water levels for the specified sites.

If the plot is directed to the user’s monitor, the hydrograph(s) will appear on screens on the monitor, with one or two hydrographs per screen, depending on the input specifications. Control of the screen and some limited modifications to the image can be applied using the buttons that appear on the upper left border of the hydrograph. For a complete explanation about Tkg2, please refer to documentation on the Tkg2 website found at:

<http://tx.cr.usgs.gov/tkg2/>

Useful Tkg2 menu options:

FILE pull-down menu:

- **Print (postscript)** – Use this option to print displayed hydrograph without exiting.
- **Print and Exit** – Use this option to print displayed hydrograph and exit from the screen displayed on the monitor and proceed to the next hydrograph screen or continue processing.
- **Exit Tkg2** – Use this option to exit from the screen and proceed to the next hydrograph screen or continue processing.

GLOBAL SETTINGS pull-down menu:

- **Edit some global settings** – Use this option to rescale the fonts if the scale headings are difficult to read.

To view successive hydrographs, the user needs to EXIT Tkg2, using options found on the FILE pull-down menu.

Once all of the hydrographs have been displayed either on the printer or monitor, and tabling specifications have been completed, the user is returned to the hydrograph menu. New hydrograph specifications may be entered or the process ended by quitting the hydrograph program.

9.3 Summary

A review of the hydrograph procedure is as follows:

1. Select Option 16: Plot Hydrographs from the GWSI Main Menu.
2. Enter the name of the file containing the sites for retrieval.
3. OR, create a list of sites, Agency Code and site ID, at Option E.
4. Enter beginning and ending hydrograph dates.
5. Enter hydrograph plot characteristics.
6. Display hydrograph(s) either at designated printer or monitor.
7. Enter water-level table specifications.
8. Return to GWSI Main Menu.