

# Chapter 4

## Output Control

### 4.1 Output Levels

The user must determine what information is needed and request a level of output that provides it. By default, HEC-6 produces a minimum level of information so that the user will know that the data file has been processed and computations have completed; however, this output will not be sufficient for analyzing model performance.

Each major data group (geometry, sediment and hydrology) has a "normal" output level with one or more additional levels available to provide more detailed information. These output levels are summarized in Tables 4-1 and 4-2, described in the following paragraphs, and illustrated in the example problems in Chapter 6.

Table 4-1  
Summary of Initial Conditions Output Options

Record	Level	Description
T1	-	Title records are echoed. Each cross section is identified by it's ID number. Each special option used is noted.
	B	Initial geometry, all geometry records are echoed.
	C	Trace output. Warning messages may be generated by inconsistent data.
T4	-	Initial condition of inflowing sediment loads and cross-sectional bed gradations. Also, secondary parameters computed from input information defining the initial conditions.
	B	Echo of input records. Trace Output.

### 4.2 Geometric Data, Initial Conditions (T1)

B-level geometric data output, available on the T1 record, is helpful in debugging the input records. After the geometry data is deemed correct, this option is usually turned off. For production simulations, it is suggested that this option be used to document geometric input.

### 4.3 Sediment Data, Initial Conditions (T4)

The default output produced during processing of the sediment data is usually sufficient for most needs. However, the B-level output option on the T4 record will provide echo of the input records as well as some trace information through the input routines. This output may allow the user to find some less common errors in the input data than is normally apparent. This option should be removed after the data have been checked for accuracy.

**Table 4-2  
Summary of Continuous Simulation Output Levels**

<b>Record</b>	<b>Level</b>	<b>Description</b>
<b>Q Column 5</b>	-	No output from hydraulics computations.
	A	Discharge, starting water surface elevation, water temperature, flow duration. General hydraulic parameters for each cross section.
	B	Initial geometry, distribution of hydraulic parameters across subsections.
	D	Trace information.
	E	Detailed trace information. Hydraulic data for each incremental area, each trial elevation in backwater computations at each cross section.
<b>Q Column 6</b>	-	No output from sediment computations.
	A	Volume of sediment entering and exiting model, trap efficiency.
	B	Bed elevation changes, water surface elevations, thalweg elevation, sediment load exiting model.
	C	Detailed output; including transport potential, load, and bed gradation per grain size.
D	Detailed trace information	
<b>\$DREDGE Column 8</b>	A - E	Levels A - E provide output from the dredging routines. The magnitude of this output ranges from simple data echo (level A) to detailed trace information (level E).
<b>\$PRT Column 8</b>	N	Turn off output at all cross sections.
	A	Provide output for all cross sections at Q record output level.
<b>CP</b>	-	The stream segment number where needed cross sections are located. Used with \$PRT option.
<b>PS</b>	-	Cross sections where output is requested. Used with \$PRT option.
<b>END</b>	-	End of \$PRT records.
<b>\$VOL Column 7</b>	-	Cumulative bed and volume change.
	X	Table of volume versus elevation.
<b>\$VOL Column 8</b>	A	Cumulative weight of sediment passing each cross section for each sediment size class.
<b>VJ, VR</b>	-	Input parameters for elevation-volume table; used with \$VOL record.

#### 4.4 Hydraulic Calculations (Q)

The water surface profile is calculated before the sediment calculations begin, therefore, an A-level hydraulic output for the first discharge calculations is useful for diagnosing immediate data problems. B-, D- and E-levels are increasingly detailed and may be useful for unusual situations. Subsequently, the user should request output using the A-level only when interested in velocity and flow distribution information. Output from the hydraulic calculations is not particularly useful once geometric problems are resolved and the  $n$  values are calibrated.

#### 4.5 Sediment Transport Calculations (Q, \$PRT, CP, PN, END)

Interpretation of HEC-6 performance requires careful selection and analysis of computed information. The availability of this information in the output file is governed by the user. The most useful sediment output options are on the Q record. Since this record is in the hydrology section, output can be turned on or off at any time in the simulation. The B-level sediment output is the most commonly used and provides all the essential sediment information for calibration, confirmation and production runs. C-level output is recommended only for the first discharge and then only if unusual results are encountered. D- and E-levels should be used only for analysis of suspected software errors. By default, output for every cross section is produced by the Q record output options.

Often it is desirable to receive output only at selected points in time and only for those cross sections of interest. This is accomplished by providing \$PRT, CP, PS and END records in the hydrologic data. The \$PRT record tells HEC-6 that instructions for selective printout follow. The CP record indicates the stream segment where the cross sections listed on the following PS records are to be found and the END record completes the input for this option.

Caution must be exercised when interpreting the calculated "bed change". This change is related to the movement of the thalweg after scour and deposition and may not reflect the average bed elevation or sediment volume change of the cross section. To obtain this type of information, the \$VOL option described in Section 4.6 should be utilized.

#### 4.6 Accumulated Sediment Volumes (\$VOL, VJ, VR)

The \$VOL record in the hydrologic data causes HEC-6 to compute the cumulative bed elevation and volume change of each cross section and the sediment load that has passed each cross section. The sediment load information is provided for each grain size class. The \$VOL record initiates the computation of an elevation-cumulative sediment volume table which is helpful for reservoir analysis. The elevation table displays the accumulated sediment volume between each parallel elevation plane specified by an elevation table which is defined by the VJ and VR records. In reservoir studies, these planes are usually horizontal but HEC-6 has the capability to determine the table based upon a user specified slope of the elevation planes.

#### 4.7 Summary of Output Controls

Table 4-1 summarized the output controls for initial conditions. These controls affect the output level associated with input data, such as geometry, inflowing sediment loads, bed gradations, and sediment characteristics. Table 4-2 summarized the output controls for the simulation. These include volume of sediment entering and exiting the reach, sediment trap efficiency, bed elevation changes, subsectional water velocities, water surface elevations, and other hydraulic and sediment information.