6.3 Example Problem 3 - Movable Bed

The following example demonstrates how to add sediment data to the previously developed file. Existence of sediment data within the input file causes HEC-6 to compute sediment transport rates and modify the cross section geometry as described in Section 2.3. Sediment related data consists of the delineation of the movable bed, characteristics and gradation of sediment within the bed, and inflowing/outflowing sediment loads and gradations. The sediment data is inserted between the EJ record of the geometry data and the $HYD record of the flow data. Table 6-3a shows the input data developed for Example Problem 3.

6.3.1 Movable Bed Limits

Information delineating the movable bed have been added to the HD record of each cross section. For example, at Section No. 1.0, the movable bed limits have been defined at stations 10,081 and 10,250. The "fixed" GR points are those outside of the movable bed stations; that is, should a limit of the movable bed coincide with a GR point, that point is movable and the next point outward is fixed.

The vertical limit (initial depth) of the movable portion of the cross section must also be defined. Data describing the location of this bedrock is entered in Field 2 of the HD record for each cross section. In Example Problem 3, it was determined that the reach represented by Section No. 58.0 had bedrock 3.4 ft below the thalweg. Section No. 33.0 through Section No. 42.1 have either concrete or bedrock at the thalweg.

6.3.2 Sediment Title Records

Five title records (T4-T8) are required at the beginning of the sediment data; these records are available for user documentation of the sediment data.

6.3.3 Sediment Transport Control Parameters

Parameters governing the computation of sediment transport rates and selection of grain sizes are entered on the I records. For Example Problem 3, the number of times that the bed material gradation is to be re-calculated within a time step is set to 5 on the I1 record (see Section 2.3.1.4). Default values for the other parameters on this record will be used. Only sands and gravels are analyzed in Example Problem 3. Since there are no clays or silts in either the bed or the inflowing load, there are no I2 or I3 records. Ten sand and gravel sizes are being analyzed as seen by the 1 in Field 3 and 10 in Field 4 of the I4 record. The transport computation method chosen is that of Yang (4 in Field 2 of the I4 record). Default values for the other parameters were selected, by not providing data. It is important to remember that the range of grain sizes selected on the I records must encompass the entire range of sizes found in both the bed material and inflowing load, even though some of those sizes may be missing in either the bed or inflowing materials.

The "most stable" weighting scheme for the hydraulic parameters has been selected via the I5 record (see Section 2.2.4).

```
GR 1000.    980.   990.0   1060.   980.0   1150.  982.00   1180.   982.0   1215.
GR 980.0   1260.   982.0   1300.   982.0   1350.  980.00   1420.   980.0   1540.
GR 982.0   1730.   982.0   1830.  984.41   1850.  979.19   1851.   961.0  1900.8
GR 961.0  2099.2   976.0   2149.   984.5   2150.  982.00   2800.   990.0   3100.
GR 1000.   3170.
HD  33.0      0.   1851.   2149.
   NOTE:      Section 33.3 is a duplicate of Section  33.0.
   Section 33.0 is a good representative cross section for a long reach.  A
   duplicate is used here to break up the long reach into two smaller reaches.
X1  33.3      21   1850.   2150.   1550.   1750.    1750     .95    1.49
XL                  250.
GR 1000.    980.   990.0   1060.   980.0   1150.  982.00   1180.   982.0   1215.
GR 980.0   1260.   982.0   1300.   982.0   1350.  980.00   1420.   980.0   1540.
GR 982.0   1730.   982.0   1830.  984.41   1850.  979.19   1851.   961.0  1900.8
GR 961.0  2099.2   976.0   2149.   984.5   2150.  982.00   2800.   990.0   3100.
GR 1000.   3170.
HD  33.3      0.   1851.   2149.
  Section 33.9 is a duplicate of Sec 33.3, needed to model IBC at Sec 35.0
X1  33.9      21   1850.   2150.   1050.   1050.   1050.     .95    1.65
X3    10
GR 1000.    980.   990.0   1060.   980.0   1150.  982.00   1180.   982.0   1215.
GR 980.0   1260.   982.0   1300.   982.0   1350.  980.00   1420.   980.0   1540.
GR 982.0   1730.   982.0   1830.  984.41   1850.  979.19   1851.   961.0  1900.8
GR 961.0  2099.2   976.0   2149.   984.5   2150.  982.00   2800.   990.0   3100.
GR 1000.   3170.
HD  33.9      0.   1851.   2149.
  A weir is located here.
X1  35.0      22   9894.  10245.       0       0       0
X3    10
X5          974.     0.5
GR 984.0   9035.   980.0   9070.   978.0   9135.  980.00   9185.   982.0   9270.
GR 980.0   9465.   981.7   9595.   983.7   9745.  984.70   9894.   963.4  9894.1
GR 963.3   9954.   967.1   9974.   967.4  10004.  968.20  10044.   967.6  10054.
GR 973.4  10115.   977.4  10120.   983.7  10155.  984.00  10245.   982.0  10695.
GR 982.0  10895.  1004.0  11085.
HD  35.0      0.   9954.  10155.
   - - -  Silver Lake  - - -
NC   .06     .06    .045
X1  42.0      32   9880.  10130.   5370.   5000.   5210.
GR 996.0   7130.   998.0   7310.   998.0   7930.  992.00   8205.   990.0   8495.
GR 988.0   8780.   986.0   8990.   985.7   9570.  986.45   9707.  989.44   9857.
GR 990.0   9880.   969.8   9881.   969.8   9941.  985.80   9941.   985.8   9943.
GR 969.8   9943.   969.8  10001.   986.7  10001.  986.70  10003.   969.8  10003.
GR 969.8  10067.   985.8  10067.   985.8  10069.  969.80  10069.   969.8  10129.
GR 989.9  10130.   989.5  10180.   988.6  10230.  987.60  10280.   985.2  10430.
GR 986.8  11720.   989.9  12310.
HD  42.0      0.   9881.  10021.
   Silver Creek - local inflow
QT
X1  44.0      28   9845.  10127.   3200.   3800.   3500.
XL                         9850.  10200.
GR 1002.   8035.   992.0   8150.   990.0   8305.  990.00   8735.   988.0   8835.
GR 996.0   9285.  1017.6   9425.   990.0   9505.  986.00   9650.   984.1   9788.
GR 980.6   9845.   970.9   9868.   972.2   9898.  970.50   9968.   967.5   9998.
GR 968.9  10028.   967.4  10058.   967.1  10078.  971.90  10118.   976.8  10127.
GR 977.8  10150.   976.9  10193.   982.0  10206.  981.20  10300.   979.2  10325.
GR 983.1  10400.   999.8  10450.  1002.4  10464.
HD  44.0      1.   9868.  10193.
X1  53.0      22  10000.  10136.   3366.   2832.   2942.
GR 1004.   7550.  1000.0   7760.   998.0   8440.  996.00   8640.   996.0   8780.
GR 994.0   8940.   986.0   9245.   986.3   9555.  986.30   9825.   983.8   9900.
GR 982.8  10000.   978.2  10011.   974.0  10041.  972.20  10071.   972.6  10101.
GR 978.2  10121.   988.7  10136.   989.3  10154.  999.20  10200.  1000.1  10320.
GR 1002.  10470.  1004.0  10700.
HD  53.0     10.  10000.  10136.
   Bear Creek - local inflow
QT
X1  55.0      18   9931.  10062.   2275.   3430.   2770.
GR 1004.   7592.  1000.0   7947.   996.0   8627.  990.00   9052.   986.0   9337.
GR 984.3   9737.   984.7   9837.   985.5   9910.  987.20   9931.   978.1   9955.
GR 974.8   9975.   974.2  10005.   972.9  10035.  973.20  10045.   983.8  10062.
GR 985.8  10187.   986.0  10307.   990.0  10497.
HD  55.0     10.   9931.  10062.
X1  58.0      22   9912.  10015.   1098.   1012.   1462.
GR 1006.   8542.  1004.0   8952.  1000.0   9702.  997.20   9812.   996.3   9912.
GR 976.2   9944.   975.4   9974.   978.2   9991.  990.40  10015.   988.3  10062.
GR 988.8  10065.   988.3  10065.   989.3  10169.  990.00  10172.   992.0  10242.
GR 992.0  10492.   988.0  10642.   986.7  10852.  988.00  11022.   986.0  11097.
GR 986.0  11137.   988.0  11192.
HD  58.0     3.4   9912.  10015.
EJ
T4      South Fork, Zumbro River - Stream Segment 1     ** Example Problem 3 **
T5      LOAD CURVE FROM GAGE DATA.
T6      BED GRADATIONS FROM FIELD SAMPLES.
```

```
T7      Use Full Range of Sands and Gravels
T8      SEDIMENT TRANSPORT BY Yang's STREAM POWER [ref ASCE JOURNAL (YANG 1971)]
I1             5
I4  SAND       4       1      10
I5            .5      .5     .25      .5     .25       0     1.0
LQ             1      50    1000    5800   90000
LT TOTAL   .0110     1.5     320   4500.  400000
LF   VFS    .119    .119    .498    .511    .582
LF    FS    .328    .328    .331    .306    .280
LF    MS    .553    .553    .156    .154    .110
LF    CS    .000    .000    .011    .016    .020
LF   VCS    .000    .000    .004    .008    .005
LF   VFG    .000    .000    .000    .004    .002
LF    FG    .000    .000    .000    .001    .001
LF    MG    .000    .000    .000    .000    .000
LF    CG    .000    .000    .000    .000    .000
LF   VCG      .0      .0    .000    .000    .000
PF EXAMP     1.0     1.0    32.0    16.0    96.5     8.0    95.0     4.0    91.0
PFC  2.0    85.0     1.0    73.0      .5    37.0     .25     8.0    .125     1.0
PFC.0625     0.0
PF EXAMP    32.0     1.0    64.0    32.0    99.5    16.0    99.0     8.0    98.5
PFC  4.0    96.0     2.0    93.5     1.0    83.0     .50    45.5    .250     8.0
PFC .125     1.0   .0625     0.0
PF EXAMP    58.0     1.0    64.0    32.0    97.0    16.0    94.0     8.0    94.0
PFC  4.0    90.0     2.0    79.0     1.0    56.0     .50     4.0    .125     0.0
$LOCAL
  LOAD TABLE - CASCADE CREEK - A LOCAL INFLOW
LQL            1     100    1000   10000
LTLTOTAL   .0040      10     500   30000
LFL  VFS    .664    .664    .015    .198
LFL   FS    .207    .207    .245    .181
LFL   MS    .086    .086    .605    .107
LFL   CS    .031    .031    .052    .098
LFL  VCS    .008    .008    .039    .127
LFL  VFG   .0030   .0030   .0200   .1160
LFL   FG   .0010   .0010   .0110   .0910
LFL   MG   .0000   .0000   .0110   .0530
LFL   CG   .0000   .0000   .0000   .0220
LFL  VCG   .0000   .0000   .0000   .0060
  LOAD TABLE - SILVER CREEK - A LOCAL INFLOW
LQL            1     100    1000   10000
LTLTOTAL   .0040      10     500   30000
LFL  VFS    .664    .664    .015    .198
LFL   FS    .207    .207    .245    .181
LFL   MS    .086    .086    .605    .107
LFL   CS    .031    .031    .052    .098
LFL  VCS    .008    .008    .039    .127
LFL  VFG   .0030   .0030   .0200   .1160
LFL   FG   .0010   .0010   .0110   .0910
LFL   MG   .0000   .0000   .0110   .0530
LFL   CG   .0000   .0000   .0000   .0220
LFL  VCG   .0000   .0000   .0000   .0060
  LOAD TABLE - BEAR CREEK - A LOCAL INFLOW
LQL           1.    100.    500.   1000.  30000.
LTLTOTAL   .0020    30.0    500.    1200   22500
LFL  VFS    .201    .201    .078    .078    .137
LFL   FS    .342    .342    .172    .175    .218
LFL   MS    .451    .451    .454    .601    .476
LFL   CS    .001    .001    .197    .142    .158
LFL  VCS    .000    .000    .000    .003    .008
LFL  VFG   .0000   .0000   .0000   .0000   .0020
LFL   FG   .0000    .000   .0000   .0000   .0010
LFL   MG   .0000    .000   .0000   .0000   .0000
LFL   CG   .0000    .000   .0000   .0000   .0000
LFL  VCG   .0000    .000   .0000   .0000   .0000
$HYD
Q    A     FLOW 1 = BASE FLOW 0F 750 CFS
Q   750.     61.     29.    128.
R   956.    962.
T    65.     72.     70.     67.
W     2.
Q    B     FLOW 2 = 50 DAYS AT BANK FULL DISCHARGE
Q  2500.    300.    150.    650.
R   965.    970.
W    50.
$PRT
CP             1
PS          15.0    32.0    32.1
END
Q   AC     FLOW 3 = NEAR BANK FULL DISCHARGE
Q  1250.    150.     78.    340.
R   960.    966.
W     1.
$PRT   A
```

```
Q    B     FLOW 4 = BASE FLOW OF 750 CFS
Q   750.     61.     29.    128.
R   957.    963.
W     1.
$$END
```

6.3.5 Bed Material Gradation

The initial gradation of material in the bed sediment control volume is described with PF (percent finer) and PFC (percent finer continuation) records. In Example Problem 3, this data has only been provided at Sections 1.0, 32.0, and 58.0 as noted in Field 2 of the PF records. The selection of which, and how many, cross sections at which to provide this data depends on study objectives, field data, etc. For intermediate cross sections HEC-6 will linearly interpolate the bed material gradation. Note that the points in the gradation tables need not coincide with the size classes selected for computation. See Appendix A for specific details of these data records.

6.3.6 Flow Data

The flow data input structure is similar to that shown in the previous examples. One of the differences, however, is the selection of A-, B- and C-level output for sediment computations on the Q records. Also, the hydrologic data are extremely important to the results of a movable bed simulation. Particular care must be taken when selecting the period of record or hypothetical event to be simulated and time step sizes to be used. Water temperature may also be important in some instances. See Gee (1984) and HEC (1992) for information regarding preparation of flow data.

6.3.7 Output of Sediment Model

Table 6-3b shows the output file for Example Problem 3. The geometric data output, similar to that produced by Example Problem 2, is followed by sediment data. At this point, no hydraulic or sediment transport computations have been performed. Rather, the input data have been read and manipulated in preparation for the computations which begin when the flow data are read. The sediment title records are echoed followed by the information on the I records. Next is the inflowing sediment load table from stream segment 1; the sediment loads are in scientific notation because of the wide range of possible values. Note that a very small value is used instead of zero because log-log interpolation is used within these data tables.

The table headed "REACH GEOMETRY FOR STREAM SEGMENT 1" depicts the status of the bed sediment control volume at the beginning of the simulation, as described by the input data. Note that the movable bed widths are not necessarily the same as given in the HD data. For example, at Section No. 1.0, the movable bed limits are specified at stations 10,081 and 10,250 which coincide with existing points in the GR data, therefore, these points are part of the movable bed. The movable bed width used for computations extends halfway to the next, fixed, GR points (at stations 10,077 and 10,275).

$$\text{Movable Bed Width} \qquad \frac{10275 \quad 10250}{2} \qquad \frac{10081 \quad 10077}{2}$$

$$183.5 \text{ ft}$$

Weighted VEL XID VEL *at Downstream Section*

Table 6-3b
Example Problem 3 - Output
Movable Bed

```
**************************************************     *********************************
*  SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS  *     *  U.S. ARMY CORPS OF ENGINEERS   *
*       Version: 4.1.00 -  AUGUST 1993            *     *  HYDROLOGIC ENGINEERING CENTER  *
*  INPUT FILE:  EXAMPLE3.DAT                      *     *  609 SECOND STREET              *
*  OUTPUT FILE: EXAMPLE3.OUT                      *     *  DAVIS, CALIFORNIA 95616-4687   *
*  RUN DATE: 01 SEP 93    RUN TIME: 10:29:27      *     *  (916) 756-1104                 *
**************************************************     *********************************

                       X     X  XXXXXXX   XXXXX          XXXXX
                       X     X  X       X     X        X     X
                       X     X  X       X              X
                       XXXXXXX  XXXX    X       XXXXX  XXXXXX
                       X     X  X       X              X     X
                       X     X  X       X     X        X     X
                       X     X  XXXXXXX   XXXXX          XXXXX

         **********************************************************************
         *  MAXIMUM LIMITS FOR THIS VERSION ARE:                              *
         *       10  Stream Segments (Main Stem + Tributaries)                *
         *      150  Cross Sections                                           *
         *      100  Elevation/Station Points per Cross Section               *
         *       20  Grain Sizes                                              *
         *       10  Control Points                                           *
         **********************************************************************

T1      EXAMPLE PROBLEM NO 3.  MOVABLE BED
T2      3 LOCAL INFLOWS
T3      SOUTH FORK, ZUMBRO RIVER     ** Example Problem 3 **

N values...  Left   Channel   Right    Contraction    Expansion
           0.1000   0.0400   0.1000       1.1000     0.7000

SECTION NO.     1.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N-Values vs. Elevation Table
       Channel           Left Overbank        Right Overbank
  0.0450     966.       0.0800     966.       0.1000     966.
  0.0640     989.       0.1300     989.       0.1100     982.
  0.0000       0.       0.0000       0.       0.1200     989.

SECTION NO.    15.000
...Left Encroachment defined at station 10700.000 at elevation   961.000
...Right Encroachment defined at station 11000.000 at elevation   970.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

LOCAL INFLOW POINT  1 occurs upstream from Section No.      15.000

N values...  Left   Channel   Right    Contraction    Expansion
           0.1000   0.0500   0.1000       1.1000     0.7000

SECTION NO.    32.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

SECTION NO.    32.100
...Ineffective Flow Area - Method 1 - Left Overbank  Right Overbank
          Natural Levees at Station      10057.000      10271.000
              Ineffective Elevation        978.500        978.500
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

SECTION NO.    33.000
...Internal Boundary Condition
   Water Surface Elevation will be read from R-RECORD, Field  2
   Head Loss =    0.000
...Limit CONVEYANCE to  250.000 ft. centered about midpoint of channel.
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

SECTION NO.    33.300
...Adjust Section WIDTH to  95.00% of original.
...Adjust Section ELEVATIONS by    1.490 ft.
...Limit CONVEYANCE to  250.000 ft. centered about midpoint of channel.
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

SECTION NO.    33.900
...Adjust Section WIDTH to  95.00% of original.
...Adjust Section ELEVATIONS by    1.650 ft.
...Ineffective Flow Area - Method 1 - Left Overbank  Right Overbank
          Natural Levees at Station       1757.500       2042.500
              Ineffective Elevation        986.060        986.150
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

SECTION NO.    35.000
...Internal Boundary Condition
   Water Surface Elevation =  974.000
   Head Loss =    0.500
```

```
...Ineffective Flow Area - Method 1 - Left Overbank  Right Overbank
          Natural Levees at Station       9894.000      10245.000
              Ineffective Elevation        984.700        984.000
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0450   0.0600       1.1000     0.7000

SECTION NO.    42.000
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

LOCAL INFLOW POINT  2 occurs upstream from Section No.      42.000

SECTION NO.    44.000
...Limit CONVEYANCE between stations    9850.000 and   10200.000
...DEPTH of the Bed Sediment Control Volume =    1.00 ft.

SECTION NO.    53.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

LOCAL INFLOW POINT  3 occurs upstream from Section No.      53.000

SECTION NO.    55.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

SECTION NO.    58.000
...DEPTH of the Bed Sediment Control Volume =    3.40 ft.

NO. OF CROSS SECTIONS IN STREAM SEGMENT= 13
NO. OF INPUT DATA MESSAGES =   0

TOTAL NO. OF CROSS SECTIONS IN THE NETWORK =  13
TOTAL NO. OF STREAM SEGMENTS IN THE NETWORK=   1
END OF GEOMETRIC DATA

==============================================================================================================

T4      South Fork, Zumbro River - Stream Segment 1     ** Example Problem 3 **
T5      LOAD CURVE FROM GAGE DATA.
T6      BED GRADATIONS FROM FIELD SAMPLES.
T7      Use Full Range of Sands and Gravels
T8      SEDIMENT TRANSPORT BY Yang's STREAM POWER [ref ASCE JOURNAL (YANG 1971)]

        EXAMPLE PROBLEM NO 3.  MOVABLE BED
        3 LOCAL INFLOWS
        SOUTH FORK, ZUMBRO RIVER     ** Example Problem 3 **

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
SEDIMENT PROPERTIES AND PARAMETERS

       SPI     IBG    MNQ      SPGF      ACGR     NFALL    IBSHER
I1      5.       0       1     1.000    32.174         2        1
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 SANDS - BOULDERS ARE PRESENT

       MTC     IASA    LASA     SPGS       GSF      BSAE       PSI     UWDLB
I4      4        1      10     2.650     0.667     0.500    30.000    93.000

USING TRANSPORT CAPACITY RELATIONSHIP #  4, YANG

GRAIN SIZES UTILIZED (mean diameter - mm)
----------------------------------------------------------------------
    VERY FINE SAND....    0.088  |  VERY FINE GRAVEL..    2.828
    FINE SAND.........    0.177  |  FINE GRAVEL.......    5.657
    MEDIUM SAND.......    0.354  |  MEDIUM GRAVEL.....   11.314
    COARSE SAND.......    0.707  |  COARSE GRAVEL.....   22.627
    VERY COARSE SAND..    1.414  |  VERY COARSE GRAVEL   45.255

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
COEFFICIENTS FOR COMPUTATION SCHEME WERE SPECIFIED
        DBI      DBN      XID      XIN      XIU      UBI      UBN      JSL
I5   0.500    0.500    0.250    0.500    0.250    0.000    1.000        1
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


SEDIMENT LOAD TABLE FOR STREAM SEGMENT #   1
          LOAD BY GRAIN SIZE CLASS (tons/day)
---------------------------------------------------------------------------
LQ       | 1.00000    | 50.0000    | 1000.00    | 5800.00    | 90000.0    |
          ------------ ------------ ------------ ------------ ------------
LF   VFS |0.130900E-02|0.178500    | 159.360    | 2299.50    | 232800.    |
LF    FS |0.360800E-02|0.492000    | 105.920    | 1377.00    | 112000.    |
LF    MS |0.608300E-02|0.829500    | 49.9200    | 693.000    | 44000.0    |
LF    CS |0.100000E-19|0.100000E-19| 3.52000    | 72.0000    | 8000.00    |
LF   VCS |0.100000E-19|0.100000E-19| 1.28000    | 36.0000    | 2000.00    |
LF   VFG |0.100000E-19|0.100000E-19|0.100000E-19| 18.0000    | 800.000    |
LF    FG |0.100000E-19|0.100000E-19|0.100000E-19| 4.50000    | 400.000    |
LF    MG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
LF    CG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
LF   VCG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
          ------------ ------------ ------------ ------------ ------------
   TOTAL |0.110000E-01| 1.50000    | 320.000    | 4500.00    | 400000.    |
---------------------------------------------------------------------------
```

REACH GEOMETRY FOR STREAM SEGMENT 1

CROSS SECTION NO.	REACH LENGTH (ft)	MOVABLE BED WIDTH	INITIAL BED-ELEVATIONS LEFT SIDE (ft)	THALWEG (ft)	RIGHT SIDE (ft)	ACCUMULATED CHANNEL DISTANCE FROM DOWNSTREAM (ft)	(miles)
	0.000						
1.000		183.500	959.300	944.700	958.900	0.000	0.000
	3280.000						
15.000		242.000	961.000	953.700	962.000	3280.000	0.621
	4240.000						
32.000		219.500	968.600	956.500	978.500	7520.000	1.424
	3320.000						
32.100		219.500	968.600	956.500	978.500	10840.000	2.053
	0.000						
33.000		299.000	979.190	961.000	976.000	10840.000	2.053
	1750.000						
33.300		284.050	980.680	962.490	977.490	12590.000	2.384
	1050.000						
33.900		284.050	980.840	962.650	977.650	13640.000	2.583
	0.000						
35.000		275.950	963.300	963.300	983.700	13640.000	2.583
	5210.000						
42.000		154.500	969.800	969.800	969.800	18850.000	3.570
	3500.000						
44.000		337.500	970.900	967.100	976.900	22350.000	4.233
	2942.000						
53.000		195.000	982.800	972.200	988.700	25292.000	4.790
	2770.000						
55.000		204.000	987.200	972.900	983.800	28062.000	5.315
	1462.000						
58.000		176.500	996.300	975.400	990.400	29524.000	5.592

BED MATERIAL GRADATION

SECNO	SAE	DMAX (ft)	DXPI (ft)	XPI	TOTAL BED	BED MATERIAL FRACTIONS per grain size					
1.000	1.000	0.105	0.105	1.000	1.000	VF SAND	0.010	VC SAND	0.120	M GRVL	0.015
						F SAND	0.070	VF GRVL	0.060	C GRVL	0.035
						M SAND	0.290	F GRVL	0.040	VC GRVL	0.000
						C SAND	0.360				
15.000	1.000	0.151	0.151	1.000	1.000	VF SAND	0.010	VC SAND	0.113	M GRVL	0.011
						F SAND	0.070	VF GRVL	0.045	C GRVL	0.022
						M SAND	0.327	F GRVL	0.033	VC GRVL	0.002
						C SAND	0.367				
32.000	1.000	0.210	0.210	1.000	1.000	VF SAND	0.010	VC SAND	0.105	M GRVL	0.005
						F SAND	0.070	VF GRVL	0.025	C GRVL	0.005
						M SAND	0.375	F GRVL	0.025	VC GRVL	0.005
						C SAND	0.375				
32.100	1.000	0.210	0.210	1.000	1.000	VF SAND	0.008	VC SAND	0.124	M GRVL	0.004
						F SAND	0.062	VF GRVL	0.038	C GRVL	0.009
						M SAND	0.321	F GRVL	0.027	VC GRVL	0.009
						C SAND	0.397				
33.000	1.000	0.210	0.210	1.000	1.000	VF SAND	0.008	VC SAND	0.124	M GRVL	0.004
						F SAND	0.062	VF GRVL	0.038	C GRVL	0.009
						M SAND	0.321	F GRVL	0.027	VC GRVL	0.009
						C SAND	0.397				
33.300	1.000	0.210	0.210	1.000	1.000	VF SAND	0.008	VC SAND	0.134	M GRVL	0.004
						F SAND	0.058	VF GRVL	0.045	C GRVL	0.011
						M SAND	0.293	F GRVL	0.028	VC GRVL	0.011
						C SAND	0.408				
33.900	1.000	0.210	0.210	1.000	1.000	VF SAND	0.007	VC SAND	0.140	M GRVL	0.004
						F SAND	0.056	VF GRVL	0.049	C GRVL	0.012
						M SAND	0.276	F GRVL	0.029	VC GRVL	0.012
						C SAND	0.415				
35.000	1.000	0.210	0.210	1.000	1.000	VF SAND	0.007	VC SAND	0.140	M GRVL	0.004
						F SAND	0.056	VF GRVL	0.049	C GRVL	0.012
						M SAND	0.276	F GRVL	0.029	VC GRVL	0.012
						C SAND	0.415				
42.000	1.000	0.210	0.210	1.000	1.000	VF SAND	0.005	VC SAND	0.169	M GRVL	0.002
						F SAND	0.044	VF GRVL	0.069	C GRVL	0.018
						M SAND	0.192	F GRVL	0.033	VC GRVL	0.018
						C SAND	0.450				
44.000	1.000	0.210	0.210	1.000	1.000	VF SAND	0.003	VC SAND	0.189	M GRVL	0.002
						F SAND	0.036	VF GRVL	0.082	C GRVL	0.022
						M SAND	0.136	F GRVL	0.035	VC GRVL	0.022
						C SAND	0.473				
53.000	1.000	0.210	0.210	1.000	1.000	VF SAND	0.002	VC SAND	0.206	M GRVL	0.001
						F SAND	0.030	VF GRVL	0.094	C GRVL	0.025
						M SAND	0.088	F GRVL	0.037	VC GRVL	0.025
						C SAND	0.492				

```
    55.000  1.000  0.210  0.210  1.000  1.000 | VF SAND  0.001 | VC SAND  0.222 | M  GRVL  0.000 |
                                               | F  SAND  0.023 | VF GRVL  0.104 | C  GRVL  0.028 |
                                               | M  SAND  0.044 | F  GRVL  0.039 | VC GRVL  0.028 |
                                               | C  SAND  0.510 |

    58.000  1.000  0.210  0.210  1.000  1.000 | VF SAND  0.000 | VC SAND  0.230 | M  GRVL  0.000 |
                                               | F  SAND  0.020 | VF GRVL  0.110 | C  GRVL  0.030 |
                                               | M  SAND  0.020 | F  GRVL  0.040 | VC GRVL  0.030 |
                                               | C  SAND  0.520 |

..LOCAL INFLOW DATA...
SEDIMENT LOAD TABLE FOR STREAM SEGMENT #   1
                 AT LOCAL INFLOW POINT #   1
          LOAD BY GRAIN SIZE CLASS (tons/day)
--------------------------------------------------------------
LQL      | 1.00000    | 100.000    | 1000.00    | 10000.0    |
          ------------ ------------ ------------ ------------
LFL  VFS |0.265600E-02| 6.64000    | 7.50000    | 5940.00    |
LFL   FS |0.828000E-03| 2.07000    | 122.500    | 5430.00    |
LFL   MS |0.344000E-03|0.860000    | 302.500    | 3210.00    |
LFL   CS |0.124000E-03|0.310000    | 26.0000    | 2940.00    |
LFL  VCS |0.320000E-04|0.800000E-01| 19.5000    | 3810.00    |
LFL  VFG |0.120000E-04|0.300000E-01| 10.0000    | 3480.00    |
LFL   FG |0.400000E-05|0.100000E-01| 5.50000    | 2730.00    |
LFL   MG |0.100000E-19|0.100000E-19| 5.50000    | 1590.00    |
LFL   CG |0.100000E-19|0.100000E-19|0.100000E-19| 660.000    |
LFL  VCG |0.100000E-19|0.100000E-19|0.100000E-19| 180.000    |
          ------------ ------------ ------------ ------------
   TOTAL |0.400000E-02| 10.0000    | 499.000    | 29970.0    |
--------------------------------------------------------------

SEDIMENT LOAD TABLE FOR STREAM SEGMENT #   1
                 AT LOCAL INFLOW POINT #   2
          LOAD BY GRAIN SIZE CLASS (tons/day)
--------------------------------------------------------------
LQL      | 1.00000    | 100.000    | 1000.00    | 10000.0    |
          ------------ ------------ ------------ ------------
LFL  VFS |0.265600E-02| 6.64000    | 7.50000    | 5940.00    |
LFL   FS |0.828000E-03| 2.07000    | 122.500    | 5430.00    |
LFL   MS |0.344000E-03|0.860000    | 302.500    | 3210.00    |
LFL   CS |0.124000E-03|0.310000    | 26.0000    | 2940.00    |
LFL  VCS |0.320000E-04|0.800000E-01| 19.5000    | 3810.00    |
LFL  VFG |0.120000E-04|0.300000E-01| 10.0000    | 3480.00    |
LFL   FG |0.400000E-05|0.100000E-01| 5.50000    | 2730.00    |
LFL   MG |0.100000E-19|0.100000E-19| 5.50000    | 1590.00    |
LFL   CG |0.100000E-19|0.100000E-19|0.100000E-19| 660.000    |
LFL  VCG |0.100000E-19|0.100000E-19|0.100000E-19| 180.000    |
          ------------ ------------ ------------ ------------
   TOTAL |0.400000E-02| 10.0000    | 499.000    | 29970.0    |
--------------------------------------------------------------

SEDIMENT LOAD TABLE FOR STREAM SEGMENT #   1
                 AT LOCAL INFLOW POINT #   3
          LOAD BY GRAIN SIZE CLASS (tons/day)
---------------------------------------------------------------------------
LQL      | 1.00000    | 100.000    | 500.000    | 1000.00    | 30000.0    |
          ------------ ------------ ------------ ------------ ------------
LFL  VFS |0.402000E-03| 6.03000    | 39.0000    | 93.6000    | 3082.50    |
LFL   FS |0.684000E-03| 10.2600    | 86.0000    | 210.000    | 4905.00    |
LFL   MS |0.902000E-03| 13.5300    | 227.000    | 721.200    | 10710.0    |
LFL   CS |0.200000E-05|0.300000E-01| 98.5000    | 170.400    | 3555.00    |
LFL  VCS |0.100000E-19|0.100000E-19|0.100000E-19| 3.60000    | 180.000    |
LFL  VFG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19| 45.0000    |
LFL   FG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19| 22.5000    |
LFL   MG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
LFL   CG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
LFL  VCG |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
          ------------ ------------ ------------ ------------ ------------
   TOTAL |0.199000E-02| 29.8500    | 450.500    | 1198.80    | 22500.0    |
---------------------------------------------------------------------------

BED SEDIMENT CONTROL VOLUMES

STREAM SEGMENT #  1: EXAMPLE PROBLEM NO 3.  MOVABLE BED
|  SECTION  |   LENGTH   |   WIDTH    |  DEPTH    |        V O L U M E         |
|  NUMBER   |    (ft)    |    (ft)    |   (ft)    |   (cu.ft)    |   (cu.yd)   |
------------------------------------------------------------------------------
|     1.000 |   1640.000 |    203.000 |   10.000 |0.332920E+07 | 123304.     |
|    15.000 |   3760.000 |    229.266 |   10.000 |0.862040E+07 | 319274.     |
|    32.000 |   3780.000 |    223.706 |   10.000 |0.845610E+07 | 313189.     |
|    32.100 |   1660.000 |    219.500 |   10.000 |0.364370E+07 | 134952.     |
|    33.000 |    875.000 |    294.017 |    0.000 |0.000000     |0.000000     |
|    33.300 |   1400.000 |    287.165 |    0.000 |0.000000     |0.000000     |
|    33.900 |    525.000 |    284.050 |    0.000 |0.000000     |0.000000     |
|    35.000 |   2605.000 |    235.467 |    0.000 |0.000000     |0.000000     |
|    42.000 |   4355.000 |    203.228 |    0.000 |0.000000     |0.000000     |
|    44.000 |   3221.000 |    282.665 |    1.000 | 910465.     | 33720.9     |
|    53.000 |   2856.000 |    220.920 |   10.000 |0.630947E+07 | 233684.     |
|    55.000 |   2116.000 |    198.870 |   10.000 |0.420808E+07 | 155855.     |
|    58.000 |    731.000 |    185.667 |    3.400 | 461456.     | 17091.0     |

NO. OF INPUT DATA MESSAGES=    0
END OF SEDIMENT DATA
==========================================================================================
```

```
$HYD
BEGIN COMPUTATIONS.

==========================================================================================
TIME STEP #       1
Q    A     FLOW 1 = BASE FLOW 0F 750 CFS

TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 3.  MOVABLE BED
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
    2.00      58.000 *      0.09                     *
              53.000 *      0.04                     *
              42.000 *      0.00                     *
   TOTAL=     35.000 *      0.14      0.00      1.00 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
    2.00      35.000 *      0.00                     *
   TOTAL=     33.000 *      0.00      0.00      0.49 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
    2.00      33.000 *      0.00                     *
              15.000 *      0.00                     *
   TOTAL=      1.000 *      0.00      0.02     -3.36 *
******************************************************

==========================================================================================
TIME STEP #       2
Q    B     FLOW 2 = 50 DAYS AT BANK FULL DISCHARGE

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
EXAMPLE PROBLEM NO 3.  MOVABLE BED
       ACCUMULATED TIME (yrs)....      0.142
       FLOW DURATION (days)......     50.000

UPSTREAM BOUNDARY CONDITIONS
----------------------------------------------------------------------
Stream Segment # 1      |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
Section No.     58.000 |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
                 INFLOW |       1400.00 |        529.98 |       62.04

Upstream of SECTION NO.     53.000 is...
LOCAL INFLOW POINT # 3 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                        |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       1400.00 |        529.98 |       62.04
      LOCAL     INFLOW |        650.00 |        647.71 |       67.00
----------------------------------------------------------------------
                  TOTAL |       2050.00 |       1177.69 |       63.61

Upstream of SECTION NO.     42.000 is...
LOCAL INFLOW POINT # 2 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                        |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       2050.00 |       1177.69 |       63.61
      LOCAL     INFLOW |        150.00 |         14.45 |       70.00
----------------------------------------------------------------------
                  TOTAL |       2200.00 |       1192.13 |       64.05

Upstream of SECTION NO.     15.000 is...
LOCAL INFLOW POINT # 1 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                        |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       2200.00 |       1192.13 |       64.05
      LOCAL     INFLOW |        300.00 |         40.00 |       72.00
----------------------------------------------------------------------
                  TOTAL |       2500.00 |       1232.13 |       65.00

TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 3.  MOVABLE BED
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   52.00      58.000 *     13.17                     *
              53.000 *     16.03                     *
              42.000 *      0.36                     *
   TOTAL=     35.000 *     29.56      5.51      0.81 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   52.00      35.000 *      5.51                     *
   TOTAL=     33.000 *      5.51      1.47      0.73 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   52.00      33.000 *      1.47                     *
              15.000 *      0.99                     *
   TOTAL=      1.000 *      2.46      0.07      0.97 *
******************************************************
```

```
TABLE SB-1:  SEDIMENT LOAD PASSING THE  BOUNDARIES OF STREAM SEGMENT #  1
--------------------------------------------------------------------------------
  SEDIMENT INFLOW at the Upstream Boundary:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------------
    VERY FINE SAND....        265.63  |  VERY FINE GRAVEL..          0.00
    FINE SAND.........        173.06  |  FINE GRAVEL.......          0.00
    MEDIUM SAND.......         82.59  |  MEDIUM GRAVEL.....          0.00
    COARSE SAND.......          6.27  |  COARSE GRAVEL.....          0.00
    VERY COARSE SAND..          2.42  |  VERY COARSE GRAVEL          0.00
                       -------------                       -------------
                                                 TOTAL =        529.98
  SEDIMENT OUTFLOW from the Downstream Boundary
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------------
    VERY FINE SAND....          0.24  |  VERY FINE GRAVEL..          0.00
    FINE SAND.........          0.27  |  FINE GRAVEL.......          0.00
    MEDIUM SAND.......          0.72  |  MEDIUM GRAVEL.....          0.00
    COARSE SAND.......          0.59  |  COARSE GRAVEL.....          0.00
    VERY COARSE SAND..          0.13  |  VERY COARSE GRAVEL          0.00
                       -------------                       -------------
                                                 TOTAL =          1.94

TABLE SB-2:  STATUS OF THE BED PROFILE AT TIME =    52.000 DAYS
--------------------------------------------------------------------------------
  SECTION   BED CHANGE   WS ELEV   THALWEG        Q      TRANSPORT RATE (tons/day)
  NUMBER       (ft)        (ft)      (ft)       (cfs)        SAND
     58.000      -0.60    981.86    974.80      1400.         557.
     55.000       0.10    980.67    973.00      1400.         525.
     53.000       0.40    977.12    972.60      2050.        1044.
     44.000       0.08    975.90    967.18      2050.        1014.
     42.000       0.92    975.15    970.72      2200.         300.
     35.000       0.17    974.00    963.47      2200.         223.
     33.900       0.57    970.36    963.22      2200.         160.
     33.300       0.12    970.19    962.61      2200.         124.
     33.000       0.33    970.00    961.33      2200.          59.
     32.100      -0.19    967.63    956.31      2200.         105.
     32.000      -0.13    966.55    956.37      2200.         157.
     15.000      -0.19    965.13    953.51      2500.         232.
      1.000       1.03    965.00    945.73      2500.           2.

------------------------------------------------------------------------------------------
$PRT
...Selective Printout Option
    - Print at the following cross sections
CP            1
PS          15.0    32.0    32.1
END

==========================================================================================
TIME STEP #       3
Q   AC     FLOW 3 = NEAR BANK FULL DISCHARGE

EXAMPLE PROBLEM NO 3.  MOVABLE BED
ACCUMULATED TIME (yrs)..........      0.142

--- Downstream Boundary Condition Data for STREAM SEGMENT NO.  1 at Control Point #  1 ---
                            DISCHARGE   TEMPERATURE  WATER SURFACE
                              (cfs)       (deg F)        (ft)
                              1250.000      65.00        960.000

****  DISCHARGE    WATER    ENERGY  VELOCITY   ALPHA     TOP      AVG       AVG VEL (by subsection)
        (CFS)     SURFACE    LINE     HEAD              WIDTH     BED        1       2       3

SECTION NO.     15.000
****   1250.000   960.477   960.622   0.144    1.000   144.463   957.639   0.000   3.048   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

--- LOCAL INFLOW POINT #  1 is upstream of Section No.      15.000 ---
                            DISCHARGE   TEMPERATURE
                              (cfs)       (deg F)
            Local Inflow:      150.000      72.00
                   Total:     1100.000      64.05

SECTION NO.     32.000
****   1100.000   963.899   963.941   0.042    1.000   132.795   958.838   0.000   1.637   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     32.100
****   1100.000   964.813   964.842   0.029    1.000   138.333   959.013   0.000   1.371   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
EXAMPLE PROBLEM NO 3.  MOVABLE BED
       ACCUMULATED TIME (yrs)....      0.145
       FLOW DURATION (days)......      1.000

UPSTREAM BOUNDARY CONDITIONS
----------------------------------------------------------------------
Stream Segment # 1     |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
Section No.     58.000 |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
                INFLOW |       682.00 |       149.81 |       61.89
```

```
  SEDIMENT INFLOW at SECTION NO.     58.000
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....         66.90  |  VERY FINE GRAVEL..         0.00
    FINE SAND.........         53.32  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......         29.58  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          0.01  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          0.00  |  VERY COARSE GRAVEL         0.00
                       -------------                    -------------
                                              TOTAL =       149.81

    FALL VELOCITIES - Method 2
              DIAMETER   VELOCITY       REY. NO.          CD
    ------------------------------------------------------------
    VF SAND   0.000290  0.1860300E-01  0.4558130       59.31192
    F  SAND   0.000580  0.5765145E-01   2.825166       12.35143
    M  SAND   0.001160  0.1327884       13.01437       4.656360
    C  SAND   0.002320  0.2803304       54.94943       2.089569
    VC SAND   0.004640  0.4807405       188.4667       1.421041
    VF GRVL   0.009280  0.7191215       563.8404       1.270145
    F  GRVL   0.018559   1.039704       1630.395       1.215254
    M  GRVL   0.037118   1.472894       4619.401       1.211086
    C  GRVL   0.074237   2.082985       13065.61       1.211086
    VC GRVL   0.148474   2.945788       36955.21       1.211086

*****************************************************************************************
                TRACE OUTPUT FOR SECTION NO.     32.100
           -------------------------------------------------------

HYDRAULIC PARAMETERS:
      VEL      SLO        EFD       EFW    N-VALUE     TAU      USTARM    FROUDE NO.
     1.371  0.000271      6.763   118.634    0.0500   0.11467   0.24306     0.093

BED SEDIMENT CONTROL VOLUME COMPUTATIONS:
NEW SURFACE AREA (SQ FT):     TOTAL       K-PORTION      S-PORTION
                          214970.00      214970.00           0.00

GRADATION OF ACTIVE PLUS INACTIVE DEPOSITS
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.012074      1.207441      VF GRVL      0.038537     94.998190
                       F  SAND      0.062093      7.416711      F  GRVL      0.027800     97.778156
                       M  SAND      0.319568     39.373478      M  GRVL      0.004329     98.211069
                       C  SAND      0.394570     78.830455      C  GRVL      0.008945     99.105534
                       VC SAND      0.123140     91.144443      VC GRVL      0.008945     99.999998

SAND
** ARMOR LAYER **
STABILITY COEFFICIENT=     0.81992
MIN.GRAIN DIAM       =    0.001943
BED SURFACE EXPOSED  =     0.28365

        INACTIVE LAYER      ACTIVE LAYER
         %       DEPTH      %      DEPTH
 CLAY   0.0000    0.00    0.0000    0.00
 SILT   0.0000    0.00    0.0000    0.00
 SAND   1.0000    9.76    1.0000    0.05
TOTAL   1.0000    9.76    1.0000    0.05

       AVG. UNIT              AVG. UNIT
         WEIGHT                 WEIGHT
        0.046500               0.046500

    COMPOSITE UNIT WT OF ACTIVE LAYER   (t/cf)=       0.046500
    COMPOSITE UNIT WT OF INACTIVE LAYER (t/cf)=       0.046500
    DEPTH OF SURFACE LAYER (ft)           DSL=            0.1
    WEIGHT IN SURFACE LAYER (tons)       WTSL=          833.0
    DEPTH OF NEW ACTIVE LAYER (ft)        DSE=         0.0008
    WEIGHT IN NEW ACTIVE LAYER(tons)   WTMXAL=            7.6
    WEIGHT IN OLD ACTIVE LAYER(tons)      WAL=          497.7
    USEABLE WEIGHT, OLD INACTIVE LAYER    WIL=        97534.4
    SURFACE AREA OF DEPOSIT (sq ft)      SABK= 0.21497000E+06

** INACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.008485      0.848488      VF GRVL      0.038120     95.056453
                       F  SAND      0.062410      7.089446      F  GRVL      0.027476     97.804037
                       M  SAND      0.321199     39.209296      M  GRVL      0.004279     98.231907
                       C  SAND      0.396583     78.867631      C  GRVL      0.008840     99.115953
                       VC SAND      0.123768     91.244461      VC GRVL      0.008840     99.999998
** ACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.715456     71.545615      VF GRVL      0.120357     83.581306
                       F  SAND      0.000000     71.545615      F  GRVL      0.091254     92.706690
                       M  SAND      0.000000     71.545615      M  GRVL      0.014211     94.127749
                       C  SAND      0.000000     71.545615      C  GRVL      0.029361     97.063875
                       VC SAND      0.000000     71.545615      VC GRVL      0.029361    100.000000

C FINES, COEF(CFFML), MX POTENTIAL= 0.000000E+00 0.100000E+01 0.237600E+07
POTENTIAL TRANSPORT (tons/day):  VF SAND 0.560062E+03  VF GRVL 0.100000E-06
                                 F  SAND 0.199470E+03  F  GRVL 0.100000E-06
                                 M  SAND 0.125719E+03  M  GRVL 0.100000E-06
                                 C  SAND 0.947155E+02  C  GRVL 0.100000E-06
                                 VC SAND 0.765651E+02  VC GRVL 0.100000E-06
```

```
  SEDIMENT OUTFLOW FROM SECTION NO.     32.100
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....        148.98  |  VERY FINE GRAVEL..         0.00
    FINE SAND.........          9.07  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......         23.59  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......         21.05  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          5.30  |  VERY COARSE GRAVEL         0.00

*************************************************************************************
                  TRACE OUTPUT FOR SECTION NO.     32.000
           -------------------------------------------------------
HYDRAULIC PARAMETERS:
      VEL      SLO        EFD       EFW     N-VALUE     TAU      USTARM    FROUDE NO.
     1.923  0.000527     5.733    110.118    0.0500   0.18875   0.31184     0.142

BED SEDIMENT CONTROL VOLUME COMPUTATIONS:
NEW SURFACE AREA (SQ FT):     TOTAL        K-PORTION      S-PORTION
                           495163.69      495163.69           0.00

GRADATION OF ACTIVE PLUS INACTIVE DEPOSITS
BED MATERIAL PER GRAIN SIZE:   BED FRACTION  PERCENT FINER             BED FRACTION  PERCENT FINER
                       VF SAND      0.011063      1.106303     VF GRVL      0.025317     95.945944
                       F  SAND      0.070203      8.126581     F  GRVL      0.025337     98.479681
                       M  SAND      0.374483     45.574892     M  GRVL      0.005068     98.986453
                       C  SAND      0.373745     82.949358     C  GRVL      0.005068     99.493225
                       VC SAND      0.104649     93.414209     VC GRVL      0.005068     99.999998

SAND
** ARMOR LAYER **
STABILITY COEFFICIENT=     0.76487
MIN.GRAIN DIAM       =    0.003170
BED SURFACE EXPOSED  =     1.00000

        INACTIVE LAYER      ACTIVE LAYER
          %       DEPTH      %      DEPTH
 CLAY   0.0000    0.00     0.0000    0.00
 SILT   0.0000    0.00     0.0000    0.00
 SAND   1.0000    9.84     1.0000    0.03
TOTAL   1.0000    9.84     1.0000    0.03

       AVG. UNIT              AVG. UNIT
         WEIGHT                 WEIGHT
        0.046500               0.046500

    COMPOSITE UNIT WT OF ACTIVE LAYER   (t/cf)=       0.046500
    COMPOSITE UNIT WT OF INACTIVE LAYER (t/cf)=       0.046500
    DEPTH OF SURFACE LAYER (ft)            DSL=            0.1
    WEIGHT IN SURFACE LAYER (tons)        WTSL=         1918.8
    DEPTH OF NEW ACTIVE LAYER (ft)         DSE=         0.0042
    WEIGHT IN NEW ACTIVE LAYER(tons)    WTMXAL=           97.6
    WEIGHT IN OLD ACTIVE LAYER(tons)       WAL=          635.8
    USEABLE WEIGHT, OLD INACTIVE LAYER     WIL=       226538.3
    SURFACE AREA OF DEPOSIT (sq ft)       SABK= 0.49516369E+06

** INACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:   BED FRACTION  PERCENT FINER             BED FRACTION  PERCENT FINER
                       VF SAND      0.009994      0.999449     VF GRVL      0.025198     95.968320
                       F  SAND      0.069961      7.995595     F  GRVL      0.025198     98.488119
                       M  SAND      0.374794     45.474949     M  GRVL      0.005040     98.992078
                       C  SAND      0.374794     82.954303     C  GRVL      0.005040     99.496038
                       VC SAND      0.104942     93.448522     VC GRVL      0.005040     99.999998
** ACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:   BED FRACTION  PERCENT FINER             BED FRACTION  PERCENT FINER
                       VF SAND      0.391813     39.181331     VF GRVL      0.067850     87.972420
                       F  SAND      0.156193     54.800582     F  GRVL      0.075005     95.472886
                       M  SAND      0.263868     81.187410     M  GRVL      0.015090     96.981924
                       C  SAND      0.000000     81.187410     C  GRVL      0.015090     98.490962
                       VC SAND      0.000000     81.187410     VC GRVL      0.015090    100.000000

C FINES, COEF(CFFML), MX POTENTIAL= 0.000000E+00 0.100000E+01 0.237600E+07
POTENTIAL TRANSPORT (tons/day):  VF SAND 0.279192E+04  VF GRVL 0.108066E+01
                                 F  SAND 0.906230E+03  F  GRVL 0.100000E-06
                                 M  SAND 0.533420E+03  M  GRVL 0.100000E-06
                                 C  SAND 0.403607E+03  C  GRVL 0.100000E-06
                                 VC SAND 0.382254E+03  VC GRVL 0.100000E-06

  SEDIMENT OUTFLOW FROM SECTION NO.     32.000
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....        256.66  |  VERY FINE GRAVEL..         0.04
    FINE SAND.........         78.38  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......        185.55  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......        116.49  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..         30.96  |  VERY COARSE GRAVEL         0.00

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Upstream of SECTION NO.     15.000 is...
LOCAL INFLOW POINT # 1 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       1100.00 |        362.61 |        64.05
      LOCAL     INFLOW |        150.00 |         14.45 |        72.00
----------------------------------------------------------------------
                 TOTAL |       1250.00 |        377.06 |        65.00
```

```
  SEDIMENT LOAD FROM LOCAL INFLOW:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....          6.78  |  VERY FINE GRAVEL..         0.08
    FINE SAND.........          4.25  |  FINE GRAVEL.......         0.03
    MEDIUM SAND.......          2.41  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          0.68  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          0.21  |  VERY COARSE GRAVEL         0.00
                       -------------                       -------------
                                                 TOTAL =        14.45

    FALL VELOCITIES - Method 2
              DIAMETER   VELOCITY       REY. NO.          CD
    ------------------------------------------------------------
    VF SAND   0.000290  0.1931441E-01  0.4941259       55.02308
    F  SAND   0.000580  0.5916114E-01   3.027072       11.72910
    M  SAND   0.001160  0.1355164       13.86779       4.470784
    C  SAND   0.002320  0.2833008       57.98200       2.045980
    VC SAND   0.004640  0.4824925       197.4999       1.410740
    VF GRVL   0.009280  0.7200893       589.5120       1.266733
    F  GRVL   0.018559   1.040325       1703.352       1.213806
    M  GRVL   0.037118   1.472894       4823.231       1.211086
    C  GRVL   0.074237   2.082985       13642.13       1.211086
    VC GRVL   0.148474   2.945788       38585.85       1.211086

*******************************************************************************************
                  TRACE OUTPUT FOR SECTION NO.     15.000
           -------------------------------------------------------
HYDRAULIC PARAMETERS:
      VEL      SLO        EFD        EFW     N-VALUE     TAU      USTARM    FROUDE NO.
     2.137  0.000485      6.241    112.022    0.0450   0.18889   0.31196     0.151

BED SEDIMENT CONTROL VOLUME COMPUTATIONS:
NEW SURFACE AREA (SQ FT):     TOTAL        K-PORTION      S-PORTION
                            543327.92     543327.92          0.00

GRADATION OF ACTIVE PLUS INACTIVE DEPOSITS
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.010618      1.061792      VF GRVL      0.045645     93.051050
                       F  SAND      0.070017      8.063516      F  GRVL      0.034096     96.460669
                       M  SAND      0.325449     40.608371      M  GRVL      0.010834     97.544118
                       C  SAND      0.365690     77.177345      C  GRVL      0.022336     99.777722
                       VC SAND      0.113092     88.486534      VC GRVL      0.002223     99.999998

SAND
** ARMOR LAYER **
STABILITY COEFFICIENT=     0.78731
MIN.GRAIN DIAM       =    0.002878
BED SURFACE EXPOSED  =     0.00000

        INACTIVE LAYER      ACTIVE LAYER
         %       DEPTH      %       DEPTH
 CLAY   0.0000    0.00     0.0000    0.00
 SILT   0.0000    0.00     0.0000    0.00
 SAND   1.0000    9.64     1.0000    0.17
TOTAL   1.0000    9.64     1.0000    0.17

       AVG. UNIT              AVG. UNIT
         WEIGHT                 WEIGHT
        0.046500               0.046500

    COMPOSITE UNIT WT OF ACTIVE LAYER   (t/cf)=       0.046500
    COMPOSITE UNIT WT OF INACTIVE LAYER (t/cf)=       0.046500
    DEPTH OF SURFACE LAYER (ft)           DSL=             0.1
    WEIGHT IN SURFACE LAYER (tons)       WTSL=          2105.4
    DEPTH OF NEW ACTIVE LAYER (ft)        DSE=          0.0000
    WEIGHT IN NEW ACTIVE LAYER(tons)   WTMXAL=             0.0
    WEIGHT IN OLD ACTIVE LAYER(tons)      WAL=          4252.7
    USEABLE WEIGHT, OLD INACTIVE LAYER    WIL=        243631.1
    SURFACE AREA OF DEPOSIT (sq ft)      SABK= 0.54332792E+06

** INACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.010000      1.000000      VF GRVL      0.044734     93.180849
                       F  SAND      0.070000      8.000000      F  GRVL      0.033457     96.526594
                       M  SAND      0.327074     40.707446      M  GRVL      0.010638     97.590423
                       C  SAND      0.366543     77.361700      C  GRVL      0.021915     99.781913
                       VC SAND      0.113457     88.707445      VC GRVL      0.002181     99.999998
** ACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.046017      4.601728      VF GRVL      0.097841     85.615105
                       F  SAND      0.071005     11.702227      F  GRVL      0.070689     92.683996
                       M  SAND      0.232303     34.932536      M  GRVL      0.022074     94.891357
                       C  SAND      0.316834     66.615964      C  GRVL      0.046463     99.537628
                       VC SAND      0.092150     75.831001      VC GRVL      0.004624    100.000000

C FINES, COEF(CFFML), MX POTENTIAL= 0.000000E+00 0.100000E+01 0.270000E+07
POTENTIAL TRANSPORT (tons/day):  VF SAND 0.326022E+04  VF GRVL 0.230126E+01
                                 F  SAND 0.107158E+04  F  GRVL 0.328571E-03
                                 M  SAND 0.638850E+03  M  GRVL 0.100000E-06
                                 C  SAND 0.495316E+03  C  GRVL 0.100000E-06
                                 VC SAND 0.491224E+03  VC GRVL 0.100000E-06
```

```
  SEDIMENT OUTFLOW FROM SECTION NO.     15.000
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ---------------------------------------------------------------------------
    VERY FINE SAND....        138.47  |  VERY FINE GRAVEL..         0.18
    FINE SAND.........         75.72  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......        168.18  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......        162.61  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..         47.90  |  VERY COARSE GRAVEL         0.00


TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 3.  MOVABLE BED
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *            SAND              *
    DAYS       POINT *   INFLOW   OUTFLOW  TRAP EFF *
   53.00      58.000 *    13.25                     *
              53.000 *    16.13                     *
              42.000 *     0.36                     *
   TOTAL=     35.000 *    29.74      5.52      0.81 *
******************************************************
    TIME       ENTRY *            SAND              *
    DAYS       POINT *   INFLOW   OUTFLOW  TRAP EFF *
   53.00      35.000 *     5.52                     *
   TOTAL=     33.000 *     5.52      1.54      0.72 *
******************************************************
    TIME       ENTRY *            SAND              *
    DAYS       POINT *   INFLOW   OUTFLOW  TRAP EFF *
   53.00      33.000 *     1.54                     *
              15.000 *     1.00                     *
   TOTAL=      1.000 *     2.54      0.07      0.97 *
******************************************************

TABLE SB-1:  SEDIMENT LOAD PASSING THE  BOUNDARIES OF STREAM SEGMENT #  1
--------------------------------------------------------------------------------
  SEDIMENT INFLOW at the Upstream Boundary:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ---------------------------------------------------------------------------
    VERY FINE SAND....         66.90  |  VERY FINE GRAVEL..         0.00
    FINE SAND.........         53.32  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......         29.58  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          0.01  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          0.00  |  VERY COARSE GRAVEL         0.00
                        -------------                       -------------
                                                TOTAL =       149.81
  SEDIMENT OUTFLOW from the Downstream Boundary
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ---------------------------------------------------------------------------
    VERY FINE SAND....          2.05  |  VERY FINE GRAVEL..         0.00
    FINE SAND.........          1.13  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......          2.94  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          2.79  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          1.08  |  VERY COARSE GRAVEL         0.00
                        -------------                       -------------
                                                TOTAL =         9.99

TABLE SB-2:  STATUS OF THE BED PROFILE AT TIME =    53.000 DAYS
--------------------------------------------------------------------------------
  SECTION   BED CHANGE   WS ELEV   THALWEG        Q      TRANSPORT RATE (tons/day)
  NUMBER       (ft)       (ft)      (ft)        (cfs)       SAND
     58.000      -0.83    979.94    974.57        682.        818.
     55.000       0.04    979.11    972.94        682.       1476.
     53.000       0.25    975.42    972.45       1022.       4056.
     44.000       0.19    974.82    967.29       1022.        560.
     42.000       0.94    974.43    970.74       1100.         15.
     35.000       0.17    974.00    963.47       1100.          6.
     33.900       0.48    966.96    963.13       1100.        528.
     33.300       0.13    966.48    962.62       1100.        442.
     33.000       0.36    966.00    961.36       1100.        156.
     32.100      -0.20    964.81    956.30       1100.        208.
     32.000      -0.15    963.90    956.35       1100.        668.
     15.000      -0.19    960.48    953.51       1250.        593.
      1.000       1.07    960.00    945.77       1250.         10.

Accumulated Water Discharge from day zero (sfd)
     MAIN
  127750.00

-------------------------------------------------------------------------------------------
$PRT   A
...Selective Printout Option
   A - Print at all cross sections

===========================================================================================
TIME STEP #       4
Q    B     FLOW 4 = BASE FLOW OF 750 CFS

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
EXAMPLE PROBLEM NO 3.  MOVABLE BED
       ACCUMULATED TIME (yrs)....      0.148
       FLOW DURATION (days)......      1.000
```

```
UPSTREAM BOUNDARY CONDITIONS
----------------------------------------------------------------------
Stream Segment # 1     |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
Section No.     58.000 |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
                INFLOW |        532.00 |         93.30 |       63.44

Upstream of SECTION NO.     53.000 is...
LOCAL INFLOW POINT # 3 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |        532.00 |         93.30 |       63.44
      LOCAL     INFLOW |        128.00 |         43.20 |       67.00
----------------------------------------------------------------------
                 TOTAL |        660.00 |        136.50 |       64.13

Upstream of SECTION NO.     42.000 is...
LOCAL INFLOW POINT # 2 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |        660.00 |        136.50 |       64.13
      LOCAL     INFLOW |         29.00 |          1.22 |       70.00
----------------------------------------------------------------------
                 TOTAL |        689.00 |        137.72 |       64.38

Upstream of SECTION NO.     15.000 is...
LOCAL INFLOW POINT # 1 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |        689.00 |        137.72 |       64.38
      LOCAL     INFLOW |         61.00 |          4.32 |       72.00
----------------------------------------------------------------------
                 TOTAL |        750.00 |        142.04 |       65.00

TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 3.  MOVABLE BED
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *          SAND                 *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   54.00      58.000 *     13.29                     *
              53.000 *     16.15                     *
              42.000 *      0.36                     *
   TOTAL=     35.000 *     29.81      5.52      0.81 *
******************************************************
    TIME       ENTRY *          SAND                 *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   54.00      35.000 *      5.52                     *
   TOTAL=     33.000 *      5.52      2.04      0.63 *
******************************************************
    TIME       ENTRY *          SAND                 *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   54.00      33.000 *      2.04                     *
              15.000 *      1.00                     *
   TOTAL=      1.000 *      3.04      0.08      0.97 *
******************************************************

TABLE SB-1:  SEDIMENT LOAD PASSING THE  BOUNDARIES OF STREAM SEGMENT #  1
--------------------------------------------------------------------------------
  SEDIMENT INFLOW at the Upstream Boundary:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------------
    VERY FINE SAND....         38.08  | VERY FINE GRAVEL..          0.00
    FINE SAND.........         34.16  | FINE GRAVEL.......          0.00
    MEDIUM SAND.......         21.06  | MEDIUM GRAVEL.....          0.00
    COARSE SAND.......          0.00  | COARSE GRAVEL.....          0.00
    VERY COARSE SAND..          0.00  | VERY COARSE GRAVEL          0.00
                        -------------                        -------------
                                                 TOTAL =         93.30
  SEDIMENT OUTFLOW from the Downstream Boundary
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------------
    VERY FINE SAND....          6.28  | VERY FINE GRAVEL..          0.15
    FINE SAND.........          2.82  | FINE GRAVEL.......          0.19
    MEDIUM SAND.......          6.67  | MEDIUM GRAVEL.....          0.07
    COARSE SAND.......          6.38  | COARSE GRAVEL.....          0.00
    VERY COARSE SAND..          2.69  | VERY COARSE GRAVEL          0.00
                        -------------                        -------------
                                                 TOTAL =         25.24

TABLE SB-2:  STATUS OF THE BED PROFILE AT TIME =    54.000 DAYS
--------------------------------------------------------------------------------
  SECTION   BED CHANGE   WS ELEV   THALWEG        Q      TRANSPORT RATE (tons/day)
  NUMBER       (ft)        (ft)      (ft)       (cfs)        SAND
     58.000      -0.94    979.24    974.46       532.        415.
     55.000       0.00    978.47    972.90       532.        833.
     53.000       0.23    974.73    972.43       660.       1274.
     44.000       0.22    974.40    967.32       660.        138.
     42.000       0.94    974.18    970.74       689.          1.
     35.000       0.17    974.00    963.47       689.          0.
     33.900       0.40    965.77    963.05       689.        433.
     33.300       0.11    965.05    962.60       689.        713.
     33.000       0.33    963.74    961.33       689.       1000.
```

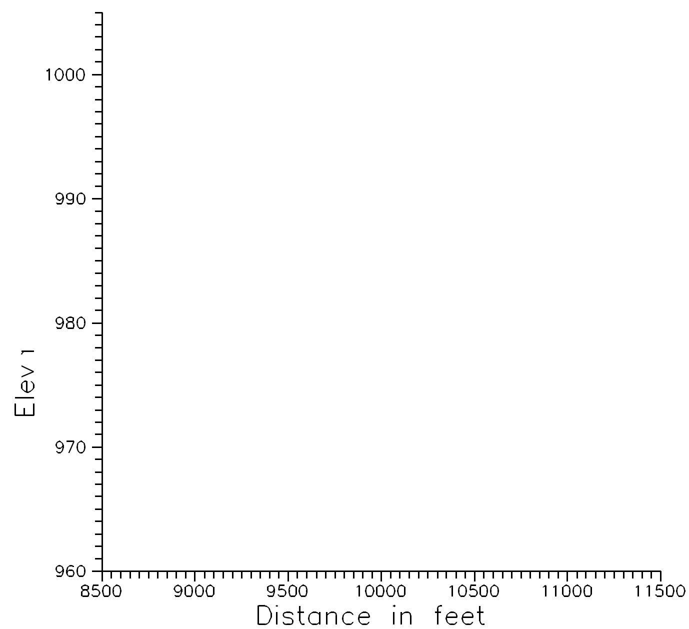
```
     32.100      -0.10    963.74    956.40        689.         49.
     32.000      -0.18    963.13    956.32        689.        694.
     15.000      -0.24    957.66    953.46        750.       1530.
      1.000       1.22    957.00    945.92        750.         25.

------------------------------------------------------------------------------------------
$$END

       0   DATA ERRORS DETECTED.

TOTAL NO. OF TIME STEPS READ =         4
TOTAL NO. OF WS PROFILES =             4
ITERATIONS IN EXNER EQ =             260

COMPUTATIONS COMPLETED
RUN TIME =  0 HOURS,  0 MINUTES &  2.00 SECONDS
```



1000
990
980
970
960
Elev 1
8500
9000
9500
10000
10500
11000
11500
Distance in feet

```
NV    22    .045   965.6    .064   988.8
NV    12     .08   965.6     .13   988.8
NV    33      .1   965.6     .11   982.0     .12   988.8
X1  15.0      27  10665.  10850.   3560.   3030.   3280.
X3                        10700.   961.0  11000.   970.0
GR 992.0   9570.   982.0  10110.   976.0  10300.   976.0  10490.   966.0  10610.
GR 964.7  10665.   956.0  10673.   953.0  10693.   954.0  10703.   955.6  10723.
GR 958.6  10750.   959.3  10800.   957.0  10822.   957.3  10825.   961.5  10850.
GR 962.0  10852.   964.0  10970.   966.0  11015.   961.0  11090.   962.0  11150.
GR 970.0  11190.   972.0  11310.   980.0  11410.   984.0  11570.   990.0  11770.
GR 990.0  11865.  1000.0  12150.
HD  15.0     10.  10673.  10852.
  CASCADE CREEK - Local Inflow
QT
NC    .1      .1     .05
X1  32.0      29 10057.0 10271.0   3630.   3060.   4240.
GR 998.0   9080.   982.0   9250.   982.0   9510.   980.0   9600.  980.01   9925.
GR979.48  10000.   978.5  10057.   968.6  10075.  959.82  10087.   956.5  10097.
GR 956.8  10117.   957.8  10137.   959.4  10157.   959.6  10177.   959.8  10196.
GR 966.5  10225.   971.2  10250.   978.5  10271.   978.5  10300.   978.6  10350.
GR978.91  10370.  978.96  10387.   980.0  10610.   982.0  10745.   982.0  11145.
GR 984.0  11150.   992.0  11240.  1000.0  11330.   1008.  11425.
HD  32.0     10.  10075.  10275.
  Section 32.1 is a duplicate of Sec 32.0 - Needed to model IBC at Sec 33.0
X1  32.1      29 10057.0 10271.0   3130.   3250.   3320.
X3    10
GR 998.0   9080.   982.0   9250.   982.0   9510.   980.0   9600.  980.01   9925.
GR979.48  10000.   978.5  10057.   968.6  10075.  959.82  10087.   956.5  10097.
GR 956.8  10117.   957.8  10137.   959.4  10157.   959.6  10177.   959.8  10196.
GR 966.5  10225.   971.2  10250.   978.5  10271.   978.5  10300.   978.6  10350.
GR978.91  10370.  978.96  10387.   980.0  10610.   982.0  10745.   982.0  11145.
GR 984.0  11150.   992.0  11240.  1000.0  11330.   1008.  11425.
HD  32.1     10.  10075.  10275.
  A spillway is located here.
X1  33.0      21   1850.   2150.       0       0       0
X5                             2
XL                  250.
GR 1000.    980.   990.0   1060.   980.0   1150.   982.0   1180.   982.0   1215.
GR 980.0   1260.   982.0   1300.   982.0   1350.   980.0   1420.   980.0   1540.
GR 982.0   1730.   982.0   1830.  984.41   1850.  979.19   1851.   961.0  1900.8
GR 961.0  2099.2   976.0   2149.   984.5   2150.   982.0   2800.   990.0   3100.
GR 1000.   3170.
HD  33.0      0.   1851.   2149.
  Section 33.3 is a duplicate of Section  33.0.
X1  33.3      21   1850.   2150.   1550.   1750.   1750.     .95    1.49
XL                  250.
GR 1000.    980.   990.0   1060.   980.0   1150.   982.0   1180.   982.0   1215.
GR 980.0   1260.   982.0   1300.   982.0   1350.   980.0   1420.   980.0   1540.
GR 982.0   1730.   982.0   1830.  984.41   1850.  979.19   1851.   961.0  1900.8
GR 961.0  2099.2   976.0   2149.   984.5   2150.   982.0   2800.   990.0   3100.
GR 1000.   3170.
HD  33.3      0.   1851.   2149.
  Section 33.9 is a duplicate of Sec 33.3 - Needed to model IBC at Sec 35.0
X1  33.9      21   1850.   2150.   1050.   1050.   1050.     .95    1.65
X3    10
GR 1000.    980.   990.0   1060.   980.0   1150.   982.0   1180.   982.0   1215.
GR 980.0   1260.   982.0   1300.   982.0   1350.   980.0   1420.   980.0   1540.
GR 982.0   1730.   982.0   1830.  984.41   1850.  979.19   1851.   961.0  1900.8
GR 961.0  2099.2   976.0   2149.   984.5   2150.   982.0   2800.   990.0   3100.
GR 1000.   3170.
HD  33.9      0.   1851.   2149.
  A weir is located here.
X1  35.0      22   9894.  10245.       0       0       0
X3    10
X5          974.     0.5
GR 984.0   9035.   980.0   9070.   978.0   9135.   980.0   9185.   982.0   9270.
GR 980.0   9465.   981.7   9595.   983.7   9745.   984.7   9894.   963.4  9894.1
GR 963.3   9954.   967.1   9974.   967.4  10004.   968.2  10044.   967.6  10054.
GR 973.4  10115.   977.4  10120.   983.7  10155.   984.0  10245.   982.0  10695.
GR 982.0  10895.  1004.0  11085.
HD  35.0      0.   9954.  10155.           969.0   9894.   9954.             1.0
    - - -  SILVER LAKE  - - -
NC   .06     .06    .045
X1  42.0      32   9880.  10130.   5370.   5000.   5210.
GR 996.0   7130.   998.0   7310.   998.0   7930.   992.0   8205.   990.0   8495.
GR 988.0   8780.   986.0   8990.   985.7   9570.  986.45   9707.  989.44   9857.
GR 990.0   9880.   969.8   9881.   969.8   9941.   985.8   9941.   985.8   9943.
GR 969.8   9943.   969.8  10001.   986.7  10001.   986.7  10003.   969.8  10003.
GR 969.8  10067.   985.8  10067.   985.8  10069.   969.8  10069.   969.8  10129.
GR 989.9  10130.   989.5  10180.   988.6  10230.   987.6  10280.   985.2  10430.
GR 986.8  11720.   989.9  12310.
HD  42.0      0.   9881.  10021.           971.0   9881.   9941.             1.0
  SILVER CREEK - Local Inflow
QT
X1  44.0      28   9845.  10127.   3200.   3800.   3500.
XL                         9850.  10200.
```

```
GR 1002.   8035.   992.0   8150.   990.0   8305.   990.0   8735.   988.0   8835.
GR 996.0   9285.  1017.6   9425.   990.0   9505.   986.0   9650.   984.1   9788.
GR 980.6   9845.   970.9   9868.   972.2   9898.   970.5   9968.   967.5   9998.
GR 968.9  10028.   967.4  10058.   967.1  10078.   971.9  10118.   976.8  10127.
GR 977.8  10150.   976.9  10193.   982.0  10206.   981.2  10300.   979.2  10325.
GR 983.1  10400.   999.8  10450.  1002.4  10464.
HD  44.0      1.   9868.  10193.           971.0   9968.  10028.             1.0
X1  53.0      22  10000.  10136.   3366.   2832.   2942.
GR 1004.   7550.  1000.0   7760.   998.0   8440.   996.0   8640.   996.0   8780.
GR 994.0   8940.   986.0   9245.   986.3   9555.   986.3   9825.   983.8   9900.
GR 982.8  10000.   978.2  10011.   974.0  10041.   972.2  10071.   972.6  10101.
GR 978.2  10121.   988.7  10136.   989.3  10154.   999.2  10200.  1000.1  10320.
GR 1002.  10470.  1004.0  10700.
HD  53.0     10.  10000.  10136.
  BEAR CREEK - Local Inflow
QT
X1  55.0      18   9931.  10062.   2275.   3430.   2770.
GR 1004.   7592.  1000.0   7947.   996.0   8627.   990.0   9052.   986.0   9337.
GR 984.3   9737.   984.7   9837.   985.5   9910.   987.2   9931.   978.1   9955.
GR 974.8   9975.   974.2  10005.   972.9  10035.   973.2  10045.   983.8  10062.
GR 985.8  10187.   986.0  10307.   990.0  10497.
HD  55.0     10.   9931.  10062.
X1  58.0      22   9912.  10015.   1098.   1012.   1462.
GR 1006.   8542.  1004.0   8952.  1000.0   9702.   997.2   9812.   996.3   9912.
GR 976.2   9944.   975.4   9974.   978.2   9991.   990.4  10015.   988.3  10062.
GR 988.8  10065.   988.3  10065.   989.3  10169.   990.0  10172.   992.0  10242.
GR 992.0  10492.   988.0  10642.   986.7  10852.   988.0  11022.   986.0  11097.
GR 986.0  11137.   988.0  11192.
HD  58.0     3.4   9912.  10015.
EJ
T4      South Fork, Zumbro River - Stream Segment 1      ** Example Problem 4 **
T5      LOAD CURVE FROM GAGE DATA.
T6      BED GRADATIONS FROM FIELD SAMPLES.
T7      FULL RANGE OF SANDS AND GRAVELS
T8      SEDIMENT TRANSPORT BY YANG'S STREAM POWER [REF-ASCE JOURNAL (YANG 1971)]
I1             5
I4  SAND       4       1      10
I5            .5      .5     .25      .5     .25       0     1.0
LQ             1      50    1000    5800   90000
LT TOTAL   .0110     1.5     320   4500.  400000
LF   VFS    .119    .119    .498    .511    .582
LF    FS    .328    .328    .331    .306    .280
LF    MS    .553    .553    .156    .154    .110
LF    CS    .000    .000    .011    .016    .020
LF   VCS    .000    .000    .004    .008    .005
LF   VFG    .000    .000    .000    .004    .002
LF    FG    .000    .000    .000    .001    .001
LF    MG    .000    .000    .000    .000    .000
LF    CG    .000    .000    .000    .000    .000
LF   VCG      .0      .0    .000    .000    .000
PF EXAMP     1.0     1.0    32.0    16.0    96.5     8.0    95.0     4.0    91.0
PFC  2.0    85.0     1.0    73.0      .5    37.0     .25     8.0    .125     1.0
PFC.0625     0.0
PF EXAMP    32.0     1.0    64.0    32.0    99.5    16.0    99.0     8.0    98.5
PFC  4.0    96.0     2.0    93.5     1.0    83.0     .50    45.5    .250     8.0
PFC .125     1.0   .0625     0.0
PF EXAMP    58.0     1.0    64.0    32.0    97.0    16.0    94.0     8.0    94.0
PFC  4.0    90.0     2.0    79.0     1.0    56.0     .50     4.0    .125     0.0
$LOCAL
  LOAD TABLE - CASCADE CREEK - A LOCAL INFLOW
LQL            1     100    1000   10000
LTLTOTAL   .0040      10     500   30000
LFL  VFS    .664    .664    .015    .198
LFL   FS    .207    .207    .245    .181
LFL   MS    .086    .086    .605    .107
LFL   CS    .031    .031    .052    .098
LFL  VCS    .008    .008    .039    .127
LFL  VFG   .0030   .0030   .0200   .1160
LFL   FG   .0010   .0010   .0110   .0910
LFL   MG   .0000   .0000   .0110   .0530
LFL   CG   .0000   .0000   .0000   .0220
LFL  VCG   .0000   .0000   .0000   .0060
  LOAD TABLE - SILVER CREEK - A LOCAL INFLOW
LQL            1     100    1000   10000
LTLTOTAL   .0040      10     500   30000
LFL  VFS    .664    .664    .015    .198
LFL   FS    .207    .207    .245    .181
LFL   MS    .086    .086    .605    .107
LFL   CS    .031    .031    .052    .098
LFL  VCS    .008    .008    .039    .127
LFL  VFG   .0030   .0030   .0200   .1160
LFL   FG   .0010   .0010   .0110   .0910
LFL   MG   .0000   .0000   .0110   .0530
LFL   CG   .0000   .0000   .0000   .0220
LFL  VCG   .0000   .0000   .0000   .0060
```

```
  LOAD TABLE - BEAR CREEK - A LOCAL INFLOW
LQL           1.     100.     500.   1000.  30000.
LTLTOTAL   .0020     30.0     500.    1200   22500
LFL  VFS    .201     .201     .078    .078    .137
LFL   FS    .342     .342     .172    .175    .218
LFL   MS    .451     .451     .454    .601    .476
LFL   CS    .001     .001     .197    .142    .158
LFL  VCS    .000     .000     .000    .003    .008
LFL  VFG   .0000    .0000    .0000   .0000   .0020
LFL   FG   .0000     .000    .0000   .0000   .0010
LFL   MG   .0000     .000    .0000   .0000   .0000
LFL   CG   .0000     .000    .0000   .0000   .0000
LFL  VCG   .0000     .000    .0000   .0000   .0000
$HYD
$B             2
$KL
Q    A     FLOW 1 = BASE FLOW 0F 750 CFS
Q   750.     61.      29.     128.
R   956.    962.
T    65.     72.      70.      67.
W     2.
$DREDGE
Q    B     FLOW 2 = 50 DAYS AT BANK FULL DISCHARGE
Q  2500.    300.     150.     650.
R   965.    970.
X            2.5      50.
Q          FLOW 3 = NEAR BANK FULL DISCHARGE
Q  1250.    150.      78.     340.
R   960.    966.
W     1.
$SED
  NEW LOAD TABLE FOR MAIN STEM...
LPOINT         1        0
LQ             1       50     1000    5800   90000
LT TOTAL   .0110      1.5      320   4500.  400000
LF   VFS    .119     .119     .498    .511    .582
LF    FS    .328     .328     .331    .306    .280
LF    MS    .553     .553     .156    .154    .110
LF    CS    .345     .345     .011    .016    .020
LF   VCS    .025     .025     .004    .008    .005
LF   VFG    .005     .005     .000    .004    .002
LF    FG    .000     .000     .000    .001    .001
LF    MG    .000     .000     .000    .000    .000
LF    CG    .000     .000     .000    .000    .000
LF   VCG      .0       .0     .000    .000    .000
  NEW LOAD TABLE FOR SILVER CREEK - A LOCAL INFLOW
LPOINT         1        2
LQL            1      100     1000   10000
LTLTOTAL   .0040       10      500   30000
LFL  VFS    .664     .664     .015    .198
LFL   FS    .207     .207     .245    .181
LFL   MS    .086     .086     .605    .107
LFL   CS    .031     .031     .052    .098
LFL  VCS    .008     .008     .039    .127
LFL  VFG   .0030    .0030    .0200   .1160
LFL   FG   .0010    .0010    .0110   .0910
LFL   MG   .0000    .0000    .0110   .0530
LFL   CG   .0000    .0000    .0000   .0220
LFL  VCG   .0000    .0000    .0000   .0060
END
$RATING
RC            40     2000        0       0   950.0   955.1   958.0   960.0   962.0
RC         963.6    965.1    966.2   967.0   967.7   968.3   968.9   969.4   969.8
RC         970.2    970.6    971.0   971.4   971.8   972.1   972.4   972.7   972.9
RC         973.1    973.3    973.5   973.7   973.8   973.9   974.0   974.1   974.2
RC         974.3    974.4    974.5   974.6   974.7   974.8   974.9   975.0
$PRT
CP             1
PS           1.0     15.0
END
$NODREDGE
Q    C     FLOW 4 = BASE FLOW OF 750 CFS
Q   750.     61.      29.     128.
R   957.    963.
W     1.
$VOL   A
$$END
```

6.4.2 Transmissive Boundary Condition

With the addition of the $B record at the beginning of the hydrologic data, HEC-6 implements a transmissive boundary condition at each downstream boundary. This option causes all inflowing sediment to pass through the affected cross section without interacting with the bed. A caution: this option applies to all downstream boundaries in the model.

As in Example Problems 2 and 3, this example has two internal boundary conditions which effectively divide the model into 3 subreaches, each with its own downstream boundary.

The effect of the transmissive boundary condition on the 3 downstream boundaries can be seen by carefully reviewing the output of Example Problem 4. For instance, looking at TABLE SB-2 for the last time step, Sections 35.0, 33.0, and 1.0 all show that no bed change has occurred after a simulation of 52 days.

6.4.3 Limerinos' Bed Form Roughness Function

The Limerinos function (16) for bed form roughness is used in this example ($KL record). The value of Manning's *n* resulting from this computation can be found in the "HYDRAULIC PARAMETERS" table of the C-level sediment output. For example, the *n* value calculated by the Limerinos equation for the last time step for Section No. 42.1 is 0.0153. Note, this computation overrides the roughness data (NC and NV records) in the geometric data.

6.4.4 Flow Duration Option

The use of X rather than W data to select the time step is also illustrated in this problem. This option allows a long period of constant flow to be subdivided into multiple computational time steps without repeating Q, Q, W data.

In this example, time step 2 represents 20 separate (incremental or computational) time steps each having a duration of 2.5 days. At the end of the last incremental time step, output is produced depicting the state of the river system for the last 2.5 day time step (i.e., instantaneous data such as the sediment load data in TABLE SB-2 are only for the last 2.5 day time step, while cumulative data, such as trap efficiency and bed change, represent changes since the start of the simulation.) Caution, because of this dichotomy, output produced by a time step such as this can be misleading. See Example Problem 7, Section 6.7.2.

6.4.5 Modifying the Sediment Load Tables

Sometimes the inflowing water vs. sediment relationship will change in time due to land use changes or even seasonal variations in vegetation. Such changes, should they be known or predicted, can be described in the flow data by using the $SED option. Example Problem 4 demonstrates the use of this option by changing the inflowing load curve for the main river and one local inflowing load curve prior to the last flow in the hydrograph. Tables echoing this data are shown in the output after time step 3.

6.4.6 Downstream Rating Curve

Prior to the last time step, a rating curve ($RATING) was added to replace the stage hydrograph (R records). Although a rating curve is usually defined prior to the first time step, it can be placed (or replaced) before any time step of the simulation.

6.4.7 Accumulated Sediment Transported

Summary information regarding weight and volume of sediment can be requested via the A-level output option on the $VOL record. A-level output begins with the table labelled "SUMMARY TABLE: MASS AND VOLUME OF SEDIMENT". This table lists cumulative values of sediment transported through and deposited at each cross section since time zero. The difference between the sediment volume entering and leaving a cross section represents the material scoured from or deposited into the control volume associated with that cross section. This value is given under the heading "SEDIMENT DEPOSITED IN REACH IN CUBIC YARDS"; negative values represent scour. Under the heading "TOTAL SEDIMENT per grain size THROUGH EACH CROSS SECTION" are tables listing the total sediment transported through each cross section's control volume since the start of the simulation by grain size. Because the $PRT option was invoked to limit output to Sections 1.0 and 15.0, only tables for these cross sections have been produced.

Table 6-4b
Example Problem 4 - Output
Sediment Options

```
***************************************************     **********************************
*  SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS  *     *  U.S. ARMY CORPS OF ENGINEERS   *
*       Version: 4.1.00 -  AUGUST 1993            *     *  HYDROLOGIC ENGINEERING CENTER  *
*  INPUT FILE:  example4.DAT                      *     *  609 SECOND STREET              *
*  OUTPUT FILE: example4.OUT                      *     *  DAVIS, CALIFORNIA 95616-4687   *
*  RUN DATE: 31 AUG 93    RUN TIME: 16:06:03      *     *  (916) 756-1104                 *
***************************************************     **********************************

                       X     X  XXXXXXX   XXXXX          XXXXX
                       X     X  X        X     X        X     X
                       X     X  X        X              X
                       XXXXXXX  XXXX     X       XXXXX  XXXXXX
                       X     X  X        X              X     X
                       X     X  X        X     X        X     X
                       X     X  XXXXXXX   XXXXX          XXXXX

         **********************************************************************
         *  MAXIMUM LIMITS FOR THIS VERSION ARE:                              *
         *       10  Stream Segments (Main Stem + Tributaries)                *
         *      150  Cross Sections                                           *
         *      100  Elevation/Station Points per Cross Section               *
         *       20  Grain Sizes                                              *
         *       10  Control Points                                           *
         **********************************************************************
```

The output produced during processing of the geometry and sediment data does not differ from that produced for Example Problem 3. It has therefore been omitted from this table. Refer to Table 6-3b.

```
==========================================================================================

$HYD
BEGIN COMPUTATIONS.

------------------------------------------------------------------------------------------
$B          2
...Transmissive Boundary Condition - ON

------------------------------------------------------------------------------------------
$KL
...USING LIMERINOS METHOD TO CALCULATE BED ROUGHNESS.

==========================================================================================
```

```
TIME STEP #       1
Q    A     FLOW 1 = BASE FLOW 0F 750 CFS

TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
    2.00      58.000 *      0.09                     *
              53.000 *      0.04                     *
              42.000 *      0.00                     *
   TOTAL=     35.000 *      0.14      0.00      1.00 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
    2.00      35.000 *      0.00                     *
   TOTAL=     33.000 *      0.00      0.00      0.36 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
    2.00      33.000 *      0.00                     *
              15.000 *      0.00                     *
   TOTAL=      1.000 *      0.00      2.96   -692.13 *
******************************************************

------------------------------------------------------------------------------------------
$DREDGE
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

STREAM SEGMENT #  1: EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.

SEC NO.     42.000
ELEVATION OF DREDGED CHANNEL INCLUDING    1.00 FEET OF OVER DREDGING=     970.00

==========================================================================================
TIME STEP #       2
Q    B     FLOW 2 = 50 DAYS AT BANK FULL DISCHARGE
COMPUTING FROM TIME=      2.0000 DAYS TO TIME=     52.0000 DAYS IN    20 COMPUTATION STEPS

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.
       ACCUMULATED TIME (yrs)....      0.142
       FLOW DURATION (days)......      2.500

UPSTREAM BOUNDARY CONDITIONS
----------------------------------------------------------------------
Stream Segment # 1      |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
Section No.     58.000 |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
                INFLOW |       1400.00 |        529.98 |       62.04

Upstream of SECTION NO.     53.000 is...
LOCAL INFLOW POINT # 3 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       1400.00 |        529.98 |       62.04
      LOCAL     INFLOW |        650.00 |        647.71 |       67.00
----------------------------------------------------------------------
                 TOTAL |       2050.00 |       1177.69 |       63.61

Upstream of SECTION NO.     42.000 is...
LOCAL INFLOW POINT # 2 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       2050.00 |       1177.69 |       63.61
      LOCAL     INFLOW |        150.00 |         14.45 |       70.00
----------------------------------------------------------------------
                 TOTAL |       2200.00 |       1192.13 |       64.05

Upstream of SECTION NO.     15.000 is...
LOCAL INFLOW POINT # 1 |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |       2200.00 |       1192.13 |       64.05
      LOCAL     INFLOW |        300.00 |         40.00 |       72.00
----------------------------------------------------------------------
                 TOTAL |       2500.00 |       1232.13 |       65.00

TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   52.00      58.000 *     13.17                     *
              53.000 *     16.03                     *
              42.000 *      0.36                     *
   TOTAL=     35.000 *     29.56      2.05      0.93 *
******************************************************
    TIME       ENTRY *            SAND               *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   52.00      35.000 *      2.05                     *
   TOTAL=     33.000 *      2.05      0.08      0.96 *
******************************************************
    TIME       ENTRY *            SAND               *
```

```
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   52.00      33.000 *      0.08                     *
              15.000 *      0.99                     *
   TOTAL=      1.000 *      1.07      3.42     -2.21 *
*******************************************************

TABLE SB-1:  SEDIMENT LOAD PASSING THE  BOUNDARIES OF STREAM SEGMENT #  1
--------------------------------------------------------------------------------
  SEDIMENT INFLOW at the Upstream Boundary:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------------
    VERY FINE SAND....        265.63  |  VERY FINE GRAVEL..         0.00
    FINE SAND.........        173.06  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......         82.59  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          6.27  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          2.42  |  VERY COARSE GRAVEL         0.00
                       -------------                         -------------
                                              TOTAL =       529.98
  SEDIMENT OUTFLOW from the Downstream Boundary
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------------
    VERY FINE SAND....          1.42  |  VERY FINE GRAVEL..         0.03
    FINE SAND.........          1.61  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......          7.44  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          9.01  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          3.68  |  VERY COARSE GRAVEL         0.00
                       -------------                         -------------
                                              TOTAL =        23.18

TABLE SB-2:  STATUS OF THE BED PROFILE AT TIME =    52.000 DAYS
--------------------------------------------------------------------------------
  SECTION   BED CHANGE   WS ELEV   THALWEG        Q      TRANSPORT RATE (tons/day)
  NUMBER       (ft)        (ft)      (ft)       (cfs)       SAND
     58.000      -2.79    978.33    972.61       1400.        577.
     55.000      -1.24    978.30    971.66       1400.        837.
     53.000      -1.55    976.02    970.65       2050.       1885.
     44.000       0.92    974.67    968.02       2050.       1258.
     42.000       1.75    974.19    971.55       2200.        138.
     35.000       0.00    974.00    963.30       2200.        138.
     33.900       0.69    970.03    963.34       2200.          9.
     33.300       0.01    970.01    962.50       2200.          4.
     33.000       0.00    970.00    961.00       2200.          4.
     32.100      -0.52    965.75    955.98       2200.        107.
     32.000      -0.05    965.23    956.45       2200.        138.
     15.000      -0.18    964.99    953.52       2500.         23.
      1.000       0.00    965.00    944.70       2500.         23.
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 

STREAM SEGMENT #  1: EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.

SEC NO.    42.000
ELEVATION OF DREDGED CHANNEL INCLUDING    1.00 FEET OF OVER DREDGING=     970.00

SEC NO.    44.000
ELEVATION OF DREDGED CHANNEL INCLUDING    1.00 FEET OF OVER DREDGING=     970.00
```

```
LFL   MG |0.100000E-19|0.100000E-19| 5.50000    | 1590.00    |
LFL   CG |0.100000E-19|0.100000E-19|0.100000E-19| 660.000    |
LFL  VCG |0.100000E-19|0.100000E-19|0.100000E-19| 180.000    |
          ------------ ------------ ------------ ------------
   TOTAL |0.400000E-02| 10.0000    | 499.000    | 29970.0    |
--------------------------------------------------------------

------------------------------------------------------------------------------------------
$RATING

Downstream Boundary Condition - Rating Curve
  Elevation      Stage     Discharge |  Elevation      Stage     Discharge
 ------------------------------------|------------------------------------
    950.000     950.000        0.000 |    972.400     972.400    40000.000
    955.100     955.100     2000.000 |    972.700     972.700    42000.000
    958.000     958.000     4000.000 |    972.900     972.900    44000.000
    960.000     960.000     6000.000 |    973.100     973.100    46000.000
    962.000     962.000     8000.000 |    973.300     973.300    48000.000
    963.600     963.600    10000.000 |    973.500     973.500    50000.000
    965.100     965.100    12000.000 |    973.700     973.700    52000.000
    966.200     966.200    14000.000 |    973.800     973.800    54000.000
    967.000     967.000    16000.000 |    973.900     973.900    56000.000
    967.700     967.700    18000.000 |    974.000     974.000    58000.000
    968.300     968.300    20000.000 |    974.100     974.100    60000.000
    968.900     968.900    22000.000 |    974.200     974.200    62000.000
    969.400     969.400    24000.000 |    974.300     974.300    64000.000
    969.800     969.800    26000.000 |    974.400     974.400    66000.000
    970.200     970.200    28000.000 |    974.500     974.500    68000.000
    970.600     970.600    30000.000 |    974.600     974.600    70000.000
    971.000     971.000    32000.000 |    974.700     974.700    72000.000
    971.400     971.400    34000.000 |    974.800     974.800    74000.000
    971.800     971.800    36000.000 |    974.900     974.900    76000.000
    972.100     972.100    38000.000 |    975.000     975.000    78000.000

------------------------------------------------------------------------------------------

$PRT
...Selective Printout Option
    - Print at the following cross sections
CP            1
PS           1.0    15.0
END

------------------------------------------------------------------------------------------

$NODREDGE


==========================================================================================
TIME STEP #       4
Q    C     FLOW 4 = BASE FLOW OF 750 CFS

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.
       ACCUMULATED TIME (yrs)....      0.148
       FLOW DURATION (days)......      1.000

UPSTREAM BOUNDARY CONDITIONS
----------------------------------------------------------------------
Stream Segment # 1     |   DISCHARGE   | SEDIMENT LOAD | TEMPERATURE
Section No.     58.000 |     (cfs)     |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
                INFLOW |        532.00 |         96.26 |       63.44

  SEDIMENT INFLOW at SECTION NO.     58.000
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  ----------------------------------------------------------------------
    VERY FINE SAND....         38.08  |  VERY FINE GRAVEL..          0.00
    FINE SAND.........         34.16  |  FINE GRAVEL.......          0.00
    MEDIUM SAND.......         21.06  |  MEDIUM GRAVEL.....          0.00
    COARSE SAND.......          2.35  |  COARSE GRAVEL.....          0.00
    VERY COARSE SAND..          0.61  |  VERY COARSE GRAVEL          0.00
                       -------------                    -------------
                                             TOTAL =         96.26

    FALL VELOCITIES - Method 2
              DIAMETER   VELOCITY       REY. NO.          CD
    -------------------------------------------------------------
    VF SAND   0.000290  0.1895778E-01  0.4746927       57.11272
    F  SAND   0.000580  0.5840962E-01   2.925091       12.03287
    M  SAND   0.001160  0.1341560      13.43676        4.561910
    C  SAND   0.002320  0.2818261      56.45410        2.067449
    VC SAND   0.004640  0.4816294      192.9560        1.415800
    VF GRVL   0.009280  0.7196122      576.5988        1.268414
    F  GRVL   0.018559   1.040018      1666.653        1.214521
    M  GRVL   0.037118   1.472894      4720.706        1.211086
    C  GRVL   0.074237   2.082985      13352.15        1.211086
    VC GRVL   0.148474   2.945788      37765.65        1.211086

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
Upstream of SECTION NO.     15.000 is...
LOCAL INFLOW POINT # 1 |   DISCHARGE    | SEDIMENT LOAD | TEMPERATURE
                       |     (cfs)      |  (tons/day)   |   (deg F)
----------------------------------------------------------------------
      MAIN STEM INFLOW |        689.00 |        140.68 |       64.38
      LOCAL    INFLOW |         61.00 |          4.32 |       72.00
----------------------------------------------------------------------
                 TOTAL |        750.00 |        145.00 |       65.00

  SEDIMENT LOAD FROM LOCAL INFLOW:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....          2.87  |  VERY FINE GRAVEL..         0.01
    FINE SAND.........          0.89  |  FINE GRAVEL.......         0.00
    MEDIUM SAND.......          0.37  |  MEDIUM GRAVEL.....         0.00
    COARSE SAND.......          0.13  |  COARSE GRAVEL.....         0.00
    VERY COARSE SAND..          0.03  |  VERY COARSE GRAVEL         0.00
                       -------------                       -------------
                                                TOTAL =         4.32

    FALL VELOCITIES - Method 2
              DIAMETER   VELOCITY       REY. NO.          CD
    ------------------------------------------------------------
    VF SAND   0.000290  0.1931441E-01  0.4941259       55.02308
    F  SAND   0.000580  0.5916114E-01   3.027072       11.72910
    M  SAND   0.001160  0.1355164      13.86779        4.470784
    C  SAND   0.002320  0.2833008      57.98200        2.045980
    VC SAND   0.004640  0.4824925      197.4999        1.410740
    VF GRVL   0.009280  0.7200893      589.5120        1.266733
    F  GRVL   0.018559   1.040325      1703.352        1.213806
    M  GRVL   0.037118   1.472894      4823.231        1.211086
    C  GRVL   0.074237   2.082985      13642.13        1.211086
    VC GRVL   0.148474   2.945788      38585.85        1.211086


*****************************************************************************************
                  TRACE OUTPUT FOR SECTION NO.     15.000
           -------------------------------------------------------

HYDRAULIC PARAMETERS:
      VEL      SLO        EFD        EFW     N-VALUE     TAU      USTARM    FROUDE NO.
     4.382  0.000558     4.555     72.960    0.0167   0.15863   0.28588     0.362

BED SEDIMENT CONTROL VOLUME COMPUTATIONS:
NEW SURFACE AREA (SQ FT):     TOTAL        K-PORTION      S-PORTION
                             336901.25     336901.25           0.00

GRADATION OF ACTIVE PLUS INACTIVE DEPOSITS
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.010519      1.051939     VF GRVL      0.045573     93.063185
                       F  SAND      0.068551      7.907044     F  GRVL      0.034049     96.468071
                       M  SAND      0.324948     40.401812     M  GRVL      0.010808     97.548838
                       C  SAND      0.367062     77.107991     C  GRVL      0.022292     99.777989
                       VC SAND      0.113979     88.505902     VC GRVL      0.002220     99.999998

SAND
** ARMOR LAYER **
STABILITY COEFFICIENT=     0.80177
MIN.GRAIN DIAM       =    0.030569
BED SURFACE EXPOSED  =     0.00000

        INACTIVE LAYER      ACTIVE LAYER
         %       DEPTH      %      DEPTH
 CLAY   0.0000    0.00     0.0000   0.00
 SILT   0.0000    0.00     0.0000   0.00
 SAND   1.0000    9.25     1.0000   0.57
TOTAL   1.0000    9.25     1.0000   0.57

       AVG. UNIT              AVG. UNIT
         WEIGHT                 WEIGHT
        0.046500               0.046500

    COMPOSITE UNIT WT OF ACTIVE LAYER   (t/cf)=       0.046500
    COMPOSITE UNIT WT OF INACTIVE LAYER (t/cf)=       0.046500
    DEPTH OF SURFACE LAYER (ft)           DSL=            0.1
    WEIGHT IN SURFACE LAYER (tons)       WTSL=         1305.5
    DEPTH OF NEW ACTIVE LAYER (ft)        DSE=         0.0373
    WEIGHT IN NEW ACTIVE LAYER(tons)   WTMXAL=          584.9
    WEIGHT IN OLD ACTIVE LAYER(tons)      WAL=         8927.8
    USEABLE WEIGHT, OLD INACTIVE LAYER    WIL=       144962.8
    SURFACE AREA OF DEPOSIT (sq ft)      SABK= 0.33690125E+06

** INACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.010000      1.000000     VF GRVL      0.044734     93.180849
                       F  SAND      0.070000      8.000000     F  GRVL      0.033457     96.526593
                       M  SAND      0.327074     40.707446     M  GRVL      0.010638     97.590423
                       C  SAND      0.366543     77.361700     C  GRVL      0.021915     99.781912
                       VC SAND      0.113457     88.707445     VC GRVL      0.002181     99.999998

** ACTIVE LAYER **
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.018953      1.895284     VF GRVL      0.059193     91.152666
                       F  SAND      0.045024      6.397700     F  GRVL      0.043652     95.517835
                       M  SAND      0.290415     35.439182     M  GRVL      0.013558     96.873609
```

```
                       C  SAND      0.375493     72.988468      C  GRVL      0.028407     99.714290
                       VC SAND      0.122449     85.233411      VC GRVL      0.002857    100.000000

C FINES, COEF(CFFML), MX POTENTIAL= 0.000000E+00 0.100000E+01 0.162000E+07
POTENTIAL TRANSPORT (tons/day):  VF SAND 0.767631E+04  VF GRVL 0.540007E+02
                                 F  SAND 0.222208E+04  F  GRVL 0.856678E+02
                                 M  SAND 0.120096E+04  M  GRVL 0.924255E+02
                                 C  SAND 0.879011E+03  C  GRVL 0.343755E+01
                                 VC SAND 0.885363E+03  VC GRVL 0.100000E-06

BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.011944      1.194380      VF GRVL      0.064549     90.362954
                       F  SAND      0.037695      4.963900      F  GRVL      0.047476     95.110553
                       M  SAND      0.276179     32.581777      M  GRVL      0.014690     96.579579
                       C  SAND      0.387609     71.342665      C  GRVL      0.031077     99.687310
                       VC SAND      0.125654     83.908024      VC GRVL      0.003127    100.000000

  SEDIMENT OUTFLOW FROM SECTION NO.     15.000
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....        115.42  |  VERY FINE GRAVEL..          3.19
    FINE SAND.........        101.72  |  FINE GRAVEL.......          3.74
    MEDIUM SAND.......        348.91  |  MEDIUM GRAVEL.....          1.25
    COARSE SAND.......        332.83  |  COARSE GRAVEL.....          0.10
    VERY COARSE SAND..        108.39  |  VERY COARSE GRAVEL          0.00

**************************************************************************************************
                  TRACE OUTPUT FOR SECTION NO.      1.000
           -------------------------------------------------------

HYDRAULIC PARAMETERS:
      VEL      SLO        EFD        EFW     N-VALUE     TAU      USTARM    FROUDE NO.
     4.011  0.000004      5.838     83.730    0.0176   0.00159   0.02864     0.293

BED SEDIMENT CONTROL VOLUME COMPUTATIONS:
NEW SURFACE AREA (SQ FT):     TOTAL         K-PORTION      S-PORTION
                             209373.61      209373.61           0.00


TRANSMISSIVE BOUNDARY CONDITION = TYPE     2
BED MATERIAL PER GRAIN SIZE:    BED FRACTION  PERCENT FINER              BED FRACTION  PERCENT FINER
                       VF SAND      0.010000      1.000000      VF GRVL      0.060000     90.999998
                       F  SAND      0.070000      8.000000      F  GRVL      0.040000     94.999998
                       M  SAND      0.290000     36.999999      M  GRVL      0.015000     96.499998
                       C  SAND      0.360000     72.999998      C  GRVL      0.035000     99.999998
                       VC SAND      0.120000     84.999998      VC GRVL      0.000000     99.999998

  SEDIMENT OUTFLOW FROM SECTION NO.      1.000
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....        115.42  |  VERY FINE GRAVEL..          3.19
    FINE SAND.........        101.72  |  FINE GRAVEL.......          3.74
    MEDIUM SAND.......        348.91  |  MEDIUM GRAVEL.....          1.25
    COARSE SAND.......        332.83  |  COARSE GRAVEL.....          0.10
    VERY COARSE SAND..        108.39  |  VERY COARSE GRAVEL          0.00


TABLE SA-1. TRAP EFFICIENCY ON STREAM SEGMENT #  1
            EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.
            ACCUMULATED AC-FT ENTERING AND LEAVING THIS STREAM SEGMENT
******************************************************
    TIME       ENTRY *            SAND              *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   54.00      58.000 *     13.30                    *
              53.000 *     16.15                    *
              42.000 *      0.36                    *
   TOTAL=     35.000 *     29.81      2.05     0.93 *
******************************************************
    TIME       ENTRY *            SAND              *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   54.00      35.000 *      2.05                    *
   TOTAL=     33.000 *      2.05      1.22     0.40 *
******************************************************
    TIME       ENTRY *            SAND              *
    DAYS       POINT *    INFLOW   OUTFLOW  TRAP EFF *
   54.00      33.000 *      1.22                    *
              15.000 *      1.00                    *
   TOTAL=      1.000 *      2.22      4.07    -0.83 *
******************************************************

TABLE SB-1:  SEDIMENT LOAD PASSING THE  BOUNDARIES OF STREAM SEGMENT #  1
--------------------------------------------------------------------------------
  SEDIMENT INFLOW at the Upstream Boundary:
      GRAIN SIZE      LOAD (tons/day) |    GRAIN SIZE      LOAD (tons/day)
  --------------------------------------------------------------------------
    VERY FINE SAND....         38.08  |  VERY FINE GRAVEL..          0.00
    FINE SAND.........         34.16  |  FINE GRAVEL.......          0.00
    MEDIUM SAND.......         21.06  |  MEDIUM GRAVEL.....          0.00
    COARSE SAND.......          2.35  |  COARSE GRAVEL.....          0.00
    VERY COARSE SAND..          0.61  |  VERY COARSE GRAVEL          0.00
                       -------------                   -------------
                                               TOTAL =         96.26
```

SEDIMENT OUTFLOW from the Downstream Boundary

GRAIN SIZE	LOAD (tons/day)	GRAIN SIZE	LOAD (tons/day)
VERY FINE SAND....	115.42	VERY FINE GRAVEL..	3.19
FINE SAND.........	101.72	FINE GRAVEL.......	3.74
MEDIUM SAND.......	348.91	MEDIUM GRAVEL.....	1.25
COARSE SAND.......	332.83	COARSE GRAVEL.....	0.10
VERY COARSE SAND..	108.39	VERY COARSE GRAVEL	0.00
		TOTAL =	1015.54

TABLE SB-2: STATUS OF THE BED PROFILE AT TIME = 54.000 DAYS

SECTION NUMBER	BED CHANGE (ft)	WS ELEV (ft)	THALWEG (ft)	Q (cfs)	TRANSPORT RATE (tons/day) SAND
58.000	-2.93	976.06	972.47	532.	195.
55.000	-1.23	975.95	971.67	532.	193.
53.000	-1.54	974.32	970.66	660.	156.
44.000	0.01	974.07	968.04	660.	7.
42.000	0.00	974.02	970.00	689.	0.
35.000	0.00	974.00	963.30	689.	0.
33.900	0.22	964.63	962.87	689.	2576.
33.300	0.03	963.41	962.52	689.	2295.
33.000	0.00	963.00	961.00	689.	2295.
32.100	-0.31	961.87	956.19	689.	85.
32.000	-0.07	961.21	956.43	689.	241.
15.000	-0.23	957.71	953.47	750.	1016.
1.000	0.00	957.00	944.70	750.	1016.

Accumulated Water Discharge from day zero (sfd)

MAIN

3500.00

$VOL A

STREAM SEGMENT # 1: EXAMPLE PROBLEM NO 4. SOME SEDIMENT OPTIONS.

SUMMARY TABLE: MASS AND VOLUME OF SEDIMENT

SECTION	SEDIMENT THROUGH SECTION (tons) TOTAL	SAND	SILT	CLAY	SEDIMENT DEPOSITED IN REACH in cu. yds TOTAL	CUMULATIVE	SAND	SILT	CLAY
INFLOW	26932.	26932.	0.	0.	21451.				
58.000	34630.	34630.	0.	0.	-6132.	-6132.	-6132.	0.	0.
55.000	47052.	47052.	0.	0.	-9894.	-16025.	-9894.	0.	0.
LOCAL	32721.	32721.	0.	0.	26062.				
53.000	104248.	104248.	0.	0.	-19495.	-35520.	-19495.	0.	0.
44.000	73173.	73173.	0.	0.	24751.	-10769.	24751.	0.	0.
LOCAL	733.	733.	0.	0.	583.				
42.000	4159.	4159.	0.	0.	55553.	44784.	55553.	0.	0.
35.000	4159.	4159.	0.	0.	0.	44784.	0.	0.	0.
33.900	2940.	2940.	0.	0.	971.	45755.	971.	0.	0.
33.300	2475.	2475.	0.	0.	370.	46125.	370.	0.	0.
33.000	2475.	2475.	0.	0.	0.	46125.	0.	0.	0.
32.100	5577.	5577.	0.	0.	-2471.	43655.	-2471.	0.	0.
32.000	7299.	7299.	0.	0.	-1371.	42283.	-1371.	0.	0.
LOCAL	2027.	2027.	0.	0.	1615.				
15.000	8242.	8242.	0.	0.	863.	43147.	863.	0.	0.
1.000	8242.	8242.	0.	0.	0.	43147.	0.	0.	0.

TOTAL SEDIMENT - per grain size - THROUGH EACH CROSS SECTION (tons)

UPSTREAM INFLOW

VF SAND	13463.	VC SAND	122.	C GRVL	0.
F SAND	8809.	VF GRVL	0.	VC GRVL	0.
M SAND	4222.	F GRVL	0.		0.
C SAND	316.				

LOCAL INFLOW

VF SAND	2765.	VC SAND	0.	C GRVL	0.
F SAND	6123.	VF GRVL	0.	VC GRVL	0.
M SAND	17758.	F GRVL	0.		0.
C SAND	6075.				

LOCAL INFLOW

VF SAND	346.	VC SAND	11.	C GRVL	0.
F SAND	214.	VF GRVL	4.	VC GRVL	0.
M SAND	122.	F GRVL	2.		0.
C SAND	34.				

LOCAL INFLOW

VF SAND	367.	VC SAND	55.	C GRVL	0.
F SAND	732.	VF GRVL	24.	VC GRVL	0.
M SAND	709.	F GRVL	10.		0.

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       C  SAND       129.

  SECTION NO.     15.000
       VF SAND       320.   VC SAND       851.   C  GRVL         3.
       F  SAND      1079.   VF GRVL        13.   VC GRVL         0.
       M  SAND      3214.   F  GRVL        14.                   0.
       C  SAND      2742.
  SECTION NO.      1.000
       VF SAND       320.   VC SAND       851.   C  GRVL         3.
       F  SAND      1079.   VF GRVL        13.   VC GRVL         0.
       M  SAND      3214.   F  GRVL        14.                   0.
       C  SAND      2742.

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$$END

      0   DATA ERRORS DETECTED.

TOTAL NO. OF TIME STEPS READ =         4
TOTAL NO. OF WS PROFILES =            23
ITERATIONS IN EXNER EQ =            1150

COMPUTATIONS COMPLETED
RUN TIME =  0 HOURS,  0 MINUTES & 9.00 SECONDS
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