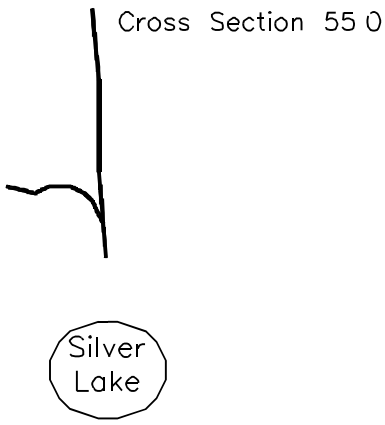
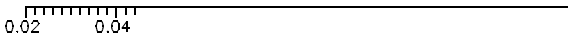

Cross Section 55 0
Silver
Lake


0.02
0.04

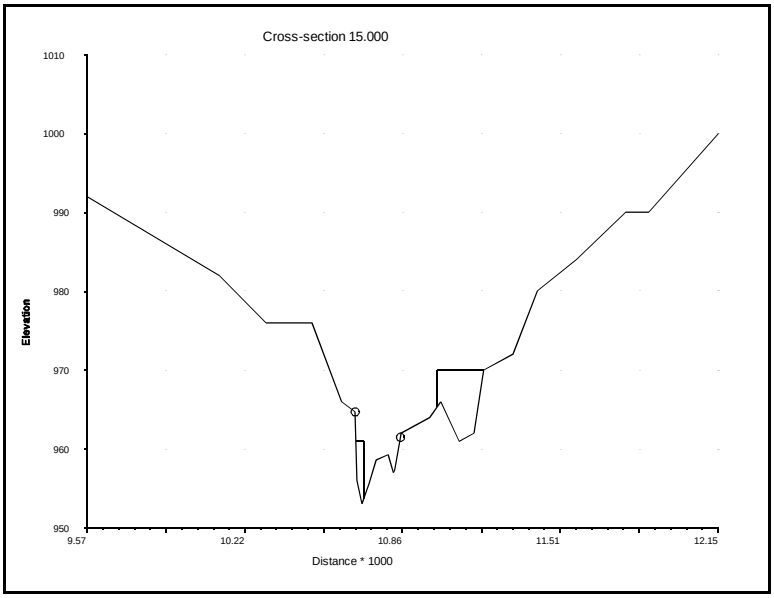

Cross-section 15.000
1010
1000
990
980
970
960
950
Elevation
9.57
10.22
10.86
11.51
12.15
Distance * 1000

Figure 6-3

```
HD  15.0
   Model Cascade Creek as a local inflow.
QT
NC    .1      .1     .05
X1  32.0      29  10057.  10271.   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.  959.82  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
  Section 32.1 is a duplicate of Sec 32.0 which is representative of the reach
  downstream of the spillway at Sec 33.0.  Sec 32.1 is a new upstream boundary.
X1  32.1      29  10057.  10271.   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.  959.82  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
  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
  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.   982.0   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
  Section 33.9 is a duplicate of Section 33.3.  It is placed at the downstream
  face of the weir being defined at Section 35.0 and is a new upstream boundary.
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
  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
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
   Model Silver Creek as a 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
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
   model Bear Creek as a 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
X1  58.0      22  9912.0 10015.0   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
EJ
$HYD
Q   A   PROFILE 1 = AVERAGE ANNUAL DISCHARGE
Q  1250.    150.     78.    340.
R   960.    966.
T    60.     60.     60.     60.
W     5.
Q   B   PROFILE 2 = FLOOD EVENT  (0.5% CHANCE FLOOD)
Q 10000.   1200.    600.   2600.
R   973.    978.
W     1.
$$END
```

6.2.4 Conveyance Limits

Ineffective flow areas can also be specified with XL data. In Example Problem 2, Section No. 33.0 has non-conveying areas centered about the channel on both sides, leaving a conveyance width of 250 ft. Since Section No. 33.3 is a duplicate of Section No. 33.0, the conveyance limit is duplicated at this section. At Section No. 44.0, conveyance limits have been specified at stations 9,850 and 10,200, leaving a conveyance width of 350 ft (not centered about the channel). The difference between the ineffective flow area option and the conveyance limits option is that deposition may occur in wetted areas outside the conveyance limits, but not in ineffective flow areas. Although both methods may yield the same hydraulic conditions, sediment deposition may differ. Refer to Sections 3.2.7 for more details.

6.2.5 Downstream Boundary Water Surface Elevation

In Example Problem 1, the downstream boundary water surface elevation was computed for each flow by interpolation within a rating curve provided by the user. Alternately, when the downstream water surface elevation is independent of discharge, as with a reservoir pool elevation, the boundary condition can be specified as a time series of water surface elevations (i.e. a stage hydrograph). This is illustrated by the R records in the input data for Example Problem 2. For this problem the starting water surface elevation at the downstream boundary is 960 ft for the first discharge and 973 ft for the second.

```
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 =    0.00 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 =    0.00 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 =    0.00 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 =    0.00 ft.

SECTION NO.    53.000
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

LOCAL INFLOW POINT  3 occurs upstream from Section No.      53.000

SECTION NO.    55.000
...DEPTH of the Bed Sediment Control Volume =    0.00 ft.

SECTION NO.    58.000
...DEPTH of the Bed Sediment Control Volume =    0.00 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

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

```
$HYD
FIXED-BED MODEL

================================================================================
TIME STEP #       1
Q   A   PROFILE 1 = AVERAGE ANNUAL DISCHARGE

EXAMPLE PROBLEM NO 2.  HYDRAULIC AND GEOMETRIC OPTIONS.
ACCUMULATED TIME (yrs).........      0.000

--- Downstream Boundary Condition Data for STREAM SEGMENT NO.  1 at Control Point #  1 ---
                           DISCHARGE   TEMPERATURE  WATER SURFACE
                             (cfs)       (deg F)        (ft)
                            1250.000       60.00        960.000

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

SECTION NO.      1.000
****   1250.000   960.000   960.008   0.008    1.266   412.262   951.520   0.120   0.731   0.075
                                                FLOW DISTRIBUTION (%) =    0.589  98.210   1.201
SECTION NO.     15.000
****   1250.000   960.343   960.518   0.174    1.000   143.121   957.736   0.000   3.350   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       60.00
                   Total:    1100.000       60.00

SECTION NO.     32.000
****   1100.000   964.111   964.151   0.041    1.000   133.277   959.020   0.000   1.621   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     32.100
****   1100.000   965.009   965.038   0.029    1.000   138.576   959.202   0.000   1.367   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     33.000
...Internal Boundary Condition - Water Surface =    966.000
                                    Head Loss =      0.000
****   1100.000   966.000   966.016   0.016    1.000   228.689   961.331   0.000   1.030   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     33.300
****   1100.000   966.410   966.441   0.031    1.000   210.966   962.711   0.000   1.410   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     33.900
****   1100.000   966.792   966.820   0.027    1.000   212.251   962.893   0.000   1.329   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     35.000
...Internal Boundary Condition - Water Surface =    974.000
                                    Head Loss =      0.500
****   1100.000   974.000   974.008   0.008    1.000   221.700   967.056   0.000   0.715   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     42.000
****   1100.000   974.356   974.371   0.016    1.000   242.451   969.819   0.000   1.000   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

--- LOCAL INFLOW POINT #  2 is upstream of Section No.      42.000 ---
                           DISCHARGE   TEMPERATURE
                             (cfs)       (deg F)
            Local Inflow:      78.000       60.00
                   Total:    1022.000       60.00

SECTION NO.     44.000
****   1022.000   974.697   974.707   0.010    1.000   264.095   969.892   0.000   0.805   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     53.000
****   1022.000   975.359   975.884   0.525    1.000    79.436   973.146   0.000   5.813   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

--- LOCAL INFLOW POINT #  3 is upstream of Section No.      53.000 ---
                           DISCHARGE   TEMPERATURE
                             (cfs)       (deg F)
            Local Inflow:     340.000       60.00
                   Total:     682.000       60.00

SECTION NO.     55.000
****    682.000   978.831   978.872   0.042    1.000   100.844   974.694   0.000   1.635   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
SECTION NO.     58.000
****    682.000   979.918   980.119   0.201    1.000    56.248   976.547   0.000   3.596   0.000
                                                FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

================================================================================
TIME STEP #       2
Q   BB  PROFILE 2 = FLOOD EVENT  (0.5% CHANCE FLOOD)

EXAMPLE PROBLEM NO 2.  HYDRAULIC AND GEOMETRIC OPTIONS.
ACCUMULATED TIME (yrs).........      0.014

--- Downstream Boundary Condition Data for STREAM SEGMENT NO.  1 at Control Point #  1 ---
                           DISCHARGE   TEMPERATURE  WATER SURFACE
                             (cfs)       (deg F)        (ft)
                           10000.000       60.00        973.000
```

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

SECTION NO.      1.000

 Cross Section Geometry (STA,ELEV)
   9915.000  1004.000   10002.000   978.400   10060.000   956.000   10077.000   959.200   10081.000   959.300
  10092.000   950.000   10108.000   948.480   10138.000   946.600   10158.000   944.700   10225.000   955.200
  10243.000   956.200   10250.000   958.900   10275.000   959.800   10300.000   959.800   10325.000   959.900
  10350.000   958.800   10400.000   957.400   10700.000   970.000   10960.000   966.000   11060.000   970.000
  11085.000   968.000   11240.000   968.000   11365.000   970.000   11500.000   970.000   11615.000   970.000
  11665.000   962.000   12400.000   962.000   12550.000   976.000   12670.000   980.000   12730.000   982.000
  12735.000   984.000

****  10000.000   973.000   973.013   0.013    4.272  2501.875   951.520   0.301   1.243   0.258
                                              FLOW DISTRIBUTION (%) =    1.914  52.875  45.211

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE    43459.641 1200769.591 1026719.286
                         AREA       635.95     4252.96     17543.21
                    HYD RADIUS       9.8620     20.9515      7.8160
  REACH...         Manning's N       0.1000      0.0400      0.1000
                       SQRT(L)       0.0000      0.0000      0.0000
  D/S SECTION...          AREA         0.00        0.00        0.00
                    HYD RADIUS        0.000       0.000       0.000

SECTION NO.     15.000

 Cross Section Geometry (STA,ELEV)
   9570.000   992.000   10110.000   982.000   10300.000   976.000   10490.000   976.000   10610.000   966.000
  10665.000   964.700   10673.000   961.000   10693.000   961.000   10699.999   961.000   10700.000   953.700
  10703.000   954.000   10723.000   955.600   10750.000   958.600   10800.000   959.300   10822.000   957.000
  10825.000   957.300   10850.000   961.500   10852.000   962.000   10970.000   964.000   11000.000   965.333
  11000.001   970.000   11015.000   970.000   11090.000   970.000   11150.000   970.000   11190.000   970.000
  11310.000   972.000   11410.000   980.000   11570.000   984.000   11770.000   990.000   11865.000   990.000
  12150.000  1000.000

****  10000.000   973.158   973.259   0.102    2.191   800.329   958.554   0.795   2.878   0.700
                                              FLOW DISTRIBUTION (%) =    5.853  77.741  16.406

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE    34197.889  454198.571   95851.669
                         AREA       736.62     2701.62     2342.75
                    HYD RADIUS       5.2173     13.9368      4.8880
  REACH...         Manning's N       0.0963      0.0512      0.1046
                       SQRT(L)      59.6657     57.2713     55.0454
  D/S SECTION...          AREA       635.95     4252.96    17543.21
                    HYD RADIUS        9.862      20.951       7.816


--- LOCAL INFLOW POINT #  1 is upstream of Section No.      15.000 ---
                          DISCHARGE   TEMPERATURE
                            (cfs)       (deg F)
            Local Inflow:     1200.000       60.00
                   Total:     8800.000       60.00

SECTION NO.     32.000

 Cross Section Geometry (STA,ELEV)
   9080.000   998.000    9250.000   982.000    9510.000   982.000    9600.000   980.000    9925.000   980.010
  10000.000   979.480   10057.000   978.500   10075.000   968.600   10087.000   959.820   10097.000   956.500
  10117.000   956.800   10137.000   957.800   10157.000   959.400   10177.000   959.600   10196.000   959.820
  10225.000   966.500   10250.000   971.200   10271.000   978.500   10300.000   978.500   10350.000   978.600
  10370.000   978.910   10387.000   978.960   10610.000   980.000   10745.000   982.000   11145.000   982.000
  11150.000   984.000   11240.000   992.000   11330.000  1000.000   11425.000  1008.000

****   8800.000   974.581   974.786   0.205    1.000   195.704   962.193   0.000   3.630   0.000
                                              FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE        0.000  377076.318       0.000
                         AREA         0.00     2424.45        0.00
                    HYD RADIUS       0.0000     11.9716      0.0000
  REACH...         Manning's N       0.1000      0.0500      0.1000
                       SQRT(L)      60.2495     65.1153     55.3173
  D/S SECTION...          AREA       736.62     2701.62     2342.75
                    HYD RADIUS        5.217      13.937       4.888

SECTION NO.     32.100

 Cross Section Geometry (STA,ELEV)
   9080.000   998.000    9250.000   982.000    9510.000   982.000    9600.000   980.000    9925.000   980.010
  10000.000   979.480   10057.000   978.500   10075.000   968.600   10087.000   959.820   10097.000   956.500
  10117.000   956.800   10137.000   957.800   10157.000   959.400   10177.000   959.600   10196.000   959.820
  10225.000   966.500   10250.000   971.200   10271.000   978.500   10300.000   978.500   10350.000   978.600
  10370.000   978.910   10387.000   978.960   10610.000   980.000   10745.000   982.000   11145.000   982.000
  11150.000   984.000   11240.000   992.000   11330.000  1000.000   11425.000  1008.000

****   8800.000   976.143   976.304   0.161    1.000   202.931   962.684   0.000   3.222   0.000
                                              FLOW DISTRIBUTION (%) =    0.000 100.000   0.000
```

```
     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL      978.500  -99999.000     978.500
  U/S SECTION...    CONVEYANCE        0.000  448358.998       0.000
                         AREA         0.00     2731.27        0.00
                    HYD RADIUS       0.0000     12.9813      0.0000
  REACH...         Manning's N       0.1000      0.0500      0.1000
                       SQRT(L)      55.9464     57.6194     57.0088
  D/S SECTION...          AREA         0.00     2424.45        0.00
                    HYD RADIUS        0.000      11.972       0.000

SECTION NO.     33.000
...Internal Boundary Condition - Water Surface =    978.000
                                  Head Loss =      0.000

 Cross Section Geometry (STA,ELEV)
    980.000  1000.000    1060.000   990.000    1150.000   980.000    1180.000   982.000    1215.000   982.000
   1260.000   980.000    1300.000   982.000    1350.000   982.000    1420.000   980.000    1540.000   980.000
   1730.000   982.000    1830.000   982.000    1850.000   984.410    1851.000   979.190    1875.000   970.424
   1900.800   961.000    2099.200   961.000    2125.000   968.771    2149.000   976.000    2150.000   984.500
   2800.000   982.000    3100.000   990.000    3170.000  1000.000

****   8800.000   978.000   978.074   0.074    1.000   250.000   961.887   0.000   2.185   0.000
                                              FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE        0.000  758052.954       0.000
                         AREA         0.00     4028.19        0.00
                    HYD RADIUS       0.0000     15.9335      0.0000
  REACH...         Manning's N       0.1000      0.0500      0.1000
                       SQRT(L)       0.0000      0.0000      0.0000
  D/S SECTION...          AREA         0.00     2731.27        0.00
                    HYD RADIUS        0.000      12.981       0.000

SECTION NO.     33.300

 Cross Section Geometry (STA,ELEV)
    931.000  1001.490    1007.000   991.490    1092.500   981.490    1121.000   983.490    1154.250   983.490
   1197.000   981.490    1235.000   983.490    1282.500   983.490    1349.000   981.490    1463.000   981.490
   1643.500   983.490    1738.500   983.490    1757.500   985.900    1758.450   980.680    1781.250   971.914
   1805.760   962.490    1994.240   962.490    2018.750   970.261    2041.550   977.490    2042.500   985.990
   2660.000   983.490    2945.000   991.490    3011.500  1001.490

****   8800.000   978.266   978.363   0.096    1.000   237.500   963.377   0.000   2.488   0.000
                                              FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE        0.000  630880.219       0.000
                         AREA         0.00     3536.31        0.00
                    HYD RADIUS       0.0000     14.7069      0.0000
  REACH...         Manning's N       0.1000      0.0500      0.1000
                       SQRT(L)      39.3700     41.8330     41.8330
  D/S SECTION...          AREA         0.00     4028.19        0.00
                    HYD RADIUS        0.000      15.934       0.000

SECTION NO.     33.900

 Cross Section Geometry (STA,ELEV)
    931.000  1001.650    1007.000   991.650    1092.500   981.650    1121.000   983.650    1154.250   983.650
   1197.000   981.650    1235.000   983.650    1282.500   983.650    1349.000   981.650    1463.000   981.650
   1643.500   983.650    1738.500   983.650    1757.500   986.060    1758.450   980.840    1805.760   962.650
   1994.240   962.650    2041.550   977.650    2042.500   986.150    2660.000   983.650    2945.000   991.650
   3011.500  1001.650

****   8800.000   978.486   978.574   0.088    1.000   277.066   965.114   0.000   2.375   0.000
                                              FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL      986.060  -99999.000     986.150
  U/S SECTION...    CONVEYANCE        0.000  611504.940       0.000
                         AREA         0.00     3704.84        0.00
                    HYD RADIUS       0.0000     13.0880      0.0000
  REACH...         Manning's N       0.1000      0.0500      0.1000
                       SQRT(L)      32.4037     32.4037     32.4037
  D/S SECTION...          AREA         0.00     3536.31        0.00
                    HYD RADIUS        0.000      14.707       0.000

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

 Cross Section Geometry (STA,ELEV)
   9035.000   984.000    9070.000   980.000    9135.000   978.000    9185.000   980.000    9270.000   982.000
   9465.000   980.000    9595.000   981.700    9745.000   983.700    9894.000   984.700    9894.100   963.400
   9954.000   963.300    9974.000   967.100   10004.000   967.400   10044.000   968.200   10054.000   967.600
  10115.000   973.400   10120.000   977.400   10155.000   983.700   10245.000   984.000   10695.000   982.000
  10895.000   982.000   11085.000  1004.000

****   8800.000   978.986   979.155   0.169    1.000   234.784   967.632   0.000   3.301   0.000
                                              FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL      984.700  -99999.000     984.000
  U/S SECTION...    CONVEYANCE        0.000  381293.994       0.000
                         AREA         0.00     2665.83        0.00
```

```
                    HYD RADIUS       0.0000     10.5576      0.0000
  REACH...         Manning's N       0.1000      0.0500      0.1000
                       SQRT(L)       0.0000      0.0000      0.0000
  D/S SECTION...         AREA          0.00     3704.84        0.00
                    HYD RADIUS        0.000      13.088       0.000

SECTION NO.     42.000

 Cross Section Geometry (STA,ELEV)
   7130.000   996.000    7310.000   998.000    7930.000   998.000    8205.000   992.000    8495.000   990.000
   8780.000   988.000    8990.000   986.000    9570.000   985.700    9707.000   986.450    9857.000   989.440
   9880.000   990.000    9881.000   969.800    9941.000   969.800    9941.000   985.800    9943.000   985.800
   9943.000   969.800   10001.000   969.800   10001.000   986.700   10003.000   986.700   10003.000   969.800
  10067.000   969.800   10067.000   985.800   10069.000   985.800   10069.000   969.800   10129.000   969.800
  10130.000   989.900   10180.000   989.500   10230.000   988.600   10280.000   987.600   10430.000   985.200
  11720.000   986.800   12310.000   989.900

****   8800.000   981.452   981.603   0.151    1.000   243.155   969.845   0.000   3.118   0.000
                                               FLOW DISTRIBUTION (%) =    0.000 100.000   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE        0.000  385783.789       0.000
                         AREA         0.00     2822.24        0.00
                    HYD RADIUS       0.0000      8.4220      0.0000
  REACH...         Manning's N       0.0600      0.0450      0.0600
                       SQRT(L)      73.2803     72.1803     70.7107
  D/S SECTION...         AREA         0.00     2665.83        0.00
                    HYD RADIUS        0.000      10.558       0.000


--- LOCAL INFLOW POINT #  2 is upstream of Section No.      42.000 ---
                           DISCHARGE   TEMPERATURE
                             (cfs)       (deg F)
            Local Inflow:     600.000       60.00
                   Total:    8200.000       60.00

SECTION NO.     44.000

 Cross Section Geometry (STA,ELEV)
   8035.000  1002.000    8150.000   992.000    8305.000   990.000    8735.000   990.000    8835.000   988.000
   9285.000   996.000    9425.000  1017.600    9505.000   990.000    9650.000   986.000    9788.000   984.100
   9845.000   980.600    9850.000   978.491    9868.000   970.900    9898.000   972.200    9968.000   970.500
   9998.000   967.500   10028.000   968.900   10058.000   967.400   10078.000   967.100   10118.000   971.900
  10127.000   976.800   10150.000   977.800   10193.000   976.900   10200.000   979.646   10206.000   982.000
  10300.000   981.200   10325.000   979.200   10400.000   983.100   10450.000   999.800   10464.000  1002.400

****   8200.000   982.491   982.571   0.079    1.085   350.000   970.182   0.000   2.301   0.958
                                               FLOW DISTRIBUTION (%) =    0.000  95.679   4.321

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE        0.000  595477.263   26895.576
                         AREA         0.00     3409.65      369.93
                    HYD RADIUS       0.0000      12.1625      5.0296
  REACH...         Manning's N       0.0600      0.0450      0.0600
                       SQRT(L)      56.5685     59.1608     61.6441
  D/S SECTION...         AREA         0.00     2822.24        0.00
                    HYD RADIUS        0.000       8.422       0.000

SECTION NO.     53.000

 Cross Section Geometry (STA,ELEV)
   7550.000  1004.000    7760.000  1000.000    8440.000   998.000    8640.000   996.000    8780.000   996.000
   8940.000   994.000    9245.000   986.000    9555.000   986.300    9825.000   986.300    9900.000   983.800
  10000.000   982.800   10011.000   978.200   10041.000   974.000   10071.000   972.200   10101.000   972.600
  10121.000   978.200   10136.000   988.700   10154.000   989.300   10200.000   999.200   10320.000  1000.100
  10470.000  1002.000   10700.000  1004.000

****   8200.000   983.479   984.372   0.893    1.037   196.098   975.086   0.681   7.586   0.000
                                               FLOW DISTRIBUTION (%) =    0.190  99.810   0.000

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE      274.155  144394.365       0.000
                         AREA        22.82     1078.93        0.00
                    HYD RADIUS       0.3378      8.1588      0.0000
  REACH...         Manning's N       0.0600      0.0450      0.0600
                       SQRT(L)      58.0172     54.2402     53.2165
  D/S SECTION...         AREA         0.00     3409.65      369.93
                    HYD RADIUS        0.000      12.163       5.030


--- LOCAL INFLOW POINT #  3 is upstream of Section No.      53.000 ---
                           DISCHARGE   TEMPERATURE
                             (cfs)       (deg F)
            Local Inflow:    2600.000       60.00
                   Total:    5600.000       60.00

SECTION NO.     55.000

 Cross Section Geometry (STA,ELEV)
   7592.000  1004.000    7947.000  1000.000    8627.000   996.000    9052.000   990.000    9337.000   986.000
   9737.000   984.300    9837.000   984.700    9910.000   985.500    9931.000   987.200    9955.000   978.100
   9975.000   974.800   10005.000   974.200   10035.000   972.900   10045.000   973.200   10062.000   983.800
  10187.000   985.800   10307.000   986.000   10497.000   990.000
```

```
****   5600.000   986.704   986.858   0.155    2.280  1047.266   976.369   0.750   3.454   0.649
                                                FLOW DISTRIBUTION (%) =   13.274  82.684   4.042

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE    32889.590  204875.028   10016.492
                         AREA       990.96     1340.52      348.55
                    HYD RADIUS       1.5513      9.9567      1.2499
  REACH...          Manning's N       0.0600      0.0450      0.0600
                        SQRT(L)      47.6970     52.6308     58.5662
  D/S SECTION...          AREA        22.82     1078.93        0.00
                    HYD RADIUS        0.338       8.159       0.000

SECTION NO.     58.000

 Cross Section Geometry (STA,ELEV)
   8542.000  1006.000    8952.000  1004.000    9702.000  1000.000    9812.000   997.200    9912.000   996.300
   9944.000   976.200    9974.000   975.400    9991.000   978.200   10015.000   990.400   10062.000   988.300
  10065.000   988.800   10065.000   988.300   10169.000   989.300   10172.000   990.000   10242.000   992.000
  10492.000   992.000   10642.000   988.000   10852.000   986.700   11022.000   988.000   11097.000   986.000
  11137.000   986.000   11192.000   988.000

****   5600.000   987.850   988.551   0.701    1.806   576.704   978.997   0.000   6.959   1.060
                                                FLOW DISTRIBUTION (%) =    0.000  92.947   7.053

     REACH PROPERTIES BY STRIP          1           2           3
               INEFF FLOW  EL   -99999.000  -99999.000  -99999.000
  U/S SECTION...    CONVEYANCE        0.000  101054.470    7668.432
                         AREA         0.00      747.99      372.73
                    HYD RADIUS       0.0000      8.2752      0.7571
  REACH...          Manning's N       0.0600      0.0450      0.0600
                        SQRT(L)      33.1361     38.2361     31.8119
  D/S SECTION...          AREA       990.96     1340.52      348.55
                    HYD RADIUS        1.551       9.957       1.250


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

       0   DATA ERRORS DETECTED.

TOTAL NO. OF TIME STEPS READ =         2
TOTAL NO. OF WS PROFILES =             2
ITERATIONS IN EXNER EQ =               0

COMPUTATIONS COMPLETED
RUN TIME =  0 HOURS,  0 MINUTES &  1.00 SECONDS
```

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
```

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

$$183.5 \text{ ft}$$

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 / Section No. 58.000	DISCHARGE (cfs)	SEDIMENT LOAD (tons/day)	TEMPERATURE (deg F)
INFLOW	532.00	93.30	63.44

Upstream of SECTION NO. 53.000 is...

LOCAL INFLOW POINT # 3	DISCHARGE (cfs)	SEDIMENT LOAD (tons/day)	TEMPERATURE (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 (cfs)	SEDIMENT LOAD (tons/day)	TEMPERATURE (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 (cfs)	SEDIMENT LOAD (tons/day)	TEMPERATURE (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 DAYS	ENTRY POINT	SAND INFLOW	SAND OUTFLOW	SAND 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 DAYS	ENTRY POINT	SAND INFLOW	SAND OUTFLOW	SAND TRAP EFF
54.00	35.000	5.52		
TOTAL=	33.000	5.52	2.04	0.63

TIME DAYS	ENTRY POINT	SAND INFLOW	SAND OUTFLOW	SAND 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 NUMBER	BED CHANGE (ft)	WS ELEV (ft)	THALWEG (ft)	Q (cfs)	TRANSPORT RATE (tons/day) 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.

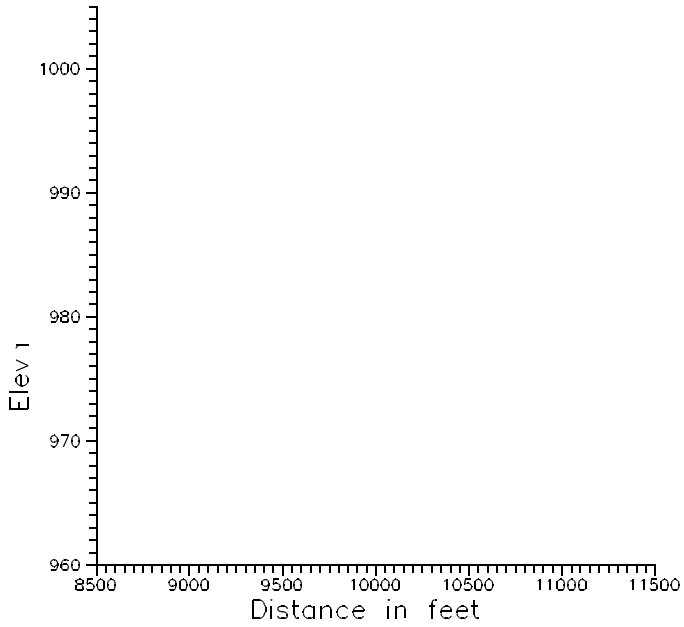
```
     32.100      -0.10    963.74    956.40        689.         49.
     32.000      -0.18    963.13    956.32        689.        694.
     15.000      -0.24    957.66    953.46        750.       1530.
      1.000       1.22    957.00    945.92        750.         25.

-------------------------------------------------------------------------------------------
$$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
```

```
  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

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 NUMBER	BED CHANGE (ft)	WS ELEV (ft)	THALWEG (ft)	Q (cfs)	TRANSPORT RATE (tons/day) 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
TONS OF SEDIMENT DREDGED FROM THIS REACH=        13568.3 ACCUMULATED FROM DOWNSTREAM END=         13568.
                          CUBIC YARDS=        10807.1                                            10807.
```

. . . . . .

```
STREAM SEGMENT #  1: EXAMPLE PROBLEM NO 4.  SOME SEDIMENT OPTIONS.
-------------------------------------------------------------------------------------------
$SED
LPOINT         1       0
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 |0.379500E-02|0.517500    | 3.52000    | 72.0000    | 8000.00    |
LF   VCS |0.275000E-03|0.375000E-01| 1.28000    | 36.0000    | 2000.00    |
LF   VFG |0.550000E-04|0.750000E-02|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 |0.151250E-01| 2.06250    | 320.000    | 4500.00    | 400000.    |
-------------------------------------------------------------------------

LPOINT         1       2
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    |
---------------------------------------------------------------

-------------------------------------------------------------------------------------------
$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

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

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                      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
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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.

```
       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.

--------------------------------------------------------------------------------
$$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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