Experiment No. 4

"To understand the effect of changing stream power and channel morphology"

Apparatus Name: Advanced Hydrological Apparatus

HYDROGEOLOGY LAB

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING

UET, LAHORE

Procedure:

Connect the flexible piping from the river inlet tank to the quick release connector on the flow meter.

Adjust the slope of the sand tank to 0.5%. Smooth the sand level and parallel with the top of the tank. Use the scoop to cut an initial straight channel from the river inlet tank to the deep cut-out at the foot of the tank. The channel should be approximately 4 cm wide and 2 cm deep. Set the river inflow rate to approximately 2 l/min.

Observe the channel during the development of an alluvial channel environment. Record the sediment yield every 10-15 minutes. Record the topography of the bed every 30 minutes (the flow may be turned to a low-level during measurement, so that the channel does not change during this time). Make notes on the presence of features such as bars, terraces, scour holes, and the position of the channel thalweg. Measure the channel length by laying a piece of string along the edge of the channel. The length of the thalweg can be measured in a similar manner.

The entrance and exit effects of the inlet and low cut-out will affect the channel shape, and it is advisable to avoid the uppermost and lowermost 30 cm of the channel when taking measurements.

Continue to take measurements in this manner for four to five hours. Note that if there is no initial sediment load introduced into the inlet flow, the channel will incise into the top of the sediment bed, which will gradually reduce the slope and stream power over the course of the run. Hence, it is advisable to add a small amount of sediment at the head of the channel as necessary to maintain the bed level.

The experiment should then be repeated at increased stream power. Stream power may be increased by increasing the valley slope, or by increasing the inlet flow rate. Several runs should be made in order to build up a comprehensive set of data covering a variety of stream powers and channel planforms. The time requirement may be decreased by changing stream power every 3-4 hours without resetting the sediment bed, but accuracy will be reduced.

One method of making diagrams of the channel requires two rulers or measuring sticks, both of which must be rigid and one of which must be at least 1 meter in length. This long ruler should be laid across the top of the tank from one side to the other, parallel to the end, and then moved along the tank in steps of 10cm. at each position, the second ruler is then used to measure the distance from the top line of the tank to the sand surface, in steps across the entire width of the tank. Reference points should be recorded for any notable features such as the positions of the channel sides, sand bars, sub-channels and thalweg.

Channel length may be measured by laying a piece of string along the side of the channel, then noting the length of the string. Thalweg length may be measured in a similar fashion.

Observations and Calculations:

Elapsed Time min	Sediment yield g/min

Assignment:

a) Describe the development of the channel cross-section and planform morphology and the features noted during the experiment, relating this to the initial conditions, river flow rate and rate of sediment transport (sediment yield).

b) Discuss the relevance of laboratory simulations to real-world situations.