Sub-Watershed Delineation

To calibrate against data at the USGS gauge stations, the sub-watersheds need to be created to have their exits correspond with the location of the gauges. This process is called delineation and the TauDEM software was used for this project. The TauDEM software is a suite of programs used to analyze Digital Elevation Models (DEM) to determine sub-watersheds and corresponding stream reaches.

Conventional TauDEM processing would entail use of the following TauDEM commands:

1. pitremove: The DEM grid is used to create the pit filled DEM grid. Filling of pits is required for the remaining steps to function reliably. A pit is considered a mistake in the DEM and the elevation in pits is increased until there is a continuous downslope to the stream.
2. d8flowdir: The pit filled DEM grid is used to calculate a flow direction grid. The flow direction for each elevation grid point is determined as the direction that has the greatest difference in elevation.
3. aread8: The flow direction grid is used to calculate the flow accumulation grid. An accumulation count is developed for each grid which is the count of all grid cells that flow into that grid.
4. threshold: The flow accumulation grid is used to calculate the stream network. A value is set to establish the accumulation count where a stream would develop.
5. streamnet: The pit remove grid, the flow direction grid, the accumulation grid, the threshold grid, and location of USGS gauges are used by "streamnet" to create the delineated sub-watersheds and stream network.

Closed, Flat, and Frontal Sub-Watersheds

The project area has several unique features that affect surface water hydrology and the delineation process. One of these is closed basins which are surface watersheds that have no observable stream flow drainage. The precipitation that falls on a closed basin either must infiltrate or evaporate. The USGS has identified closed basins at the HUC12 level of detail throughout the United States.

Table 9-12. USGS flow data quality categories (Kennedy 1983)

Quality Category	Description
Excellent	95% of daily discharges within 5% of ‘true’
Good	95% of daily discharges within 10% of ‘true’
Fair	95% of daily discharges within 15% of ‘true’
Poor	Daily discharges have less than ‘fair’ accuracy