probably blow off the manhole. The gap (lift) will generally increase with higher velocity as well.

3. Time – convert to minutes

Volume (Gal.) = (Area) (Velocity) (Time) (448 gpm/cfs)

Example: Field observation of 2-inch gap and velocity of 4 ft/sec for a period of 3 hours, 30 minutes.

Volume (Gal.) = (0.524 ft^2) (4ft/sec) (210min) (448)
= 197,192 gallons

D.2.3.D. Loss from Manhole without a lid in place

If no cover exists, an estimate of the average height the water column (plume) extends above the top of the manhole frame must be made. Use the height to velocity estimate from (A) above to estimate the velocity. Be sure to adjust the height estimate downward for the affects of debris around the edge of the rim which will cause the height to be incorrectly high.

Area = (π) ($D^2/4$) = (3.14) ($2^2/4$) = 3.14 ft^2

Velocity – from field observation of water column height

Time - convert to minutes

Volume (Gal.) = (Area) (Velocity) (Time) (448 gpm/cfs)

Example: A manhole without a lid was observed to have an overflow with a 3 – inch high column of water for a period of 6 hours, 10 minutes

Volume (Gal.) = (3.14) (4.0 ft /sec) (370) (448)
Volume = 2,081,946 gallons

D.2.3.E. Other

1. Generally approach of estimating a cross sectional area where the flow is leaving and a velocity of flow can be used to determine a rate. This can be applied to any situation.

2. Several observations over an event to estimate the area and velocity are better than a single observation. The overflow examples above assume a constant rate over the period which will estimate volumes too high. As an example, if an hour at the beginning and end of each event is assumed for the flow to build up from zero to maximum and back to zero, a calculation could be done as follows: