Appendix I

Guidance on Estimating Sewer Overflow Volumes

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A variety of approaches exist for the estimation of the volume of a sanitary sewer overflow. This appendix documents methods that are often employed. Other methods are also possible. The person preparing the estimate should use the method most appropriate to the SSO using their judgment.

Method 1 "Visual Estimate":

The volume of very small spills can be estimated by imagining the amount of water that would spill from a 5-gallon bucket or 50 gallon barrel. If the spill is larger than the amount of liquid from a 50 gallon barrel, try to visualize how many barrels the standing water would fill and then multiply by the number of barrel volumes by 50. This method can be useful for contained spills that are not more than a couple of hundred gallons.

Method 2 "Measured Volume":

The volume of some small spills can be estimated using this method if it is not raining. The shape dimensions and depth of the spilled wastewater are needed to use this method. The shape dimensions are used to calculate the area of the spill and the depth calculates the volume.

1. Sketch the shape of the contained area of sewage.

2. Measure or pace off the dimensions and add the dimensions to your sketch.

3. Measure the depth in several locations and then average the depth for the spill. (If the shape and depth vary, break your sketch into sections and calculate the volume of each by repeating the steps below).

4. Convert the dimensions to feet (if they are not in feet to begin with).

5. Calculate the area using the following formulas (depending on the shape of the spill):

Rectangle	Area = length X width
Circle	Area = diameter X diameter X 0.785
Triangle	Area = base X height X 0.5

[1] Adapted from information in the following guidance and reporting document: http://www.swrcb.ca.gov/rwqcb2/news_items/sso%20reporting%20requirements%20nov%2011%202004.pdf

6. To get the volume in cubic feet, multiply the area times the average of the depths you measured

7. Multiply the volume by 7.48 to convert to gallons

Method 3 "Duration and Flow Rate"

Calculating the volume of spills where it is difficult or impossible to measure the area and depth requires a different approach. In this method separate estimates are made of the duration (the elapsed time from the start of the overflow to the time the spill is stopped) of the spill and the flow rate.

Start time can be difficult to establish. Here are two approaches to estimating start time:

- For very large overflows, changes in flow on a downstream flow meter can be used to establish the start time. Typically, the daily flow peaks are "cut off" of flattened by the loss of flow. This can be identified by comparing hourly flow data on the downstream flow meter.

- Conditions at a spill site may change with time. Initially, there will be limited deposits of grease and toilet paper. After a few days to a week, the grease forms a light colored residue. After a few weeks to a month the grease turns dark. In the latter two cases the quantity of toilet paper and other materials of sewage origin increase in amount. These changes with time can be used to estimate the start time in the absence of other information.

- Sometimes it is simply not possible to estimate the start time and the date that the overflow was first observed should be used on the form.

- End time is usually much easier to establish. Field crews on site observe the "blow down" that occurs when the blockage has been removed. The end can also be observed in downstream flow meter readings.

  Flow Rate:

  - One way to estimate flow rate is to look at changes in flow rates in the downstream flow meters to estimate how much of the flow rate was lost during the spill (this generally only works for large SSOs)

  - A second way to estimate flow rate is to base it on up-stream connections: Once the location of the spill is known, the number of upstream connections can be determined from records or your computerized system. Multiply the number of connections by 150

to 200 gallons per day per connection or 6-8 gallons per hour for each connection (or other flow rates that are consistent with your data for your connections).

- A Third way is to check with the Administrative Assistant who has access to online actual flow data which is updated every 24 hours.

Once duration and flow rate have been estimated, the volume of the spill is the product of the duration in hours (or days) times the flow rate in gallons per hour (or gallons per day).