SSO Volume Estimation: It’s Not Your Grandfather’s Tools & Techniques

Your Presenters…..

Andy Morrison,
Union Sanitary District
779 miles gravity lines
Over 300,000 served
24 mgd conveyed

Sam Rose,
South Placer MUD
250 miles
65,000 served
4.8 mgd conveyed

Shawn Nesgis,
Union Sanitary District
779 gravity lines
Over 300,000 served
24 mgd conveyed
CWEA WEBINAR: PART 2 of 3

SSO Volume Estimation:
It's Not Your Grandfather's Tools & Techniques

Review of Webinar No. 1

The Changing World of SSO Volume Estimation

Andy Morrison – Union Sanitary District
CWEA SSO Volume Estimating

- Focus of this 3 part series is fairly narrow
- Does not cover:
  - SSO Prevention
  - SSO Response
  - Clean-up/follow-up

- Does cover:
  - Common pitfalls of improper estimating/documentation
  - Useful information on how to avoid those pitfalls
  - How to estimate and document SSO volumes
Why should I care?

- The landscape of SSO Volume Estimation is changing
  - Estimations are not satisfactory
  - Lack of Documentation

- Our Audience has changed (Flashlight vs. Microscope)

- Someone other than you may have to explain your documentation during an Audit/Inspection
  - How you established your start time?
  - How did you determine rate of Flow?
What needs to change?

- Our forms and methods used

- Field Crews need to understand “why” our reports need to be defensible & better documented

- Remember it’s not what is reasonable to us, but what the regulators deem reasonable
Who is looking at us?

- State Water Board
- Regional Water Board
- EPA
- Non-Governmental Organizations (NGO’s)
What are Regulators looking for?

- Written procedures
- Consistent documentation
- Methods used
- Calculations used
1.2 Why are we inspecting?

- Assist Enrollees in reducing SSOs and their impacts on public health and the environment

- SSSWDRs Compliance Support
  - ID violations and/or areas of concern
  - Assist in directing fast, firm, fair enforcement where needed
  - Establish “compliance performance” baseline since most facilities have never been inspected by Water Board staff

- Verify accuracy of certified CIWQS data
  - Review agency methodologies, calculations, procedures, etc for how spill volumes were calculated
  - File audits/reviews add confidence to establishment of ongoing data metrics, trends, benchmarks, etc
What are they finding during Inspections?

- Agency “… did not maintain adequate documentation to verify and substantiate the SSO volumes reported in certified SSO reports in CIWQS”

- “failed to document the method of estimating…”

- “likely … underestimated” volumes due to “start time was the same time that the agency was first notified”

- Field reports did not match CIWQS
Bad vs. Good

Bad:
- Inadequate documentation substantiating volumes reported in CIWQS
- Method used not documented
- “Likely … underestimating” due to Start time same as Notify time

Good:
- Detailed field Reports with Volume Estimation worksheets
- Use an Estimation Worksheet, attach to Field Report
- Make a simple attempt to establish the “Start Time” and write it on the Work sheet i.e. “Mrs Jones said she first noticed it about 5 minutes before she called us, which would be 12:07pm”
Why are Volume Estimates so Important?

California Water Code

- **Section 13350** - Civil Liability on a per gallon basis may not exceed Ten dollars ($10) per gallon for each gallon of waste discharged.

- **Section 13385** - Where there is a discharge, any portion of which is not susceptible to cleanup or is not cleaned up, and the volume discharged but not cleaned up exceeds 1,000 gallons, an additional liability not to exceed ten dollars ($10) multiplied by the number of gallons by which the volume discharged but not cleaned up exceeds 1,000 gallons.

...also why data is investigated in so much detail...
Sample Forms available on the Web

Forms Developed by SPMUD and USD are Available at:

www.cwea.org/sso

PLEASE NOTE:

◦ These documents have been developed by SPMUD and USD and are agency-specific. How we do business may be different than the way you do business. Also, these are “works-in-progress.” Please review each document and alter as you see fit to serve Your Purpose.
SSO Volume Estimation:

*It's Not Your Grandfather's Tools & Techniques*

*The Changing World of SSO Volume Estimation*

Shawn Nesgis – Union Sanitary District

Sam Rose – South Placer Municipal Utility District
Volume Estimation Methods

- Post-Event Flow Monitoring
- Flow Calculation Worksheet
- Upstream Connections
- Area / Volume
- Eyeball Estimation
- Lower Lateral Estimator
- Lift Station Estimations
- Spill Simulator / Photo Comparison
Post-Event Flow Monitoring

Portable Flow Monitoring Equipment

1. Install the flow monitoring equipment in the same mainline segment that experienced the spill.
   a) Monitor for the same time Period/Duration.
   b) Use the Average Flow Rate and apply it to the spill
Diurnal Flow Pattern – A Daily Cycle
Diurnal Flow Pattern – A Daily Cycle

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday
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How Well Do You Know Your Flows?

- Flow Monitoring Program Can Tell You…
  - Agency-Wide … Gallons per EDU
  - Shed-by-Shed … Gallons per EDU
  - Dry Weather vs. Wet Weather Flow Characteristics
  - Diurnal Flow Characteristics
Determining Spill Rate

Don’t Overlook the Downstream Manhole

= Blockage
Post-Event Flow Monitoring Method

**Pros**

- Sometimes it's the only information you will have
- Helps to set limits (High & low) of the spill volume
- Rain Events can be accounted for if flow data is combined with rain gauge data;

**Cons**

- Is affected by the Spill Duration, so ‘Start Time’ is a factor
- Not every agency owns flow monitoring equipment
Flow Calculation Worksheet

Low-Tech
Flow Calculation Worksheet

Work Order Nbr. 5412

Date: 5/23/11 Manhole #: J08-023 Pipe Diameter: 10"

Site Location: Pacific Street / Rocklin

CALCULATE / DETERMINE VELOCITY (V)

Velocity (U) 2.0 ft/sec

CALCULATE D²:

D²

(Inside diameter: 10" inches / 12)² = 0.694 FT²

CALCULATE LEVEL TO DIAMETER RATIO L / D:

L/D

Level 4" inches / inside dia. 10" inches = L / D 0.4

IDENTIFY FLOW UNIT MULTIPLIER (K) IN TABLE II USING L / D:

K

L/D - K = 0.1896 *(MGD, GPM, CFS)

PROFILED FLOW = (V x D² x K):

V 2.0 x D² 0.694 x K 0.1896 = 0.263 (MGD)
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<td>960.7964</td>
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</table>
Profiled Flow

PROFILED FLOW = (V x D^2 x K):

\[ V \cdot 2.0 \times D^2 \cdot 0.694 \times K \cdot 0.1896 = 0.263 \text{ (MGD)} \]

*Unit / Measurement

Select
- MGD
- GPM
- CFS
What is the **Velocity** of this Section of Pipe?

Drop a ball in at the Upstream Manhole. Measure the time it takes to arrive at the Downstream Manhole.

Example: It took 4.5 minutes to travel 528’

Convert 4.5 minutes into Seconds (4.5 x 60 = 270 Seconds)

528 feet / 270 Seconds = **1.95 fps**
<table>
<thead>
<tr>
<th><strong>Pros</strong></th>
<th><strong>Cons</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quick and Easy</td>
<td>• It is only one <em>sample</em> of the flow, can’t account for fluctuations in the flow</td>
</tr>
<tr>
<td>• Spill Volume estimate is documented</td>
<td>• Not all manhole channels are uniform in shape. <em>Cast-in-place for example.</em></td>
</tr>
</tbody>
</table>
Upstream Connections
132 homes @ 180 GPD = 23,760 GPD

23,760 ÷ 1440 Minutes/Day = 16.5 GPM

Duration x Flow Rate = Spill Volume
Upstream Connections Method

Pros

• Good for spills affecting only a small portion of the collection system

• A method that can be applied consistently by crews/staff

Cons

• Must have a reliable volume per household or EDU

• Can be difficult to apply to large portions of the system with mixed use (residential, commercial, industrial)
Area / Volume Estimations

- Size of “Wetted Footprint” or stain
- Amount Captured/Contained
Areas and Volumes

**AREA OF A RIGHT TRIANGLE**

Base x Height x 0.05 x Depth = Area in Cubic Feet

Base (45') x Height (10') x 0.5 x Depth (.05') x 7.48 gallons/cubic foot = **22.5 gallons**

For Isosceles Triangles (two sides are equal lengths),
Break it down into two Right Triangles and compute area as you for the Right Triangle above.

---

**Chart - A**

<table>
<thead>
<tr>
<th>Conversion: Inches to Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8” = 0.01'</td>
</tr>
<tr>
<td>1/4” = 0.02'</td>
</tr>
<tr>
<td>3/8” = 0.03'</td>
</tr>
<tr>
<td>1/2” = 0.04'</td>
</tr>
<tr>
<td>5/8” = 0.05'</td>
</tr>
<tr>
<td>3/4” = 0.06'</td>
</tr>
<tr>
<td>7/8” = 0.07'</td>
</tr>
<tr>
<td>1” = 0.08'</td>
</tr>
<tr>
<td>2” = 0.17'</td>
</tr>
<tr>
<td>3” = 0.25'</td>
</tr>
<tr>
<td>4” = 0.33'</td>
</tr>
<tr>
<td>5” = 0.42'</td>
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<tr>
<td>6” = 0.50’</td>
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<tr>
<td>7” = 0.58’</td>
</tr>
<tr>
<td>8” = 0.67’</td>
</tr>
<tr>
<td>9” = 0.75’</td>
</tr>
<tr>
<td>10” = 0.83’</td>
</tr>
<tr>
<td>11” = 0.92’</td>
</tr>
<tr>
<td>12” = 1.00’</td>
</tr>
</tbody>
</table>
Areas and Volumes

AREA OF A CIRCLE

Diameter Squared x 0.785 x Depth = Area in cubic feet.

Diameter = Any straight line segment that passes through the center of a circle.

For our purposes, it is the measurement across the widest part of a circle.

\[ D^2 \times 0.785 \times \text{depth} = \text{Volume in cubic feet} \]

Example:

\[ 27' \times 27' \times 0.785 \times 0.03 = 17.17 \text{ cubic feet} \]

17.17 cubic feet x 7.48 gallons/cubic foot = \textbf{128 gallons}

<table>
<thead>
<tr>
<th>Chart - A</th>
<th>Conversion: Inches to Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot;</td>
<td>0.01'</td>
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<tr>
<td>1/4&quot;</td>
<td>0.02'</td>
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<tr>
<td>1/2&quot;</td>
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<td>0.08'</td>
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<td>0.17'</td>
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<td>0.75'</td>
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<td>10&quot;</td>
<td>0.83'</td>
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<tr>
<td>11&quot;</td>
<td>0.92'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>1.00'</td>
</tr>
</tbody>
</table>

Spill Volume Guide

Depth

1/32 inch on concrete

1/64 inch on asphalt

South Placer Municipal Utility District
The Spill Footprint

Use Approximately $\frac{1}{2}$ of the circle

Some in, some out… Use all of the Rectangle

Use Approximately 95% of this Rectangle
The Spill Footprint
With “Pooling” or “Ponded” sewage

Same Process, Except Depth is Determined Differently
‘Pooled’ or ‘Ponded’ Sewage

Spill contained. Determine Area (L x W = Area)
‘Pooled’ or ‘Ponded’ Water

\[ 3'' + 6'' + 5'' + 6'' + 6'' + 2'' = 28''. \]

\[ 28'' / 6 = 4.66'' \text{ average depth} \]

Average Depth (Profile View)
‘Pooled’ or ‘Ponded’ Water

EXAMPLE:

• Area = 1,125 sq ft.

• Average Depth = 4.66 inches
  • Convert to feet: \( \frac{4.66}{12} = 0.39 \text{ feet} \)

• \( 1,125 \times 0.39 \times 7.48 = 3,282 \text{ gallons} \)
Spill Contained on Dirt
You can Measure the Area, but…

How Much of the Sewage Soaked into the Ground?
One Gallon Spill on Dirt

Sample
After the Fact
Spill One Gallon on Dirt

Three Samples – Determined 1.25” Average Depth of Wet Soil
\[ D^2 \times 0.785 \times d \times 7.48 \]

\[ 3.08 \times 3.08 \times 0.785 \times 0.125 = 6.96 \text{ Gallons} \]

Since it is known that one gallon was spilled, we can determine the saturated soil content in the sample…

\[ 1 \text{ gallon} / 6.96 \text{ gallons} = 14.4\% \]
\[ D^2 \times 0.785 \times d \times 7.48 \quad \ldots \text{then Multiply by 14.4\%} \]

\[ 3.08 \times 3.08 \times 0.785 \times 0.125 \times 7.48 \times 14.4\% = 1.00 \text{ Gallons} \]

• Measure the ‘wetted’ spill area,

• Measure the average depth of the ‘wetted’ soil,

• Determine the volume (in gallons) of the wetted soil,

• Multiply the volume by the percent arrived at with the Test Sample,

• Document & Report
Sewage Contained in a Storm Drain System
Area – Volume Method

Pros

• Very good when spill is contained

Cons

• A ‘Fair Weather’ method. Affected by rain events and, in some cases, hot weather

• Surfaces have different textures, difficult to determine depth

• Must be able to see the ‘edges’ of the spill
Eyeball Estimation

Definition: Making a determination using your experience and ‘sizing up’ the rate or volume???

Recommend Drills/Practice to ‘Calibrate’ Your Eyes

Recommend Documenting Your Training
Kick the Bucket

- **Kick it:**
  - On Asphalt
  - Concrete
  - Sloped Surface
  - Flat Surface

- **Kick it:**
  - One Gallon
  - Five Gallons
  - Fifty Gallons
  - Etc.
Kick the Bucket
Kick the Bucket
Kick the Bucket
Kick the Bucket
Kick the Bucket
Eyeball Estimation
Eyeball Estimation Method

Pros

• Sometimes it is the only method we have
• Useful on smaller spills

Cons

It has its Place, but is Difficult to Defend

• Difficult to repeat (will two different people come up with essentially the same number?)
• Not very good for large spills
Spill Due to Blockage in Lower Lateral

= Blockage
Adjusted using Diurnal Flow Pattern

180 GPD per Household
(District-wide diurnal flow patterns are applied to estimate usage during each period)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Gals per Minute</th>
<th>Gals per Hour</th>
<th>Gals per Period</th>
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<td>A - 6 AM to Noon</td>
<td>0.20</td>
<td>12.0</td>
<td>72</td>
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<tr>
<td>B - Noon to 6 PM</td>
<td>0.15</td>
<td>9</td>
<td>54</td>
</tr>
<tr>
<td>C - 6PM to 9 PM</td>
<td>0.13</td>
<td>7.5</td>
<td>45</td>
</tr>
<tr>
<td>D - 9 PM - Midnight</td>
<td>0.03</td>
<td>1.5</td>
<td>9</td>
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</tbody>
</table>

Spill Start Time ________ - Spill End Time ________ = Spill Duration ________

Spill Duration ________ x Spill Rate ________ x EDUs ________ = Spill Volume ________
Spill Due to Blockage in Lower Lateral

EXAMPLE:

If it is determined that the spill began at 11:15 am and was eliminated at 1:45 pm, the volume would be determined as follows:

45 minutes at 0.20 GPM = 9 gallons

105 minutes at 0.15 GPM = 15.75 gallons

Total Gallons Spilled = 25 gallons
A spill from a single home that occurred in the middle of the day with a duration of 2 hours and 20 minutes could equal 25 gallons…

- Washing Machine ............. 30 gallons/load
- Dish Washer .................. 9 gallons/load
- Shower (10 min.) ............. 25 Gallons
Lower Lateral Estimation Method

Pros

• Provides a ‘Reasonable’ estimate when there is minimal evidence to make estimate.

Cons

• It is difficult to know what is going on inside a home or business at any given time.

• Must have a way to determine daily water use per EDU
Lift Station Estimation

Do you know your Flows?

Influent

Effluent
**Lift Stations**

#1 Measure the Volume in the normal operating range:

**Formula:** \( D^2 \times 0.785 \times d \)

Convert inches to feet:

\[
\frac{45''}{12} = 3.75' 
\]

\( 9^2 \times 0.785 \times 3.75 \)

\( 81 \times 0.785 \times 3.75 = 238.44 \text{ cu ft} \)

238.44 cu/ft x 7.48 gallons =

1,783.53 Gallons
Steel Tape & Styro-Foam
#2 Determine the ‘Fill’ time:

#3 Determine the ‘Pump’ time:

Repeat enough times to collect a reasonable sample the pumping cycle for the lift station.
LS-01 (Munoz) ~ 111.3 EDU's
Ave Pump Output = 153 GPM ~ Ave Starts per 24 Hours = 51

*Data Based on September 2000 Flows*

(Dry)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Max GPM</th>
<th>Ave GPM</th>
<th>Ave Fill Time Minutes Btw 'ON' &amp; 'OFF'</th>
<th>Ave Overflow Capacity (Min/Hours)</th>
<th>Max Overflow Capacity (Min/Hours)</th>
<th>Ave Overflow + Ave Fill Time Min / Hours</th>
<th>Max Overflow + Ave Fill Time Min / Hours</th>
<th>Ave Daily Flow</th>
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<tbody>
<tr>
<td>Midnight to 6 AM</td>
<td>18</td>
<td>6</td>
<td>61</td>
<td>900 / 15:00</td>
<td>300 / 5:00</td>
<td>961 / 16:00</td>
<td>360 / 6:00</td>
<td></td>
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<td>6 AM to Noon</td>
<td>32</td>
<td>21</td>
<td>18</td>
<td>257 / 4:15</td>
<td>169 / 2:50</td>
<td>275 / 4:35</td>
<td>187 / 3:07</td>
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<tr>
<td>Noon to 6 PM</td>
<td>24</td>
<td>15</td>
<td>25</td>
<td>360 / 6:00</td>
<td>225 / 3:45</td>
<td>385 / 6:25</td>
<td>250 / 4:10</td>
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</tr>
<tr>
<td>6 PM to Midnight</td>
<td>23</td>
<td>18</td>
<td>21</td>
<td>300 / 5:00</td>
<td>235 / 3:55</td>
<td>321 / 5:21</td>
<td>256 / 4:15</td>
<td></td>
</tr>
<tr>
<td>All Day</td>
<td>15</td>
<td>25</td>
<td>360 / 6:00</td>
<td>~</td>
<td>385 / 6:25</td>
<td>~</td>
<td>~</td>
<td>23,500 Gals.</td>
</tr>
</tbody>
</table>

Overflow Capacity (Tank) = 5,400 Gallons ~ By-Pass Manifold = 4” (Thompson Pump)
Dump Manhole = Q15-018 (Penryn Rd)
Vector Shuttle = 1,000 gallons per Trip. Can Complete a Trip in 40 minutes. De-Water Rate = 25 GPM

*Data Based on February 11, 2000 Flows – 1.31” Rain*

(WET)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Max GPM</th>
<th>Ave GPM</th>
<th>Ave Fill Time Minutes Btw 'ON' &amp; 'OFF'</th>
<th>Ave Overflow Capacity (Min/Hours)</th>
<th>Max Overflow Capacity (Min/Hours)</th>
<th>Ave Overflow + Ave Fill Time Min / Hours</th>
<th>Max Overflow + Ave Fill Time Min / Hours</th>
<th>Ave Daily Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midnight to 6 AM</td>
<td>17</td>
<td>8</td>
<td>45</td>
<td>675 / 11:15</td>
<td>318 / 5:18</td>
<td>720 / 12:00</td>
<td>363 / 6:03</td>
<td></td>
</tr>
<tr>
<td>6 AM to Noon</td>
<td>31</td>
<td>22</td>
<td>17</td>
<td>245 / 4:06</td>
<td>174 / 2:54</td>
<td>262 / 4:22</td>
<td>191 / 3:11</td>
<td></td>
</tr>
<tr>
<td>Noon to 6 PM</td>
<td>29</td>
<td>21</td>
<td>18</td>
<td>257 / 4:17</td>
<td>186 / 3:06</td>
<td>275 / 4:35</td>
<td>204 / 3:24</td>
<td></td>
</tr>
<tr>
<td>All Day</td>
<td>18</td>
<td>22</td>
<td>300 / 5:00</td>
<td>~</td>
<td>322 / 5:22</td>
<td>~</td>
<td>~</td>
<td>25,400 Gals.</td>
</tr>
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</table>

(8% Increase over Dry Conditions)
Vaector Wet Well De-Watering Benchmark
October 14, 2003

This procedure was performed to determine a benchmark time for maintaining flows in lift station wet wells using the hydro-vac unit to shuttle sewage from the station to a pre-determined dumping manhole. The test was performed at the Munoz Lift Station (LS-01) in Penryn on a weekday afternoon. The test was conducted as follows:

Started with hydro-vac unit parked outside lift station gate as if it just arrived.

1. (5 minutes) Open gate, position hydro-vac unit and set up vacuum tubes.
2. (11 minutes) to De-Water (vacuum) wet well (apx. 1000 gallons.)
3. (7 minutes) Disconnect vacuum tubes, move hydro-vac unit outside fence, lock gate.
4. (5 minutes) drive to dump manhole (this time will vary from station to station, but this is the furthest distance of any station
5. (7 minutes to set up, dump, and pick up.
6. (5 minutes) to return to station.

Findings: 40 minutes are required for one hydro-vac unit to make a complete De-Watering round trip. This equates to a de-watering rate of **25 GPM**.

This procedure was performed two times in succession with the same total time recorded on both trips. Crew was directed to work at a normal, everyday pace.

Driver/Operators - Wayne & Henry; Supervisor - Frank
### De-Watering Wet Well using One Hydro-Vac

[Add One (1) Trip to Period during Heavy Rain Events]

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Average Inflow Rate for Period</th>
<th>Number of Trips During Period to Keep Up with Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midnight to 6 AM</td>
<td>6 GPM</td>
<td>0</td>
</tr>
<tr>
<td>6 AM to Noon</td>
<td>21 GPM</td>
<td>8</td>
</tr>
<tr>
<td>Noon to 6 PM</td>
<td>15 GPM</td>
<td>6</td>
</tr>
<tr>
<td>6 PM to Midnight</td>
<td>18 GPM</td>
<td>7</td>
</tr>
</tbody>
</table>

Add 1 Trip if Wet Well if full prior to beginning of period

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**Pump Run Time**

**Wet Well Fill Time**

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Determine Lift Station Flows

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This Station serves 113 homes
Influent rate:

If the spill is due to the station failing, then the rate of flow into the station will be the spill rate.

Effluent rate:

If the force main fails, then the pump discharge rate, along with the cycle frequency, will be the spill rate.
# Lift Stations

**Pros**

- Using metered data is reliable

**Cons**
South Placer M.U.D.
Spill Simulator
…with Leveling Feet
100 GPM
50 GPM

D&L Supply A-1021
26” Diameter Lid
130 Lbs +/-
50 GPM

Discontinued

25.5” Lid
110 Lbs +/-
50 GPM

60 GPM

Discontinued

25.5” Lid

110 Lbs +/-
40 gal

30 gal
40 GPM
• All Vent Holes Open
• Measured Height = 4”

40 GPM
• One Vent Holes Plugged
• Measured Height = 6”
What Have We Learned?

Measuring Accuracy

\( \frac{1}{4} \) inch could not be consistently repeated

\( \frac{1}{2} \) inch could not be consistently repeated

One inch is where we have settled… for now.
What Have We Learned?

Level vs. Cross-Slope

The fewer the Vent and/or Pick holes the more “Cross-Slope’ is a factor in appearance of the spill

The weight and diameter affect the point which the lid will become buoyant.

Once the lid becomes buoyant it is difficult to accurately measure the spilling sewage
What South Placer M.U.D. is Doing

• Taking Pictures of a spilling structure

• Measuring the lid for Level / Cross-Slope

• Measuring the height of the water using one-inch increments

• Using all this information and setting up the simulator to represent field conditions

• Running Water through the simulator, increasing volume until it (best) resembles the actual flow.
What South Placer M.U.D. is Doing

Continued

• Adjusting the (determined) spill rate using known diurnal flow characteristics

• Factoring in any other information collected during the spill event

• Then, asking ourselves - is this REASONABLE?
Sanitary Sewer Overflow Estimation Technical Training System
First Attempt at a Simulator
5 Gallon
25 Gallons
50 Gallons
100 Gallons
Riser and 36” Lid

25 Gallons

25 Gallons
“Instructions: Since USD has several different size of lids with varying weight and number of pick holes, it is important to follow these steps when using this SSO flow rate estimating tool. 1) If you are able, take a picture of overflowing manhole/riser. 2) Measure lid diameter and select the correct chart to use. There are 4 different charts, one for each diameter. If you have a lid that is an odd size or does not match one of the charts, ask a coach for help. If the lid is stuck to the casting or any of the vent holes are plugged, make a note of that on the SSO estimation worksheet. 3) Match overflowing lid to the closest picture on the correct chart, and use that as the rate of flow on the SSO estimation worksheet.”
“Instructions: Since USD has several different size of lids with varying weight and number of pick holes, it is important to follow these steps when using this SSO flow rate estimating tool. 1) If you are able, take a picture of overflowing manhole/riser. 2) Measure lid diameter and select the correct chart to use. There are 4 different charts, one for each diameter. If you have a lid that is an odd size or does not match one of the charts, ask a coach for help. If the lid is stuck to the casting or any of the vent holes are plugged, make a note of that on the SSO estimation worksheet. 3) Match overflowing lid to the closest picture on the correct chart, and use that as the rate of flow on the SSO estimation worksheet.”
Conclusions

The more sound the method, the more defensible your position will be.

Document all your efforts so the hard work you and your crews put in are not wasted.

…utilizing a second method can serve as a double check.

More than one method may have to be utilized to best determine the spill volume, and…
Conclusions

There are many variables to consider. Control the ones you can. The concept here is we are trying establish defensible estimates using reasonable methods

There is no “One-Size-Fits-All” answer YET
Questions
Answers to be posted online

- What are some different types of flow monitors that are used?
- What brand are your flow meters?
- Are your EDUs calculated flows or planning numbers?
- How does altitude come into play, considering the specific gravity changes in higher altitudes?
- Have you done the same thing with clean out boxes?
- Are there long term plans to publish this information with CWEA endorsement?
- Are there plans to incorporate scripting for callers at time of notification to expedite flow of information (ie, is it flowing to a creek)?