Preventing Sewage Spills:

**Sewage Spill Prevention Plans**

**For Collection Systems**

**Plan Preparation Guidance**

**Preparing O, M & ER Plans (SSPPs)**

**General Procedure**

1. Identify Elements “Prone to Failure”
2. From List 1, Identify Elements “Prone to Failure” That Would Result In Release of Raw Sewage
3. Develop Inspection Schedule For List 2
4. Develop “Emergency Contingency Plan” to Reduce Volume and Effect of Spill From List 2 Failure Events

**Deadlines:**

- **O, M & ER Plans For Treatment Plant, Pump Stations and Stream Crossings:** Due April 1, 2008
- **O, M & ER Plans For Collection Systems:** July 1, 2010 or Subsequent Permit Renewal

**Preventing O, M &ER Plans**

- Task May Be Less Daunting Than You Think
- Some Historical Data Available Already
  - Collection System Maintenance Logs
  - CCTV Records

**Planning Requirement Limits:**

- Not Required For “Acts of God” - Hurricane Floyd, 1998 Ice Storm
- Not Required For Flows As A Result of Storms Larger Than the 2-Year “CSO Design Storm”
  - Above 2.5” In 24 Hours / Above 1.07” In 1 Hour
- Not Required For Events Or Cascading Events Of Very Low Risk Or Probability

**Preventing O, M &ER Plans For Collection Systems (July 1, 2010)**

- Some Emergency Planning Already Done
  - Emergency Power Failure Plans
  - Emergency Response Plans
  - SOP’s Already In Use For Emergency Situations
- Can Use Same “Emergency Contingency Plan” For Many of the Different Failure Events
"Elements Prone to Failure"

10 V.S.A. S 1278 Section 5a.), (b), :

(1) Identification of those elements of the facility, including collection systems that are determined to be prone to failure based on age, design, or other relevant factors.

(2) Identification of those elements of the facility under subdivision (1) of this subsection which, if one or more failed, would result in a significant release of untreated or partially treated sewage to the surface waters of the state.

"Elements Prone to Failure"

Definitions:

"Untreated or Partially Treated Sewage": Undisinfected or Partially Disinfected Wastewater - Any Collection System Release Is "Untreated Sewage"

"Elements Prone to Failure": Those Collection System Components With A Moderate Likelihood Of A Failure Occurring That Would Result In A Discharge of Raw Sewage

"Elements Prone to Failure"

Each "Element Prone to Failure" Will Have Some Level of Risk of Release, And Of Probability Of Failure, That Combine To Cause A Moderate Likelihood Of A Sewage Spill

Definitions:

- "Risk": Possibility That Blockage Or Failure Of A Collection System Component Will Cause Discharge Of Raw Wastes To "Waters of the State"
- "Probability": Likelihood That Failure Will Occur

"Elements Prone to Failure"

Divide Collection System Into Convenient Subsections:

- Similar Age and Materials
- Geographic Separation
- Pump Station Subsections
- Other "Natural" Divisions

"Elements Prone to Failure"

"Elements Prone To Failure" In Collection Systems Are The "Troublespots" In Each Subsection

- Grease Blockages
- Roots
- Misaligned Pipe, Piping Bottlenecks
- Pipe Defects
- Etc.

Northfield Collection System Plan

- Newer Subsections
- "East Side" Subsection
- Interceptor
- "West Side" Subsection
Identifying Collection System “Troublespots”

- History of Collection System “Events”
- Releases to State Waters, Basements of Structures, Ground Surface,
- Surcharging Without Release
- TV Camera Inspections
- Use Ranking System To Assess Imminence of Failure

Preparing O, M & ER Plans

- Use Checklist To Assess Probability Of Failure For Troublespots In Each Subsection Of The Collection System Based On:
  - Age, History and Condition
  - Design and Construction
- “Moderate” Probability Of Failure → “Element Prone To Failure” – Include In List (1)

Preparing O, M & ER Plans

- For Each List (1) Element Assess Risk Of Release Of Raw Sewage Due To Blockages Or Failures
- A “Moderate” Risk of Release → “Element Prone to Failure” That “Would Result In Significant Release Of Untreated Or Partially Treated Sewage” – Include In List (2)

Risk and Probability Assessments

- Use Any Convenient Rational Basis
  - "Low", "Medium", "High", etc.
  - Numeric: 1, 2, 3 or 1 - 5, etc.
- Develop and Document Rating Criteria
- Assess Both Risk and Probability
- Document The Rating Process For Each “List 2)” Collection System Subsection

Numeric Risk / Probability Matrix

- Assign Values For:
  - Risk of Significant Release If Failure Occurs
  - Probability of Failure Occurring
- Multiply “R” Times “P” For R-P Value
- Compare R-P to Cut-Off Value

Levels for Risk of Release

<table>
<thead>
<tr>
<th>Risk</th>
<th>Numeric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>0</td>
<td>Failure Would Not Cause Raw Sewage Release to Waters of the State</td>
</tr>
<tr>
<td>Low</td>
<td>1 - 2</td>
<td>Failure Would Cause Raw Sewage Release Under Unusual Circumstances</td>
</tr>
<tr>
<td>Mod</td>
<td>3 - 4</td>
<td>Failure Would Possibly-to-Likely Cause Raw Sewage Release</td>
</tr>
<tr>
<td>High</td>
<td>5</td>
<td>Failure Event Will Cause Raw Sewage Release</td>
</tr>
</tbody>
</table>
### Levels for Risk of Release

Risk Of Release To “Waters Of The State” Depends On:

- Size Of Upstream Collection System
- Proximity Of “Waters” – Distance, Terrain, Drainageways, Ground Conditions
- Accessibility, Noticeability

### Levels of Probability

<table>
<thead>
<tr>
<th>Level</th>
<th>Numeric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1</td>
<td>Failure Event Extremely Unlikely to Occur</td>
</tr>
<tr>
<td>Mod</td>
<td>2 - 4</td>
<td>Failure Event Has Occurred In Subsection Or Others Like It</td>
</tr>
<tr>
<td>High</td>
<td>5</td>
<td>Failure Event Likely to Occur</td>
</tr>
</tbody>
</table>

### Levels for Probability of Release

Probability Of Failure Indicated By:

- Age, Material and Condition of Piping, Services, Manholes, etc.
- Cracks, Crushes, Breaks
- Roots
- Grease
- Alignment, Piping Bottlenecks
- History of Blockages, Failures

### Probability Level Examples

<table>
<thead>
<tr>
<th>Level</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (1)</td>
<td>- Clean, &lt;5 Years Old, Good Condition</td>
</tr>
</tbody>
</table>
| Mod (2-4) | - Cracked Pipe, Slight Misalignment 2)  
- Few Roots, Moderate Grease, Moderate Pipe Misalignment, >50 Years (3)  
- Many Roots Present, Crushed Pipe, Significant Misalignment, Severe Grease (4)  |
| High (5) | - Crushed and Broken Pipe, Bottlenecks, Severe Misalignment, Grease Blockage, >100 Years Old (5) |

### Collection System Risk Level Examples

<table>
<thead>
<tr>
<th>Risk</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>None (Some Risk With Any Raw Sewage Release) (0)</td>
</tr>
<tr>
<td>Low</td>
<td>Very Small Collection System Subsection W/ Release Point To Contained Area (2)</td>
</tr>
<tr>
<td>Mod</td>
<td>Moderate-sized Subsection, Release Route To “Waters Of The State” (4)</td>
</tr>
<tr>
<td>High</td>
<td>Large Subsection, Any Sized Subsection Proximate To “Waters Of State” (5)</td>
</tr>
</tbody>
</table>

### Risk / Probability Matrix

<table>
<thead>
<tr>
<th>Risk Probability Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probability</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Low (1)</td>
</tr>
<tr>
<td>Moderate (2-4)</td>
</tr>
<tr>
<td>High (5)</td>
</tr>
</tbody>
</table>
Risk / Probability Matrix

- Determine What R-P Value To Use For Planning Cutoff
  - A Value of “10 or Above” Makes Sense
    - Moderate Probability, Moderate Risk
    - High Probability, Relatively Low Risk

Risk / Probability Matrix Example

- For Moderate-Sized Collection System Subsection, Built In 1957, With Severe Grease, Relief Point 50 Yards From Stream
  - Probability Fairly High - “4”
  - Risk Fairly High - “4”
  - R-P Value: 4 X 4 = 16, R-P > 10
- Must Include In O,M and ER Plan
  - Schedule For Cleaning, Inspection
  - Mitigation Plan - Emergency Response

Plan Preparation

Full-Sized Collection System Plan(s)
- Collection System Subsections
- “Elements Prone To Failure” (Troublespots)
- Age and Materials, Diameter, Flow Direction
- Water Courses
- Overflow Structures

Plan Preparation

Inspection Schedules
- CCTV Inspections
  - Known Troublespots: Every 1 - 2 Years or Less
  - Very Small, Newer Subsections: Every 10 Years
  - Subsections 10 - 25 Years Old: Every 5 Years
  - Subsections > 25 Years Old: Every 10 Years
- Manhole Visual Inspections
  - As Necessary, But No Substitute For CCTV

Plan Preparation

Mitigation Plans- Plan Must Work - Test It
- Flow Handling - Pumps, Septage Haulers
  - Inflatable Plugs, Sand Bags, Hoses, Etc.
- Repair Equipment
  - Jettters, Rodders, Pipe Repair Methods, Etc.
- Cleanup Equipment
  - Booms, Bales, Stakes, Hydrated Lime, Etc.
- Equipment Necessary Must Be On-Hand or Available (WARN, Rental, Etc.)

Northfield Collection System Plan Detail