

November 6, 2007

Subject: Operation, Management and Emergency Response Plans

Dear Chief Operator,

Paul Olander and Dennis Bryer of my staff have begun work to prepare a model Operation, Management and Emergency Response Plan based on the first plan of its kind which was received from the Village of Northfield. We anticipate that the document will be made available to the wastewater operations community some time after the first of next year.

During the course of the work it has become clear that one of the major issues in the preparation of these plans will be the determination of which treatment components are "elements prone to failure...which...would result in a significant discharge of untreated or partially treated sewage to the surface waters of the state". Dennis and Paul have worked on this question and put together a presentation on the subject, which Paul presented at the November 2, 2007 meeting of the Green Mountain Water Environment Association. Attached to this letter is an updated copy of the Powerpoint presentation handouts.

The presentation discussed the elements which need to be included in the plan submitted, provided a definition for untreated or partially treated sewage, and identified the limits of events for which planning is required. The presentation also discussed a "probability-risk matrix" which you may find helpful in determining which elements must be included in the plan.

Should you have any questions on these or other aspects during the preparation of the required plans please contact Dennis Bryer at 241 -3735 or Paul Olander at 242-3746.

Sincerely,



Brian Kooiker
Direct Discharge Section Chief
VT Department of Environmental Conservation



Sewage Spill Prevention Plans

Plan Preparation Guidance –
Determining “Elements Prone to
Failure”

Preparing O, M & ER Plans (SSPPs)

Basic Plan Preparation Steps:

- 1) Identify Elements “Prone to Failure” – List (1)
- 2) From List (1), Identify “Elements Prone to Failure” That Would Result In Release of Untreated or Partially Treated Sewage – List (2)

Preparing O, M & ER Plans (SSPPs)

Basic Plan Preparation Steps, (cont’d):

- 3) Develop Inspection Schedule For Elements in List (2)
- 4) Develop “Emergency Contingency Plan” to Reduce Volume and Effect of Spill From List (2) Failure Events

Preparing O, M & ER Plans (SSPPs)

Deadlines:

- O, M & ER Plans For Treatment Plant, Pump Stations and Stream Crossings Due April 1, 2008
- O, M & ER Plans For Collection Systems Due July 1, 2010

Preparing O, M & ER Plans

- Task May Be Less Daunting Than You Think
- Some Historical Data Available Already
 - Maintenance Logs
 - Collection System Logs
 - O&M Manuals, Equipment Files

Preparing O, M & ER Plans

- 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

Preparing O, M &ER Plans

What Are "Elements Prone to Failure"??

What Is "Untreated or Partially Treated Sewage"??

What Is a "Significant Release"??

What Events Must Be Planned For??

"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. BOD and TSS Treatment Failures ONLY IF They Could Cause Disinfection Failure (such as in UV systems).
- **"Elements Prone to Failure"**: Those Treatment System Components With A Moderate Likelihood Of A Failure Occurring That Would Result In A Discharge of Partially or Undisinfected Wastewater

"Significant Release"

- **"Significant Release"**: Any Release of Undisinfected or Partially Disinfected Sewage to Surface Waters of the State That Will Cause A Water Quality Standards Violation
- ANY Release That May Enter State Waters Should Be Regarded, and Planned For, As A Potentially Significant Release

"Elements Prone to Failure"

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 Storm"
 - Above 2.5" In 24 Hours / Above 1.07" In 1 Hour
- Not Required For Events of Very Low Risk or Probability

"Elements Prone to Failure"

■ Definitions:

- **"Probability"**: Likelihood That A Failure Event Will Occur
- **"Risk"**: Possibility That Failure of a Treatment System Component Will Cause Discharge of Undisinfected or Partially Disinfected Wastes

Each "Element Prone to Failure" Will Have Some Level of Probability of Failure and of Risk That Combine to Cause a Moderate Likelihood of a Sewage Spill

Preparing O, M &ER Plans

- Use Checklists In Guidance Document (or Others) to Assess Probability of Failure For Each Piece of Equipment Based On:
 - Age, History and Condition
 - Design and Construction
- "Moderate" Probability of Failure Determines An "Element Prone to Failure" – Include In List (1)

Preparing O, M &ER Plans

- Assess Risk of Release of Untreated or Partially Treated Sewage For List (1) Element Failures
- Redundancy, Alarms/Autodialers, Proximity to Waters of State All Affect Risk
- A "Moderate" Risk of Disinfection Failure – "Element Prone to Failure" That "Would Result in Significant Release of Untreated or Partially Treated Sewage" – Include In List (2)

Disinfection Failure Risks

- Raw Sewage Overflows and Disinfection Failures Cause Highest Risks
- The Biological Treatment Process Is An "Element Prone to Failure"
 - Partial Nitrification w/ Chlorination (Demand)
 - BOD/TSS Failures w/ UV (Turbidity), Cl₂ (Demand)
- Probability Based On Plant Type, History
- Risk of Release: (5)

Risk / Probability Matrix

- Must Have A Rational Method To Determine "Element Prone To Failure" For Which Failure "Would Result In A Significant Release Of Untreated or Partially Treated Sewage to Surface Waters of the State"
- Must Document Basis For Determination
- Only List (2) Elements Need To Be In Plan

Risk / Probability Matrix

- We Are Testing One Possible Method To Assess Whether A Component Prone to Failure is A Risk : A Risk-Probability Matrix
- Assign Values For Risk and Probability
- Multiply "R" Times "P" For R-P Value
- Compare R-P to Cut-Off Value

Levels of Probability

Level Numeric Description

Low	1	Event Extremely Unlikely to Occur
Mod	2 - 4	Event Has Occurred @ Facility or Others Like It
High	5	Event Likely to Occur

Levels of Probability

Level	Examples
Low (1)	SBR Control PLC Failure (1) New UV Systems (1)
Mod (2 - 4)	Diaphragm Chem Pump, New (2), Older (3+) PS Pump Failure, New (1), Older (2 - 4) Sewer Blockage, Newer Subsections (2+) Flow Meters Pacing Cl ₂ Systems (2)
High (5)	Sewer Line Blockage, Problem Areas (5)

Levels of Risk

Risk	Numeric	Description
Nil	0	Failure would not cause inadequate disinfection
Low	1 - 2	Failure would lead to inadequate disinfection under unusual circumstances
Mod	3 - 4	Failure would possibly-to-likely cause inadequate disinfection
High	5	Failure event will cause inadequate disinfection

Levels of Risk

Risk	Examples
Nil	Grit Pump Failure (0)
Low	Return Sludge Pump Failure (2)
Mod	Pump Station Pump Failure (3 - 4+)
High	UV Control System Failure (5) Chlorine Feed Pump Failure (5)

Risk / Probability Matrix

	Risk			
Probability	None (0)	Low (1-2)	Moderate (3-4)	High (5)
Low (1)	0	1 - 2	3 - 4	5
Moderate (2-4)	0	2 - 8	6 - 16	10 - 20
High (5)	0	5 - 10	15 - 20	25

- ### 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, Low Risk

- ### Risk / Probability Matrix Example
- For Failure of Older Pump Station Pump
 - Probability Fairly High - "4"
 - Risk Fairly High - "4"
 - R-P Value: 4 X 4 = 16, R-P > 10
 - Must Include In SSPP
 - Schedule For Inspection
 - Mitigation Plan