Potential Assessment Costs Associated With a Treatment Technique Approach

Vanessa Speight
TWG Representative
TCRDS Federal Advisory Committee Meeting
April 9, 2008

This Presentation

Objectives

Provisions

System compliance

Improvement

Research

Assessment Action Options

Objectives of Presentation

- Present analysis of assessment actions with several variations
- Present the preliminary TWG characterizations of assessments that would include different responses triggered after different events:
  - Level 1
  - Level 2
    - Performed by system
    - Performed by state
    - Performed by 3rd party
- Discuss potential follow-up actions based on findings of an assessment

Assessment Assumptions for All Variations

- Threshold to trigger action:
  - 2 TC+ samples for systems taking less than 40 samples/month
  - 5% TC+ samples for systems taking 40 or more samples/month

- Different levels of assessment:
  - For first exceedance
  - For second exceedance in one year
  - For second consecutive exceedance

Assessment Assumptions for All Variations (Continued)

- Acute MCL violation
  - Using requirements from current rule for all options means there is no difference between options
  - Assessment and corrective actions have not yet been defined for acute MCL violations

Assessment Elements

- Review of sample lab QC
- Review of sample collection procedures
- Review of system events (e.g. main breaks)
- Analysis of operational data
- Historical trends in data
- Evaluation of condition of the sample tap
- Evaluation of the conditions at the sample site
- Evaluation of facilities in vicinity of sample (e.g. tanks)
- Reporting
- Other

Refer to Handout for Detailed List of Elements

Groups of Assessment Elements Define Levels of Response

- Definition of Levels:
  - Level 1 = basic self-evaluation
  - Level 2 = detailed evaluation
    - 2A = performed by system
    - 2B = performed by state
    - 2C = performed by 3rd party

- Elements include system effort to accompany/assist state or 3rd party assessors
- Cost estimates are a preliminary calculation of labor costs only

Variations for Assessment Actions

- For all variations, used the number of systems triggered under the current rule as implemented
- Two types of assessment approaches:
  - Do some elements = systems stop the assessment once they find a cause, so not all systems will conduct all elements on the list; cost developed by estimating the percentage of systems that might perform each element
  - Do all elements = all elements from list must be performed

All costs and estimates are preliminary and are shown here for discussion purposes only

Current Rule as Implemented

- Variation A represents the current rule as implemented
  - Includes some triggered systems taking voluntary actions to assess and correct deficiencies that are identified
  - Developed costs by estimating the percentage of systems that currently undertake actions – we are lacking real data to support these estimates

Not yet calculated

Summary of Assessment Variations (for purposes of discussion only)

	Possible Level of Assessment				
Trigger	Variation A (Implemented)	Variation B	Variation C	Variation D	Variation E
First Exceedance (6,677 sys)	Implemented Baseline	Level 1, Some Elements	Level 1, All Elements	No action	No action
Second Exceedance (1,999 sys)	Implemented Baseline	Level 2, Some Elements, Self	Level 2, All Elements, Self	Level 1, Some Elements, Self	Level 1, All Elements, Self
Second Consecutive Exceedance (1,343 sys)	Implemented Baseline	Level 2, Some Elements, State	Level 2, All Elements, State	Level 2, Some Elements, Self	Level 2, All Elements, Self

Level 1 vs. Level 2 Assessment

- Examples of different LOE assessments based on different trigger levels
  - Weighted average hours below represent estimates for a system self-investigation and a “do some elements” style investigation
  - Hours are weighted by % of systems estimated to perform each element

	Level 1		Level 2	
	System Hours	State Hours	System Hours	State Hours
NCWS<1000	7	2	9	3
CWS<1000	8	2	9	3
CWS serving 33,000 - 96,000	15	2	124	3

Who Conducts the Assessment

- Examples of distribution of hours depending on who conducts the assessment
  - Weighted average hours below represent estimates for a level 2 investigation and a “do some elements” style assessment
  - Hours are weighted by % of systems estimated to perform each element

	System Assessment		State Assessment		Third Party Assessment		
	System Hours	State Hours	System Hours	State Hours	System Hours	State Hours	3rd party Hours
NCWS<1000	9	3	6	8	6	2	9
CWS<1000	9	3	7	9	8	2	13
CWS serving 33,000 - 96,000	124	3	94	87	109	3	115

Do Some vs. All Elements

- Examples of different styles of assessments
  - Weighted average hours below represent estimates for a level 1 system self-assessment
  - Hours are weighted by % of systems estimated to perform each element

	Do some elements		Do all elements	
	System Hours	State Hours	System Hours	State Hours
NCWS<1000	7	2	8	2
CWS<1000	8	2	8	2
CWS serving 33,000 - 96,000	15	2	36	2

Summary of National Assessment Costs (Labor Only)

Includes 6,677 systems with 1 exceedance, 1,999 systems with 2 exceedances in 12 months, and 1,343 systems with 2 consecutive exceedances

	Possible Level of Assessment				
	Variation A (Implemented)	Variation B	Variation C	Variation D	Variation E
National System Costs	TBD	$2,267,101	$3,069,541	$508,566	$548,169
National State Implementation Costs	TBD	$1,260,593	$947,080	$209,732	$213,680

Very preliminary estimate:
National cost of baseline monitoring (157,000 systems) on the order of $300M
National cost of assessments (8,700 systems) on the order of $3M

Questions to Consider

- Development of these illustrative examples pointed out the need to define:
  - Triggers for an assessment
  - Different triggers leading to different types of assessment
  - Which elements belong in each type of assessment
  - The party/parties performing the assessment
  - Different types of assessments for different types of systems?
  - Whether some elements or all elements should be performed

Follow-up Linked to Assessment

- Sample QC
- Sample methodology
- Sample tap
- Sample site
- Vicinity of sample site
- Operational data
- Historical trends

Laboratory error

Sampling protocol not followed

Sample tap contaminated

On-premise plumbing problem

O&M activity near positive site

Loss of chlorine residual

August nitrification episodes

If a cause can be identified then response can be tailored to that cause.

Numerous Potential Actions Exist

- Procedural Changes
  - Increase Sampler Training
  - Install Dedicated Sample Tap
- O&M Practices
  - Sample Tap Repairs
  - Additional Diagnostic Sampling
  - Shock disinfection (well)
  - Line Flushing
  - O&M SOP Training
  - O&M Plan Revision
  - Additional Process Control
  - Treatment Optimization
  - Storage Facility O&M
  - Repair Backflow Prevention Device
  - Advanced Flushing (unidirectional flushing, pigging, etc)
  - Temporary alternative water source
  - Change in disinfection
  - Increase residual near TC+ obs.
  - Increase residual at source
  - Change disinfectant
- Capital Investments
  - Storage facility modification
  - Change pressure management
  - Install CCC device
  - Install / modify treatment
  - Lining / Replacing pipe
  - Repair / Construct new source
  - Elimination of dead ends

Selecting what activity will be effective in response to any specific situation will be based on local conditions.

Selecting an Effective Response

- Determining how to most effectively obtain the greatest impact will drive
  - What follow-up actions are taken
  - What order the actions are undertaken
  - How aggressively
    - How quickly
    - How large an area affected
- This drive for an effective response is thwarted in many instances by the lack of a definitive signal as to the exact cause of positive samples

Problem Definition Groupings

- Uncertainty in meaning of positive sample
  - Few positive samples
  - Sporadic occurrence
- Patterns associated with sampling process
  - Particular sample site
  - Field staff
  - Particular laboratory
- Nominal linkage to identifiable activities
  - New main put into service
  - Facility plumbing renovation project
  - Water system line flushing program near sample site
- Temporal distribution in observations
  - Warm weather months
  - Low-water demand periods or locations
- Source related
  - Well appears to be contaminated

We currently have limited data to discern how frequently different types of problem scenarios occur.

Simplify to a General Case (for cost estimating purposes, if required)

- Lacking information to apportion activity among realistic scenarios, we identified the activities that might occur most frequently in a CWS:
  - Flushing
  - Elevating residual in distribution system
  - Refresher training
  - Storage tank O&M

Trends Driving Level of Effort

- The extent of activities attempted to resolve a situation will increase:
  - As positives are observed over a progressively larger number of sampling periods without resolution
  - With higher levels of state involvement
    - States do not typically get involved until there are multiple positive sample periods
  - Based on the complexity of the problem scenario
    - For example, correcting a bad sampling habit is simpler, quicker, and cheaper than modifying a storage tank

Appendix

Description of Flushing

- Localized flushing
  - Subdivision sized area (several blocks to small development)
  - Emphasis is on removing stagnant water
  - Frequently combined with elevating disinfectant residual
- Costs
  - Minimum of a two person team, more often 3+ field crew
- Duration 1 ½ days in that locale
  - Day 1 – Flushing activity
  - Day 2 – Follow-up monitoring
- Costs not considered are incidental damage to valves, streets, etc.; dechlorination
- Personnel time, lost water, vehicle

Description of Elevating Residual

- In-the field application of chlorine to achieve target disinfectant residual at a target sampling location for treatment area
- In smaller systems residual can be elevated at the treatment facility
- In limited number of instances residual can be elevated at booster stations

- Costs - Field application
  - Similar to flushing
  - Costs not considered are incidental damage to valves, streets, etc.; dechlorination
  - Personnel time, lost water, vehicle
    - Vehicle now includes mixing tank, pumps, etc; price varies with sophistication
- Costs – At fixed facility
  - Limited to WTP operator adjusting residual

Description of Refresher Training

- Training in TCR sampling
- Content reviews purpose, methods, sampling SOPs, and internal coordination
  - May involve outside trainer for smaller systems
  - In-house training for larger systems
- Costs
  - 3 hours for each trainee
  - Assumed that material for training was already compiled
  - 3 hours for trainer
  - Assumed
    - Utilizes existing facilities
    - Common base of operations assumed.