

Process Evaluation of Total Coliform Rule Implementation in Minnesota and Texas

Appendices

Promoting Environmental Results



Through Evaluation

APPENDIX A EVOLUTION OF EVALUATION QUESTIONS

The work assignment provided to ERG posed six evaluation questions:

- How are each state's resources (e.g., FTE, contracts, and grant dollars) allocated across a range of program activities to implement the TCR requirements, as well as state-specific TCR implementation activities?
- How do factors within the state's span of control (e.g., organizational structure, resource allocation to various program activities, relationships with analytical laboratories) affect program delivery, in terms of key outputs and short-term outcomes?
- How are the states incorporating external factors into the implementation of their TCR programs?
- Is each state implementing the TCR in the way that it intends (as envisioned based on factors within its control or influence)?
- How is each state measuring its efficiency and effectiveness in TCR implementation, and how should each state do so?
- Given current resource levels, resource allocations across activities, and factors within the state's span of control, how efficiently or effectively are the states implementing the TCR?

At the outset of the project, however, ERG was provided with a new set of questions that reflected EPA, MDH, and TCEQ input. The new set of questions were:

1. How are State FTE/\$ allocated across program activities to implement the TCR provisions (using categories that correspond to the current TCR)?
2. How do factors in the State's span of control (e.g., organizational structure) affect program delivery?
3. Is the state implementing the TCR in the way that it intends (as envisioned based on structures and allocation of resources)?
4. How is the state measuring efficiency/effectiveness in TCR implementation? How should it?
5. Given its current level of resources, resource allocation across activities, and org. structure, how effectively/efficiently are the states implementing the TCR?

Table A-1 provides a link between this second set of evaluation questions and the refined evaluation questions presented in Section 2.2.

Table A-1. Refined Evaluation Questions, Original Evaluation Questions

Evaluation Question Given to ERG for Refinement	Refined Evaluation Question
(1) How are State FTE/\$ allocated across program activities to implement the TCR provisions (using categories that correspond to the current TCR)?	(1) Using relevant categories of expenditure how are State FTE/\$ allocated across the program activities to implement the TCR provisions?
(2) How do factors in the State’s span of control (e.g., organizational structure) affect program delivery?	(2a) How do the following factors affect program delivery related to MCL violations? <ul style="list-style-type: none"> • State organizational structure • State resources • Other factors in the State’s span of control to be determined.
	(2b) How do the following factors affect program delivery related to Monitoring and Reporting (M/R) violations? <ul style="list-style-type: none"> • State organizational structure • State resources • Other factors in the State’s span of control to be determined.
(3) Is the state implementing the TCR in the way that it intends (as envisioned based on structures and allocation of resources)?	(3a) What processes/procedures does the state follow with respect to MCL violations?
	(3b) Regarding MCL violations, is the State implementing the TCR in the way that it intends?
	(3c) What processes/procedures does the state follow with respect to M/R violations?
	(3d) Regarding M/R violations, is the State implementing the TCR in the way that it intends?
(4) How is the state measuring efficiency/effectiveness in TCR implementation? How should it?	(4a) What performance metrics are being used by the State to measure the efficiency/ effectiveness of TCR implementation?
	(4b) What recommendations can be made for improving the performance metrics being used by the State to measure efficiency/effectiveness of TCR implementation?
(5) Given its current level of resources, resource allocation across activities, and org. structure, how effectively/efficiently are the states implementing the TCR?	(5) Based on the recommendations in Question 4b (i.e. the performance metrics that the State should use to measure efficiency/effectiveness of TCR implementation) and on the best available data, what is the State’s current level of efficiency/ effectiveness in implementation of TCR?

APPENDIX B
INTERVIEW SCRIPTS FOR TCEQ SITE VISIT - JANUARY 6-8, 2009

Program Manager Interview (Introductory Interview)

Program Organization

1. Please give us a broad overview of the organization of TCEQ?
2. How does the TCR program fit into the overall organization?
3. Discuss in detail the organization of the TCR program.
 - a. What are the key components of the program?
 - b. How are responsibilities distributed between the central and regional offices? Why?
4. What is TCEQ's philosophy on working with PWSs (i.e. hands-on versus hands-off, prevention versus response)?
5. What is TCEQ's philosophy on TCR implementation? What types of activity have the most priority and why?
6. What is TCEQ's philosophy on leveraging program resources?

Roles and Responsibilities

7. Describe the roles of the different offices and key staff? What aspects of the TCR program are each responsible for? How do program partners fit in?
8. Does the TCR program have dedicated staff or do staff responsibilities include multiple programs? If the latter, approximately what percent of the time do they spend on TCR?
9. What priority is given to the TCR program relative to other drinking water rules?
10. How do staff members responsible for different components of the program communicate with each other?
11. To what extent does the TCR program rely on information exchanged with other parts of TCEQ? How is the information shared? How effective would you say is this system?

Standard Procedures

12. [Provide list of SOP documents] Does this set of documents completely document the official standard operating procedures for the TCR program? What is missing? What is included that shouldn't be?
13. Please describe the appropriate program staff response to the key TCR violations: M/R (major and minor), MCL, AMCL (and PN)?

Performance Metrics

14. Does TCEQ track the effectiveness or efficiency of the TCR program? If so, could you describe the measures that are being used? Would it be possible for us to see the current measure(s)?
 15. What data sources are being used to develop the measure(s) of effectiveness or efficiency?
 16. In your opinion, is this measure the best way to gauge the effectiveness or efficiency of the program? Is there a more relevant measure you would like to use? If so, what are the barriers to using this measure?
 17. Does TCEQ receive feedback on the effectiveness of TCR program delivery from PWSs or program partners? How is the feedback communicated? What are the key themes of the feedback?
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Key Staff Interview (Detailed Interview)

Roles and Responsibilities

1. What is your role at TCEQ? Discuss your responsibilities in the implementation of the TCR program.

Trigger Events, Responses and Activities

2. How does TCEQ respond when a PWS has a routine sample that is positive for total Coliform?
[Note: the following set of prompts is used for all questions in this section.]
 - a. How does this response vary for a community water system (CWS) versus a noncommunity water system (NCWS)?
 - b. How does this response vary for public water systems (PWS) that serve less than 1,000 consumers versus those that serve more than 1,000 consumers?
 - c. How does this response vary for PWSs that use surface water, ground water or ground water under direct influence of surface water?
 - d. What other activities follow this type of event? Public notifications? Other actions suggested for the PWS? Other actions required of the PWS? Other non-administrative actions by TCEQ? Other administrative actions?
 - e. How does this response differ from the standard procedure for responding to this event? Why is it done this way?
3. How does TCEQ respond when a PWS has a repeat sample that is positive for total Coliform?
4. How does TCEQ respond when a PWS has a routine sample that is positive for fecal coliforms or *e.coli*?
5. How does TCEQ respond when a PWS has a repeat sample that is positive for fecal coliforms or *e.coli*?
6. How does TCEQ respond when a PWS has an MCL violation?
7. How does TCEQ respond when a PWS has an AMCL violation?
8. How does TCEQ respond when a PWS has a major routine monitoring and reporting (M/R) violation?

9. How does TCEQ respond when a PWS has a minor routine M/R violation?
10. How does TCEQ respond when a PWS has a major repeat M/R violation?
11. How does TCEQ respond when a PWS has a minor repeat M/R violation?
12. Are there other events that result in a response by TCEQ? [Repeat prompts.]

Overall

13. In your experience, what are the most effective state program activities to reduce the occurrence of M/R violations? MCL or AMCL violations?
 14. In your experience, what are the key roadblocks to TCR program implementation?
 15. Do you have any suggestions for improving the effectiveness or efficiency of the TCR program?
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Field Staff, Lab Contacts and Partners Interview (Supplementary Interviews)

Roles and Responsibilities

1. Describe your role and responsibilities with respect to the TCR program.

Trigger Events, Responses and Activities

2. How does TCEQ respond when a PWS has a routine sample that is positive for total Coliform?
[Note: the following set of prompts is used for all questions in this section.]
 - a. How does this response vary for a community water system (CWS) versus a noncommunity water system (NCWS)?
 - b. How does this response vary for public water systems (PWS) that serve less than 1,000 consumers versus those that serve more than 1,000 consumers?
 - c. How does this response vary for PWSs that use surface water, ground water or ground water under direct influence of surface water?
 - d. What other activities follow this type of event? Public notifications? Other actions suggested for the PWS? Other actions required of the PWS? Other non-administrative actions by TCEQ? Other administrative actions?
 - e. How does this response differ from the standard procedure for responding to this event? Why is it done this way?
3. How does TCEQ respond when a PWS has a repeat sample that is positive for total Coliform?
4. How does TCEQ respond when a PWS has a routine sample that is positive for fecal coliforms or *e.coli*?
5. How does TCEQ respond when a PWS has a repeat sample that is positive for fecal coliforms or *e.coli*?
6. How does TCEQ respond when a PWS has an MCL violation?

7. How does TCEQ respond when a PWS has an AMCL violation?
8. How does TCEQ respond when a PWS has a major routine monitoring and reporting (M/R) violation?
9. How does TCEQ respond when a PWS has a minor routine M/R violation?
10. How does TCEQ respond when a PWS has a major repeat M/R violation?
11. How does TCEQ respond when a PWS has a minor repeat M/R violation?
12. Are there other events that result in a response by TCEQ? [Repeat prompts.]

Overall

13. In your experience, what are the most effective state program activities to reduce the occurrence of M/R violations? MCL or AMCL violations?
 14. In your experience, what are the key roadblocks to TCR program implementation?
 15. Do you have any suggestions for improving the effectiveness or efficiency of the TCR program?
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Data Expert Interview

1. Describe the database used by TCEQ.
2. What types of information go into the database and how are these data collected? When are these data collected and in what format (i.e. electronic, hard copy, etc.)?
3. How is information entered into the database and who is responsible for entering information?
4. How does TCEQ use the database?
5. Does TCEQ provide training to users of the database?
6. Is the database user-friendly? If not, what makes it hard to use? How do these factors impact the TCR program?
7. Are data collected and stored in any other way besides this database? If so, could you describe how and why this is the case?
8. What QA/QC procedures has TCEQ established for entering data into the database (for example: consistent data collection and entry, completion of required fields, handling of duplicate entries)? How often is the database reviewed and who is responsible for this task?

APPENDIX C

INTERVIEW SCRIPTS FOR MDH SITE VISIT - JANUARY 27-29, 2009

Introductory Interview

Program Organization

1. Please give us a broad overview of the organization of MDH.
2. How does the TCR program fit in to the overall organization?
3. Discuss in detail the organization of the TCR program.
 - a. What are the key components of the program?
 - b. How are responsibilities distributed between the central and regional offices? Why?
4. What is MDH's philosophy on working with PWSs (i.e. hands-on versus hands-off, prevention versus response)?
5. What is MDH's philosophy on TCR implementation? What types of activity have the most priority and why?
6. What is MDH's philosophy on leveraging program resources?

Roles and Responsibilities

7. Describe the roles of the different offices and staff. What aspects of the TCR program are each responsible for? How do program partners fit in?
8. Does the TCR program have dedicated staff or do staff responsibilities include multiple programs? If the latter, approximately what percent of the time do they spend on TCR?
9. What priority is given to the TCR program relative to other drinking water rules?
10. How do staff members responsible for different components of the program communicate with each other?
11. To what extent does the TCR program rely on information exchanged with other parts of MDH? How is the information shared? How effective would you say is this system?

Standard Procedures

12. [Provide list of SOP documents] Does this set of documents completely document the official standard operating procedures for the TCR program? What is missing? What is included that shouldn't be?
13. Please describe the appropriate program staff response to the key TCR violations: M/R (major and minor), MCL, AMCL (and PN)?

Performance Metrics

14. Does MDH track the effectiveness or efficiency of the TCR program? If so, could you describe the measures that are being used? Would it be possible for us to see the current measure(s)?
 15. What data sources are being used to develop the measure(s) of effectiveness or efficiency?
 16. In your opinion, is this measure the best way to gauge the effectiveness or efficiency of the program? Is there a more relevant measure you would like to use? If so, what are the barriers to using this measure?
 17. Does MDH receive feedback on the effectiveness of TCR program delivery from PWSs or program partners? How is the feedback communicated? What are the key themes of the feedback?
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Detailed Interview

Roles and Responsibilities

1. What is your role at MDH? Discuss your responsibilities in the implementation of the TCR program.

Trigger Events, Responses and Activities

2. How does MDH respond when a PWS has a routine sample that is positive for total Coliform?
[Note: the following set of prompts is used for all questions in this section.]
 - f. How does this response vary for a community water system (CWS) versus a noncommunity water system (NCWS)?
 - g. How does this response vary for public water systems (PWS) that serve less than 1,000 consumers versus those that serve more than 1,000 consumers? Does it also vary for those that take 40 or more samples a month?
 - h. How does this response vary for PWSs that use surface water, ground water or ground water under direct influence of surface water?
 - i. What other activities follow this type of event? Public notifications? Other actions suggested for the PWS? Other actions required of the PWS? Other non-administrative actions by MDH? Other administrative actions?
 - j. How does this response differ from the standard procedure for responding to this event? Why is it done this way?
3. For systems that take more than 40 samples a month, how does MDH respond when a PWS has a repeat sample that is positive for total Coliform and the total number of positives is less than five percent of the total samples taken (i.e., no violation has been found)?
4. How does MDH respond when a PWS has a routine sample that is positive for fecal coliforms or *e.coli*?
5. How does MDH respond when a PWS has a repeat sample that is positive for fecal coliforms or *e.coli*?
6. How does MDH respond when a PWS has an MCL violation?

7. How does MDH respond when a PWS has an AMCL violation?
8. How does MDH respond when a PWS has a major routine monitoring and reporting (M/R) violation?
9. How does MDH respond when a PWS has a minor routine M/R violation?
10. How does MDH respond when a PWS has a major repeat M/R violation?
11. How does MDH respond when a PWS has a minor repeat M/R violation?
12. Are there other events that result in a response by MDH? [Repeat prompts.]

Overall

13. In your experience, what are the most effective state program activities to reduce the occurrence of M/R violations? MCL or AMCL violations?
14. In your experience, what are the key roadblocks to TCR program implementation?
15. Do you have any suggestions for improving the effectiveness or efficiency of the TCR program?

Supplementary Interviews - Base Interview Questions for Staff Covering Specific Program Areas

1. Describe your office's role at MDH. Describe your role and responsibilities with respect to the TCR program.
2. Does your office have any standard operating procedures for TCR? Could you describe those procedures?
3. How and under what circumstances would actual procedures vary from the standard operating procedures?
4. In your experience, how strong is the communication between your office and the Drinking Water program with respect to TCR issues?
5. What data systems are used by your program? How good are these data systems?
6. Does your office track the effectiveness or efficiency of your program? If so, could you describe the measures that are being used? Would it be possible for us to see the current measure(s)?

Data Expert Interview

1. Describe the database used by MDH.
2. What types of information go into the database and how are these data collected? When are these data collected and in what format (i.e. electronic, hard copy, etc.)?

3. How is information entered into the database and who is responsible for entering information?
4. How does MDH use the database?
5. Does MDH provide training to users of the database?
6. Is the database user-friendly? If not, what makes it hard to use? How do these factors impact the TCR program?
7. Are data collected and stored in any other way besides this database? If so, could you describe how and why this is the case?
8. What QA/QC procedures has MDH established for entering data into the database (for example: consistent data collection and entry, completion of required fields, handling of duplicate entries)? How often is the database reviewed and who is responsible for this task?

**APPENDIX D:
SOURCE DOCUMENTS PROVIDED BY MDH AND TCEQ**

Documents Provided by MDH

- “Monitoring Requirements for TCR”—A table listing MDH’s monitoring requirements for various sizes and types of PWSs.
- “BacTi Positive and Repeat Sampling Protocol”—A document providing instructions for laboratories reporting a positive bacteriological results.
- “Positive Monthly Bacti Sample Procedures”—A document describing step-by-step instructions for responding to and documenting positive monthly samples.
- “Positive Quarterly Bacteriological Sample Procedures”—A document describing step-by-step instructions for responding to and documenting positive quarterly samples.
- “Quarterly Microbiological Sampling for Total Coliform”—A document describing how to prepare for, collect and ship a total coliform sample.
- “Bacteriological Flow Chart – Monthly & Quarterly Systems”—A set of flow charts describing how to respond to a positive sample from a monthly or quarterly systems.
- “Bacteriological Investigation Report”—A document summarizing results from an investigation in response to a positive sample.
- “MDH Noncommunity Program 9/16/2008, What Happens When Coliform Bacteria is Present?”—A document describing MDH’s procedure for identifying violations, determining the cause of contamination and documenting sampling results.
- “Entering Noncommunity Bacti Incident”—A document with step-by-step instructions for entering positive sample results into MNDWIS.
- “Internal document tracking investigation of NCWS”—A document summarizing MDH actions in response to a positive sample from a noncommunity water system.
- “Bacteriological Investigation Report”—A letter sent to PWS summarizing samples and sampling results following an investigation of a positive sample.
- “Bacteriological Investigation Report, False Positive”—A letter sent to a PWS following an investigation that did not confirm positive sample results.
- “Letter subject: Notice of a Coliform Acute Maximum Contaminant level (AMCL) violation”—A letter informing a PWS of an AMCL violation.
- “Procedures for a Coliform Acute MCL (AMCL) Violation”—A document providing instructions and a template for PWSs notifying the public following an AMCL violation.

Documents Provided by TCEQ

- “30 TAC 290 Subchapter D: Rules and Regulations for Public Water Systems”—A document describing Texas regulations governing public water systems.
- “Checklist for TCR Daily Positive Samples”—A checklist for TCEQ staff performing a daily review of sample results reported by the lab.
- “TCEQ Monthly Summary of Multiple Bacteriological results for PWS”—A reporting form summarizing monthly sample results for a PWS.
- “Drinking Water Protection Team SOP: SOP #01-06 Daily List Positives”—A document describing the procedure that TCR program staff follow when responding to positive sample results.
- “Coliform Positive Bacteriological Sample(s)” —A courtesy letter sent to a PWS describing sampling requirements following a positive sample result.
- “Total Coliform Rule (TCR) Monitoring Violations”—A letter sent to a PWS in response to a routine monitoring violation.
- “Mandatory Language for Public Notice: Repeat Monitoring Violation (TCR 25/26)” —A template for public notice provided to PWSs following a repeat monitoring violation.
- “Mandatory Language for Public Notice: Routine Monitoring Violation (TCR 23/24)” —A template for public notice provided to PWSs following a routine monitoring violation.
- “Mandatory Language for Public Notice: Increased Monitoring Violation (T3/T4)” —A template for public notice provided to PWSs following a violation of increased monitoring requirements
- “Instructions for Notifying Customers of a MCL violation”—A document providing instructions and a template for PWSs notifying the public following an MCL violation.

**APPENDIX E
DETAILED EXPENDITURE TABLES**

Table E-1-State Response Actions and Levels of Effort (LOEs) for Responding to TCR-Related Events – Minnesota Department of Health (MDH)

Event	PWS Category	State Response Action	Level of Effort [a]
Routine Sample TC+, not Leading to Acute or Monthly MCL	CWS <1000	<ul style="list-style-type: none"> Collect repeat samples and on-site investigation of causes (including meeting set-up, phone calls, sampling, and associated technical assistance) 	<ul style="list-style-type: none"> 4-8 hours
	NCWS All	<ul style="list-style-type: none"> Short phone call to PWS to discuss results 	<ul style="list-style-type: none"> 5-10 minutes (assumed)
		<ul style="list-style-type: none"> Site visit and technical assistance. 	<ul style="list-style-type: none"> 20-60 min for most systems; 2hrs for larger non-transient systems
		<ul style="list-style-type: none"> Enter Bacti results in MNDWIS incident tracker 	<ul style="list-style-type: none"> 1-2hrs for travel
	CWS >1000	<ul style="list-style-type: none"> Visit PWS and conduct technical assistance 	<ul style="list-style-type: none"> < 5 minutes
Repeat Sample TC+, not Leading to Acute or Monthly MCL	CWS >1000	<ul style="list-style-type: none"> Visit PWS and conduct technical assistance 	<ul style="list-style-type: none"> 4 hours per event
Non-Acute MCL Violation	CWS All excepts those < 500	<ul style="list-style-type: none"> At least 2 visits to assist with chlorination, testing of residual and re-sampling 	<ul style="list-style-type: none"> 4-8 hours per visit (8-16 hours per event)
		<ul style="list-style-type: none"> Fax/email and enter data into MNDWIS 	<ul style="list-style-type: none"> 10 minutes per sample
		<ul style="list-style-type: none"> Send letter for NOV 	<ul style="list-style-type: none"> 1 hour
		<ul style="list-style-type: none"> Check every other day to track active files in MNDWIS 	<ul style="list-style-type: none"> <5 minutes
	CWS <500	<ul style="list-style-type: none"> Same as those > 500; but require more and longer visits. [Assume 4 visits per event] 	<ul style="list-style-type: none"> 8 hours per visit (32 hours per event)
	NCWS All	<ul style="list-style-type: none"> Contact facility to disinfect (often involves faxing information) 	<ul style="list-style-type: none"> 10 minutes
		<ul style="list-style-type: none"> Collect repeat samples, assist with disinfection (typically 2 visits per event) 	<ul style="list-style-type: none"> 4-6 hours per visit (6-16 hours per event)
	NCWS Quarterly or Monthly Reporting	<ul style="list-style-type: none"> Fax/email and enter data into MNDWIS 	<ul style="list-style-type: none"> 10 min per sample
		<ul style="list-style-type: none"> Send letter for NOV 	<ul style="list-style-type: none"> 1 hour
		<ul style="list-style-type: none"> Check every other day to track active files in MNDWIS 	<ul style="list-style-type: none"> <5 minutes
Acute MCL from FC/EC+ during	CWS All	<ul style="list-style-type: none"> Phone PWS to verify results 	<ul style="list-style-type: none"> 5-10 minutes
		<ul style="list-style-type: none"> Visit PWS and conduct technical assistance 	<ul style="list-style-type: none"> 4 hours

Event	PWS Category	State Response Action	Level of Effort [a]
Routine Sampling		• Fax/email and enter data into MNDWIS	• 10 minutes per sample
		• Send letter for NOV	• 1 hour
		• Check every other day to track active files in MNDWIS	• <5 minutes
	NCWS All	• Contact facility to disinfect (often involves faxing information)	• 10 minutes
		• Collect repeat samples, assist with disinfection (typically 2 visits per event)	• 4-6hours per visit (8-16 hours per event)
Acute MCL from FC/EC+ during Repeat Sampling	CWS All	Same as “Acute MCL from FC/EC+ during Routine Sampling”	
Minor M/R Violation during Routine Sampling	CWS All	• Courtesy calls to PWS (about 10 calls per month)	• 5 minutes per call
		• Enter manually-submitted samples into database	• 1hour per month
		• Phone call to lab to check results	• A few calls per month
		• Send reminder postcards	• 10-15 min per mailing
		• Generate and send letter for NOV	• 1 hour
Major M/R Violation during Routine Sampling	CWS All	Same as “Minor M/R Violation during Routine Sampling”	Same as “Minor M/R Violation during Routine Sampling”
Minor M/R Violation during Repeat Sampling	CWS All	Same as “Minor M/R Violation during Routine Sampling”	Same as “Minor M/R Violation during Routine Sampling”
Major M/R Violation during Repeat Sampling	CWS All	Same as “Minor M/R Violation during Routine Sampling”	Same as “Minor M/R Violation during Routine Sampling”
Sanitary Surveys	CWS All	• Pre-survey activities (review documents and last SS)	• .25-1.5 hours (includes travel)
		• On-site visit and information and paperwork update	• .25-1 hour (Note: MDH conducts 60-120 sanitary surveys per person per year)
		• Drop samples at the lab	• 15-30 minutes
	CWS Small	• Collect samples and conduct technical assistance	• 1 hour
		• Write up survey and update database	• 15-20 minutes
	CWS Very Large	• Collect samples	• >2 days; may require 1-2 engineers
		• Write up survey and update database	• 1.5-2 hours
NCWS All	• Write up survey	• .33-1.5 hours	

Event	PWS Category	State Response Action	Level of Effort [a]
	NCWS Average	<ul style="list-style-type: none"> Collect samples and conduct technical assistance 	<ul style="list-style-type: none"> 30-45 minutes
	NCWS Larger	<ul style="list-style-type: none"> Collect samples and conduct technical assistance 	<ul style="list-style-type: none"> >3 hours
	NCWS GW	<ul style="list-style-type: none"> Pre-survey activities (review documents and last SS) 	<ul style="list-style-type: none"> 15-20 minutes
	NCWS SW	<ul style="list-style-type: none"> Pre-survey activities (review documents and last SS) 	<ul style="list-style-type: none"> >15-20 minutes 2 -4 hours travel
Training and Conferences/Violation Prevention	All	<ul style="list-style-type: none"> Conduct TCR-related training for Well Contractors 	<ul style="list-style-type: none"> 2hrs every 5 years
		<ul style="list-style-type: none"> Prepare for TCR-related water school presentations 	<ul style="list-style-type: none"> 8 hours
		<ul style="list-style-type: none"> Conduct TCR-related water school presentations 	<ul style="list-style-type: none"> 1 hour (12 presentations per year) 1day for travel
		<ul style="list-style-type: none"> Conduct internal specialty training, including Webcasts 	<ul style="list-style-type: none"> 1-2 hour per session; 20-30sessions per year.
Guidance Documents	All	<ul style="list-style-type: none"> Revise 1994 document 	<ul style="list-style-type: none"> 30 hours for 1 key staff 20-30 hours for additional staff
		<ul style="list-style-type: none"> Revise TCR portion of sampling requirements packet 	<ul style="list-style-type: none"> 4-5 hours per year
		<ul style="list-style-type: none"> Revise NCWS staff reference guide 	<ul style="list-style-type: none"> 40-80 hours per year for basic revisions 16 hours per year for sanitary survey chapter revisions 24-44 hours per year for other revisions (including printing, editing, etc.)
Operator Certification	All	<ul style="list-style-type: none"> Review operator licenses. 	<ul style="list-style-type: none"> 5 minutes to 2 hours, but 2 hours would be unusual.
Data Tasks	All	<ul style="list-style-type: none"> Check log files 	<ul style="list-style-type: none"> 2 minutes per day
		<ul style="list-style-type: none"> Upload files 	<ul style="list-style-type: none"> 2 minutes per week
		<ul style="list-style-type: none"> Conduct other TCR-related data activities 	<ul style="list-style-type: none"> 2 hours per month
Labs	All	<ul style="list-style-type: none"> Log in sample 	<ul style="list-style-type: none"> 5 minutes per sample
		<ul style="list-style-type: none"> Set-up and sample analysis (includes membrane filtration) 	<ul style="list-style-type: none"> 22 minutes per sample
		<ul style="list-style-type: none"> Enter sample results into database 	<ul style="list-style-type: none"> 2-3 minutes per sample
Events Identified During Site Visits			
CWS Quarterly Reporting	CWS that report quarterly	<ul style="list-style-type: none"> Send reminder letters/cards [MDH staff sends reminder letters to NCWS that perform quarterly reporting.] 	<ul style="list-style-type: none"> 2 hrs per quarter
		<ul style="list-style-type: none"> Fax/email and enter data into MNDWIS 	<ul style="list-style-type: none"> 10 minutes per sample
		<ul style="list-style-type: none"> Send letters for NOV 	<ul style="list-style-type: none"> 1 hour per month
		<ul style="list-style-type: none"> Check every other day to track active files in MNDWIS 	<ul style="list-style-type: none"> <5 minutes per day

Event	PWS Category	State Response Action	Level of Effort [a]
CWS Monthly Reporting	CWS that report monthly	<ul style="list-style-type: none"> • Send reminder letters/cards [MDH staff sends reminder letters to NCWS that perform monthly reporting.] 	<ul style="list-style-type: none"> • 15 minutes per month
		<ul style="list-style-type: none"> • Fax/email and enter data into MNDWIS 	<ul style="list-style-type: none"> • 10 minutes per sample
		<ul style="list-style-type: none"> • Send letters for NOV 	<ul style="list-style-type: none"> • 1 hour per month
		<ul style="list-style-type: none"> • Check every other day to track active files in MNDWIS 	<ul style="list-style-type: none"> • <5 minutes per day

[a] All LOE estimates are per event (first column) unless otherwise specified.

Table ES-2-State Response Actions and Levels of Effort (LOEs) for Responding to TCR-Related Events – Texas Commission on Environmental Quality (TCEQ)

Event	PWS Category	State Response Action	Level of Effort [a]
Routine Sample TC+ not Leading to Acute or Monthly MCL	All	<ul style="list-style-type: none"> • Compile lists of samples and send out notifications 	Included under “Daily Activities” below
Repeat Sample TC+ not Leading to Acute or Monthly MCL	All	<ul style="list-style-type: none"> • Compile lists of samples and send out notifications 	Included under “Daily Activities” below
		<ul style="list-style-type: none"> • Phone call to PWS to discuss results 	<ul style="list-style-type: none"> • 20-40 minutes
		<ul style="list-style-type: none"> • Communicate with other parties (i.e. labs) 	<ul style="list-style-type: none"> • 10 minutes
Non-Acute MCL Violation	All	<ul style="list-style-type: none"> • Compile lists of samples and send out notifications 	Included under “Daily Activities” below
		<ul style="list-style-type: none"> • Phone call to lab to certify results 	<ul style="list-style-type: none"> • 10 minutes
		<ul style="list-style-type: none"> • Phone call to PWS to discuss results 	<ul style="list-style-type: none"> • 30 minutes
Acute MCL from FC/EC+ during Routine Sampling	All	<ul style="list-style-type: none"> • Compile lists of samples and send out notifications 	Included under “Daily Activities” below
		<ul style="list-style-type: none"> • Phone call to lab to certify results 	<ul style="list-style-type: none"> • 10 minutes
		<ul style="list-style-type: none"> • Phone call to PWS to discuss results 	<ul style="list-style-type: none"> • 30 minutes to 1 hour
Acute MCL from FC/EC+ during Repeat Sampling	All	<ul style="list-style-type: none"> • Compile lists of samples and send out notifications 	Included under “Daily Activities” below
		<ul style="list-style-type: none"> • Phone call to lab to certify results 	<ul style="list-style-type: none"> • 10 minutes
		<ul style="list-style-type: none"> • Phone call to PWS to discuss results 	<ul style="list-style-type: none"> • 30 minutes to 1 hour
		<ul style="list-style-type: none"> • Alert other affected parties as needed 	<ul style="list-style-type: none"> • 30 minutes every 3 years
M/R Violations: All Types (Minor During Routine Sampling, Major During Routine, Minor During Repair, Major During Repeat)	All	<ul style="list-style-type: none"> • Send required notices 	<ul style="list-style-type: none"> • 51-52 hours per month
		<ul style="list-style-type: none"> • Enter electronic submissions into database 	<ul style="list-style-type: none"> • 5-6 hours per month
		<ul style="list-style-type: none"> • Enter paper submissions into database 	<ul style="list-style-type: none"> • 80-120 hours per month
		<ul style="list-style-type: none"> • Respond to invalidation requests 	<ul style="list-style-type: none"> • 60-70 hours per month
		<ul style="list-style-type: none"> • Altering database as a result of sample invalidation 	<ul style="list-style-type: none"> • 2-4 hours per month per person (3 staff people involved; 6-12 hours per month total)
Comprehensive Compliance Investigations (2,500 CCI's per year)	All	<ul style="list-style-type: none"> • Conduct pre-investigation activities (workplan development, records review, scheduling) 	<ul style="list-style-type: none"> • 1-6 hours • 1-6 hours/event for travel
	CWS GW Any Size	<ul style="list-style-type: none"> • Conduct on-site investigation 	<ul style="list-style-type: none"> • 6-8 hours
	CWS SW <1000	<ul style="list-style-type: none"> • Conduct on-site investigation 	<ul style="list-style-type: none"> • 6-8 hours
	CWS SW >1000	<ul style="list-style-type: none"> • Conduct on-site investigation 	<ul style="list-style-type: none"> • 8-16 hours
	NCWS GW <1000	<ul style="list-style-type: none"> • Conduct on-site investigation 	<ul style="list-style-type: none"> • 2-4 hours

Event	PWS Category	State Response Action	Level of Effort [a]
	NCWS GW > 1000	• Conduct on-site investigation	• 6-8 hours
	NCWS SW <1000	• Conduct on-site investigation	• 6-8 hours
	NCWS SW >1000	• Conduct on-site investigation	• 8-16 hours
	All	• Conduct post-investigation activities (compiling results, writing report, issuing violations, correspondence)	• 2-8 hours
Training and Conferences	All	• Conduct TCR-related training	• 2 hours
		• Prepare for conference presentation	• 6-8 hours
		• Conduct presentation at 5-7 conference per year	• 7-10 hours total (all conferences) • 1-2 hours/event for travel
Guidance Documents	All	• Create new or update current materials for external use	• 10 hours per year
		• Create new or update current materials for internal use	• 8 hours per month
Other Communications	All	• Send reminder letters to PWSs	• 150 hours per year
		• Create CCR template	• 80-120 hours per year
Technical Assistance	All	• Make Directed Assistance Referrals (DAR)	• 10 minutes per referral
		• Conduct DAR related to TCR (conducted by TRWA); 150 visits per year.	• 4 hours per visit/600 hours/year
		• Answer phone calls to agency	• 100-400 hours per month
Enforcement Querying	All	• Total	• 8 hours per day
		• Make enforcement determinations	• 30 minutes per day
		• Send notifications	• 30 minutes
		• Build case	• 4-6 hours
		• Enter data into database	• < 5 minutes
Operator Certification	All	• Review manuals/materials	• 25-35 hours per complex manual; 4-8 hours per short material (creation/review of 100 Op Cert training manuals per year)
Events Identified During Site Visits			
Daily Activities	All	• Compile lists of samples	• 4 hours per day
		• Update the PWS inventory	• 6 hours per day
		• Conduct data QC	• 1 hour per day
		• Send notifications (for all violation types)	• .5-1 hour per day

**APPENDIX F:
ORGANIZATIONAL CHARTS FOR MDH AND TCEQ**



Drinking Water Protection Section
Minnesota Department of Health
Division of Environmental Health

Randy Ellingboe
Environmental Health Manager

Community Public Water Supply Unit

Karla Peterson, Supervisor
Admin. Engr.-Technical

Central Region
St. Cloud

David Schultz,
Supervisor
Principal Engineer

Kim Larsen
Engineer 2

St. Paul

Isaac Bradlich
Engineer 2

Chad Kolstad
Senior Engineer

South Region
Mankato

Mark Sweers,
Supervisor
Principal Engineer

Marshall

John Blomme
Engineer
Specialist, Sr.

Rochester

Paul Halvorson
Senior Engineer

St. Paul

Bassam Banat
Senior Engineer

North Region
Fergus Falls

Steven Pederson
Supervisor
Principal Engineer

Bemidji

Todd Johnson
Senior Engineer

Duluth

Michael Luhrsen
Senior Engineer

St. Cloud

Jon Groethe
Principal Engineer

St. Paul

Lih-in Reznia
Principal Engineer

Vacant
Principal Engineer

David Rindal
Senior Engineer

Vacant
Health Program
Rep.

Cindy Swanson
Health Program
Rep. Sr.

Pauline Wuoti
Health Program
Rep. Inter.

Source Water Protection Unit

Bruce Olsen, Supervisor
Hydrologist 4

GIS Technical
Support

Brian Johnson,
Leadworker
ITS 4 - GIS

Michael Baker
ITS 4 - GIS

Alan Epp
ITS 4 - GPS

Philippe LeGrand
ITS 3

Sheila Grow
Hydrologist
Supervisor

James Walsh
Hydrologist 3

James Lundy
Hydrologist 3

Yarta Clemens -
Major
Hydrologist 3

Gail Haglund
Hydrologist 3

Richard Soule
Hydrologist 3

Steve Robertson
Hydrologist 3

Justin Blum
Hydrologist 3

Vacant
Hydrologist 2

Amal Djerrari
Hydro 3

Source Water Protection
Student Workers

Vacant

SWP Plan
Approval
Rochester

Art Persons
Planning
Supervisor

Bemidji

Beth Kluthe
Principal
Planner

Mankato

Terry Bovee
Principal
Planner

St. Cloud

Vacant
Principal
Planner

Metro

Vacant
Planner

Noncommunity Public
Water Supply Unit

Gerald Smith, Supervisor
Admin. Engr.-Technical

Northeast Region
St. Paul

James Witkowski
Sanitarian Supvr.

Adesegun Adefuye
Sanitarian 3

Ezekiel Mark
Sanitarian 3

Steve Stone
Sanitarian 2

Duluth

Mark Peterson
Sanitarian 2

Mike Suttiff
Sanitarian 2

Lawrence
Peterson
Sanitarian 2

West Central Region
Fergus Falls

Sharon Smith
Sanitarian Supvr.

Jill DeBrito
Sanitarian 2

Kyle Johnsen
Sanitarian 1

Tony Mariotti
Sanitarian 2

St. Cloud

Dave Schaff
Sanitarian 3

Karen Voz
Sanitarian 3

Karen Kullgren
Sanitarian 2

Northwest Region
Bemidji

Tom Davey
Sanitarian Supvr.

Paul Felling
Sanitarian 3

Wayne Potter
Sanitarian 2

Steven Lindgren
Sanitarian 3

Javin Bedard
Sanitarian 2

Greg Boole
Sanitarian 2

South Region
Mankato

Carol Kephart,
Sanitarian Supvr.

Rhonda Johnson
Sanitarian 2

Marshall

Joyce Hedlin
Sanitarian 3

Rochester

Dave Abnet
Sanitarian 2

St. Paul

Scott Hanson
Sanitarian 1

St. Paul

Brenda
Eschenbacher
Sanitarian 3

St. Paul

Krishna Mohan
Engineer 1

Rochelle Spielman
Sanitarian 1

Christine Oliver
Sanitarian 2

Chris O'Brien
Health Program
Rep.

Ann Norgaard
Sanitarian 1

Susan Hibberd
Health Educator 2

Duluth

Anita Anderson
Senior Engineer

Administrative Unit
St. Paul

Robert Smude, Supervisor
Admin. Engr.-Technical

Education/Certification

Stew Thornley,
Leadworker
Health Educator 3

Vacant
Health Program
Rep. Sr.

Mark Sloan
Health Program
Rep. - Sr.

Engineering

Brian Noma
Principal Engineer

Lucas Martin
Engineer 2

Matthew Bartholow
Student Wkr
Para Professional

State Revolving Fund

John Schnickel
State Prog.
Admin. Princ.

Compliance/Financial

Anita Smith
Grants Specialist
Intermediate

System Support

Theresa Roble
ITS 4

Judy McDermott
ITS 2

QA/Planning

Douglas Benson
Principal Planner

Support Staff Unit
St. Paul

Marilyn Krause
Office Services
Supervisor 1

Section Support

Carrie Pasket
Office & Admin.
Specialist Sr.

Nancy Kadrik
Office & Admin.
Specialist

State Revolving Fund
Education & Certification

Noel Hansen
Office & Admin.
Specialist Sr.

Jeanette Boothe
Office & Admin.
Specialist Sr.

NonCommunity

Melissa LaFayette
Office & Admin.
Specialist Sr.

Community

Vacant
State Prog. Admin
Tech Specialist

Kathy Russell
Office & Admin.
Specialist Sr.

Jenevera Cook
Office & Admin
Specialist -temp

Source Water

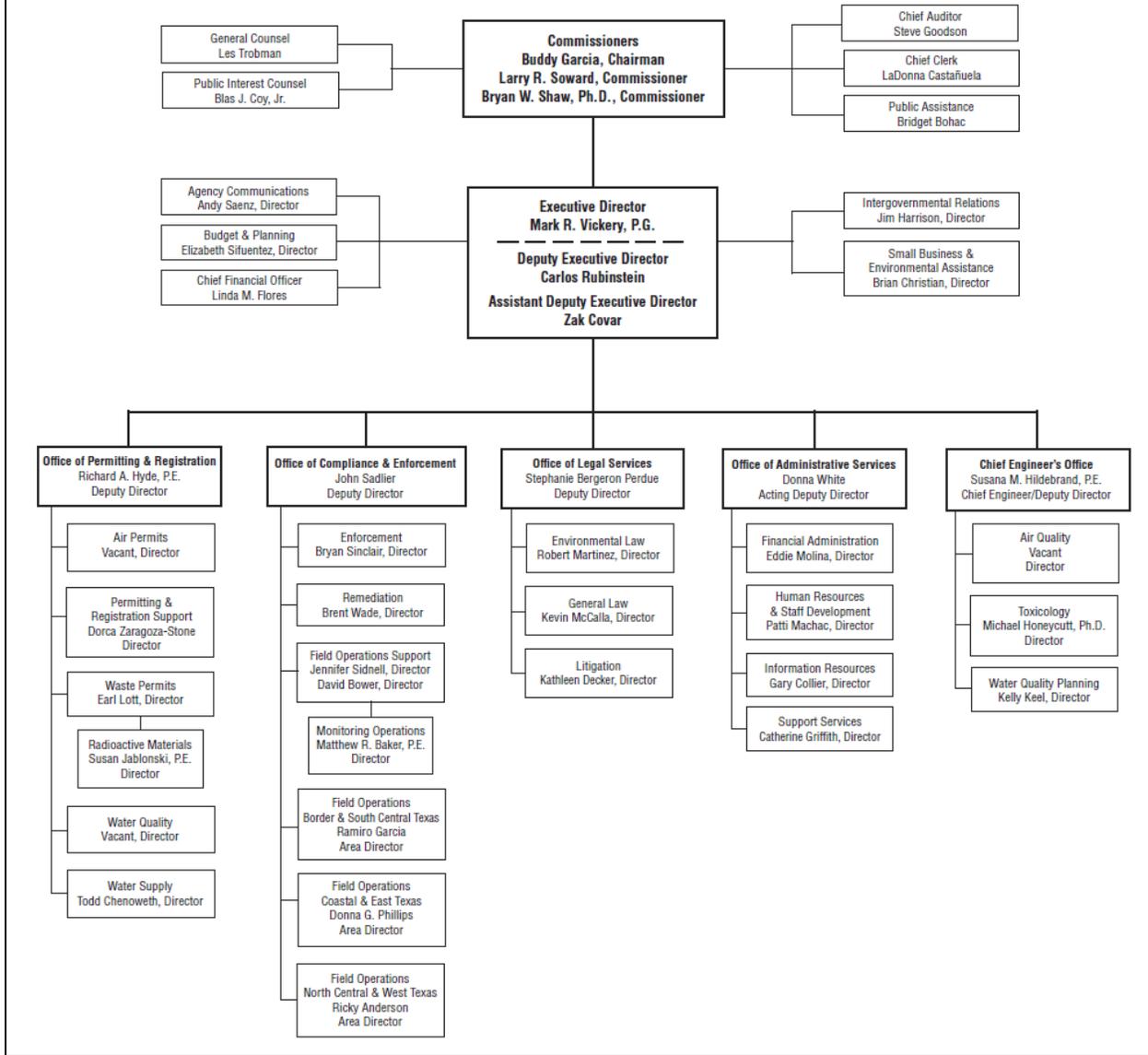
Trudi Witkowski,
State Prog Admin.
Tech Spec.-DWP

Kathleen Corson
Office & Admin.
Specialist Sr.

Melanie Johnson
Office Specialist

TCEQ ORGANIZATION

July 22, 2009



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**APPENDIX G:
DETAILS ON CALCULATING THE SAMPLE INCIDENT RATE USING LOGIC MODEL
REPORTING TOOL DATA**

This appendix describes the process ERG used in calculating the incident rates. ERG’s approach involved using the 06(2) data from the Logic Model Reporting Tool (LMRT) data. However, the same calculation can be done using the A6(1) data.

Once the MS Excel pivot table file is open, you should “Unhide” the “DetailData” sheet (Format-Sheet-Unhide) and sort those data by PWSID and then by Violation Awareness Date. Once that is done, insert a new sheet and call it “Calcs.” Format the “Calcs” sheet as to look like the following:¹

	A	B	C	D	E	F	G
6	Final row on DetailData		2397				
7	Earliest		1/1/04				
8	Latest		12/31/08				
9	Ref Period Months		3				
10	Tracking Period Months		9				
11							
12							
13	Reference Period				Tracking Period		
14	Start	End	ID	Number of unique systems	End	Incidents	Rate
15	1/1/04	3/31/04	1	50	12/31/04	30	60.0
16	4/1/04	6/30/04	2	129	3/30/05	17	13.2
17	7/1/04	9/30/04	3	157	6/30/05	24	15.3
18	10/1/04	12/31/04	4	72	10/1/05	17	23.6
19	1/1/05	3/31/05	5	45	12/31/05	25	55.6
20	4/1/05	6/30/05	6	168	3/30/06	43	25.6
21	7/1/05	9/30/05	7	198	6/30/06	58	29.3
22	10/1/05	12/31/05	8	98	10/1/06	33	33.7
23	1/1/06	3/31/06	9	51	12/31/06	26	51.0
24	4/1/06	6/30/06	10	163	3/30/07	38	23.3
25	7/1/06	9/30/06	11	164	6/30/07	43	26.2
26	10/1/06	12/31/06	12	75	10/1/07	24	32.0
27	1/1/07	3/31/07	13	45	12/31/07	14	31.1
28	4/1/07	6/30/07	14	145	3/30/08	29	20.0
29	7/1/07	9/30/07	15	166	6/30/08	29	17.5
30	10/1/07	12/31/07	16	113	10/1/08	33	29.2
31	1/1/08	3/31/08	17	50	12/31/08	15	30.0

¹ Descriptions on how to calculate the numbers in the ‘Calcs’ sheet appear in the table that follows this screen shot.

The following are the Excel formulas to be used in constructing the “Calcs” sheet:

Description in Above Example	Formula	Purpose/Description
Header Information		
Final row of DetailData	COUNTA('DetailData '!B:B)	Count the total number of records in the DetailData sheet. Used as a programming end point.
Earliest	MIN(INDIRECT("'"DetailData '!O2:O"&\$C\$6))	Find the earliest date in the DetailData sheet.
Latest	MAX(INDIRECT("'"DetailData '!O2:O"&\$C\$6))	Find the latest date in the DetailData sheet.
Ref Periods Months	Number to be entered by user.	Sets the length of the reference period. Once all of the formulas are complete, this can be manipulated to see the effect of changing reference period length on the incident rate.
Tracking Period Months	Number to be entered by user.	Sets the length of the tracking period. Once all of the formulas are complete, this can be manipulated to see the effect of changing tracking period length on the incident rate.
Column Information		
Start (under Reference Period), first cell in column	=C7	References “Earliest” date from header information.
Start (under Reference Period), second cell in column	=B15+1	Adds one day to the end date of previous reference period.
Start (under Reference Period), all remaining cells in column	Copy and paste second cell in column to remaining.	Adds one day to the end date of previous reference period. Cut and paste down for other rows.
End (under Reference Period), all cells	DATE(YEAR(A15),MONTH(A15)+\$C\$9,DAY(A15))-1	Calculates end date of the reference period. Cut and paste down for other rows.
ID (under Reference Period)	Number set by user. Number reference periods starting at one.	ID codes for reference periods to simplify programming.
Number of unique systems (under Reference Period)	COUNTIF(INDIRECT("'"DetailData '!Y\$2:\$Y"&\$C\$6),Calcs!C15)	Calculates the number of unique systems in the reference period. Cut and paste down for other rows. <i>NOTE: the “Y” column on “DetailData” will be defined below.</i>
End (under Tracking Period)	DATE(YEAR(B15),MONTH(B15)+\$C\$10,DAY(B15))	Calculates the end date of the tracking period. Cut and paste down for other rows.
Incidents	SUMIF(INDIRECT("'"DetailData '!X\$2:\$X"&\$C\$6), Calcs!\$C15,INDIRECT("'"DetailData '!AC\$2:AC"&\$C\$6))	Calculates the number of incidents that occur at the reference period systems through the end of the tracking period. Cut and paste down for other rows. <i>NOTE: “DetailData” columns “X” and “AC” will be defined below.</i>
Rate	IF(ISERROR(F15/D15),"-", 100*F15/D15)	Calculates the incident rate. Cut and paste down for other rows.

The “DetailData” sheet will need to have a number of columns added to it to perform calculations. Our example assumes that the first open column is column “X” in the “DetailData” sheet.² Additionally, the data in the “DetailData” sheet must be sorted by PWSID and then by Violation Awareness Data. The following calculations should be added to the data in the “DetailData” sheet:

Column	Row	Formula	Purpose/Description
X	1	“RP”	Column label.
X	2 – end	VLOOKUP(O2,Calcs!\$A\$15:\$C\$34,3, TRUE)	Identifies the reference period for the violation. Copy and paste to end.
Y	1	“UniqueInRP”	Column label.
Y	2	=X2	Used to determine uniqueness of PWSID in reference period. Copy and paste to end.
Y	3 – end	IF(AND(C3=C2,X3=X2),"",X3)	
Z	1	“Counts”	Column label.
Z	2 – end	COUNTIF(\$C\$2:\$C\$2397,C2)	Counts the number of times each PWSID appears in the data. Copy and paste to end. <i>Note: the \$C\$2397 should be updated to reflect the final record in the database.</i>
AA	1	“Position”	Column label.
AA	2	=1	Sets a counting start point.
AA	3 – end	IF(C3=C2,AA2+1,1)	Counts sequence for each PWSID. Copy and paste to end.
AB	1	“EndF”	Column label.
AB	2 - end	VLOOKUP(X2,Calcs!\$C\$15:\$E\$34,3,FALSE)	Calculates the end of the tracking period for the violation’s reference period. Copy and paste to end.
AC	1	“Incidents”	Column label.
AC	2 – end	COUNTIF(INDIRECT("O"&ROW()): INDIRECT("O"&ROW(OFFSET(\$O2,\$Z2-\$AA2,0))),">"&O2)- COUNTIF(INDIRECT("O"&ROW()): INDIRECT("O"&ROW(OFFSET(\$O2,\$Z2-\$AA2,0))),">="&AB2)	Calculates the number of incidents in the tracking period for the reference period violation.

² If “X” is open, but not the first open column, then these formulas will still work. However, if “X” is not open, the formulas will need to be adjusted accordingly.