

**VERMONT****Vermont Department of Environmental Conservation
Drinking Water and Groundwater Protection Division***Agency of Natural Resources***Disinfection Byproducts (DBP) Operational Evaluation Report****I. GENERAL INFORMATION**

Water System Name: _____ WSID: _____

Water Source (check all that apply): Surface Water Surface Water Purchased from _____
Groundwater Groundwater Purchased from _____

Report Prepared by: (Print): _____

(Signature): _____ Date: _____

II. OPERATIONAL EVALUATION LIMIT (OEL) EXCEEDANCE DATA

See the letter that requested this report for a summary of this information. The OEL value at a sample point is the weighted average of the last 3 quarters, with most recent weighted twice. HAA5 = total of 5 haloacetic acids. TTHM = total of 4 trihalomethanes. Sample points = HA001, TH003, etc.

OEL exceedance(s) that triggered this report; if you only had one, only complete the first row:

1. HAA5 TTHM OEL = _____ µg/L mg/L Sample Point _____ Address _____
2. HAA5 TTHM OEL = _____ µg/L mg/L Sample Point _____ Address _____
3. HAA5 TTHM OEL = _____ µg/L mg/L Sample Point _____ Address _____
4. HAA5 TTHM OEL = _____ µg/L mg/L Sample Point _____ Address _____

Collection date of last quarterly DBP sample that caused the OEL exceedance: _____

III. OPERATIONAL EVALUATION FINDINGS**A. Checklists and any other documents attached to this report.**

Source Water Evaluation Checklist – optional for consecutive systems

Treatment Process Evaluation Checklist – optional for consecutive systems

Distribution System Evaluation Checklist – required for all systems

Other documents attached (e.g., separate text for B or C below): _____

B. Summarize the most likely cause(s) of this OEL exceedance, considering the three quarters included in the calculation.**C. List steps that could be taken to minimize future OEL exceedances. If there was a previous OEL or MCL exceedance, review any changes made already.**

Return this signed page, checklists, and any other attachments to DBP Rule Coordinator (_____):
Mail to VT DEC DWGPD; 1 National Life Dr, Davis 4; Montpelier VT 05620-3521 or
Fax to: 802-828-1541 or Email to: _____

Source Water Evaluation Checklist

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☐ NO DATA AVAILABLE

System Name:

Checklist Completed by: _____

A. Do you have source water temperature data? ☐ Yes ☐ No

If NO, proceed to item B. If YES, was the source water temperature high? ☐ Yes ☐ No

If NO, proceed to item B. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

☐ ☐ Was the raw water storage time longer than usual?

☐ ☐ Did you place another water source on-line?

☐ ☐ Were river/reservoir flow rates lower than usual? If yes, indicate the location of lower flow rates and the anticipated impact on the OEL exceedance.

☐ ☐ Did point or non-point sources in the watershed contribute to the OEL exceedance?

B. Do you have data that characterizes organic matter in your source water (e.g., TOC, DOC, SUVA, color, THM formation potential)? ☐ Yes ☐ No

If NO, proceed to item C. If YES, were these values higher than normal? ☐ Yes ☐ No

If NO, proceed to item C. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

☐ ☐ Did heavy rainfall or snowmelt occur in the watershed?

☐ ☐ Did you place another water source on-line?

☐ ☐ Did lake or reservoir turnover occur?

☐ ☐ Did point or non-point sources in the watershed contribute to the OEL exceedance?

☐ ☐ Did an algal bloom occur in the source water?

☐ ☐ If algal blooms were present, were appropriate algae control measures employed (e.g., addition of copper sulfate)?

☐ ☐ Did a taste and odor incident occur?

C. Do you have source water bromide data? ☐ Yes ☐ No

If NO, proceed to item D. If YES, were the bromide levels higher or lower than normal? ☐ Yes ☐ No

If NO, proceed to item D. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

☐ ☐ Has saltwater intrusion occurred?

☐ ☐ Are you experiencing a long-term drought?

☐ ☐ Did heavy rainfall or snowmelt occur in the watershed?

☐ ☐ Did you place another water source on-line?

☐ ☐ Are you aware of any industrial spills in the watershed?

Source Water Evaluation Checklist

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D. Do you have source water turbidity or particle count data? ☐ Yes ☐ No

If NO, proceed to item E. If YES, were the turbidity values or particle counts higher than normal? ☐ Yes ☐ No

If NO, proceed to item E. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- ☐ ☐ Did lake or reservoir turnover occur?
- ☐ ☐ Did heavy rainfall or snowmelt occur in the watershed?
- ☐ ☐ Did logging, fires, or landslides occur in the watershed?
- ☐ ☐ Were river/reservoir flow rates higher than normal?

E. Do you have source water pH or alkalinity data? ☐ Yes ☐ No

If NO, proceed to item F. If YES, was the pH or alkalinity different from normal values? ☐ Yes ☐ No

If NO, proceed to item F. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- ☐ ☐ Was there an algal bloom in the source water?
- ☐ ☐ If algal blooms were present, were algae control measures employed?
- ☐ ☐ Did heavy rainfall or snowmelt occur in the watershed?
- ☐ ☐ Has the PWS experienced diurnal pH changes in source water?

F. Conclusion

Did source water quality factors contribute to your OEL exceedance? ☐ Yes ☐ No
☐ Possibly

If YES or POSSIBLY, explain below.

Treatment Process Evaluation Checklist

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☐ NO DATA AVAILABLE

Facility Name:

Checklist Completed by:

A. Review finished water data for the time period prior to the OEL exceedance(s) and compare to historical finished water data using the following questions:

Were DBP precursors (TOC, DOC, SUVA, bromide, etc.) higher than normal? ☐ Yes ☐ No

Was finished water pH higher or lower than normal? ☐ Yes ☐ No

Was the finished water temperature higher than normal? ☐ Yes ☐ No

Was finished water turbidity higher than normal? ☐ Yes ☐ No

Was the disinfectant concentration leaving the plant(s) higher than normal? ☐ Yes ☐ No

Were finished water TTHM/HAA5 levels higher than normal? ☐ Yes ☐ No

Were operational and water quality data available to the system operator for effective decision making? ☐ Yes ☐ No

B. Does the treatment process include predisinfection? ☐ Yes ☐ No

If NO, proceed to item C. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

☐ ☐ Was disinfected raw water stored for an unusually long time?

☐ ☐ Were treatment plant flows lower than normal?

☐ ☐ Were treatment plant flows equally distributed among different trains?

☐ ☐ Were water temperatures high or warmer than usual?

☐ ☐ Were chlorine feed rates outside the normal range?

☐ ☐ Was a disinfectant residual present in the treatment train following predisinfection?

☐ ☐ Were online instruments utilized for process control?

☐ ☐ Did you switch to free chlorine as the oxidant?

☐ ☐ Was there a recent change (or addition) of pre-oxidant?

☐ ☐ Did you change the location of the predisinfection application?

C. Does your treatment process include presedimentation? ☐ Yes ☐ No

If NO, proceed to item D. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

☐ ☐ Were flows low?

☐ ☐ Were flows high?

☐ ☐ Were online instruments utilized for process control?

☐ ☐ Was sludge removed from the presedimentation basin?

☐ ☐ Was sludge allowed to accumulate for an excessively long time?

☐ ☐ Do you add a coagulant to your presedimentation basin?

☐ ☐ Was there a problem with the coagulant feed?

D. Does your treatment process include coagulation and/or flocculation? ☐ Yes ☐ No

If NO, proceed to item E. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Were there any feed pump failures or were feed pumps operating at improper feed rates? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were chemical feed systems controlled by flow pacing? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were there changes in coagulation practices or the feed point? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you change the type or manufacturer of the coagulant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you suspect that the coagulant in use at the time of the OEL exceedance did not meet industry standards? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did the pH or alkalinity change at the point of coagulant addition? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were there broken or plugged mixers? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were flow rates above the design rate or was there short-circuiting? |

E. Does your treatment process include sedimentation or clarification? ☐ Yes ☐ No

If NO, proceed to item F. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Were there changes in plant flow rate that may have resulted in a decrease in settling time or carry-over of process solids? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were settled water turbidities higher than normal? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there any disruption in the sludge blanket that may have resulted in carryover to the point of disinfection? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there any maintenance in the basin that may have stirred sludge from the bottom of the basin and caused it to carry over to the point of disinfectant addition? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was sludge allowed to accumulate for an excessively long time or was there a malfunction in the sludge removal equipment? |

F. Does your treatment process include filtration? ☐ Yes ☐ No

If NO, proceed to item G. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in individual or combined filter effluent turbidity or particle counts? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in turbidity or particle loading onto the filters? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in flow onto the filters or malfunction of the rate of flow controllers? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were any filters taken off-line for an extended period of time that caused the other filters to operate near maximum design capacity and created the conditions for possible breakthrough? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were any filters operated beyond their normal filter run time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were there any unusual spikes in individual filter effluent turbidity (which may indicate particulate or colloidal TOC breakthrough) in the days leading to the excursion? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were all filters run in a filter-to-waste mode during initial filter ripening? |
| <input type="checkbox"/> | <input type="checkbox"/> | If GAC filters are used, is it possible the adsorptive capacity of the GAC bed was reached before reactivation occurred (leave blank if not applicable)? |
| <input type="checkbox"/> | <input type="checkbox"/> | If biological filtration is used, were there any process upsets that may have resulted in the breakthrough of TOC (leave blank if not applicable)? |

G. Does your treatment process include primary disinfection by injecting chlorine prior to a clearwell? ☐ Yes ☐ No

If NO, proceed to item H. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a sudden increase in the amount of chlorine fed or an increase in the chlorine residual? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in clearwell holding time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was the plant shut down or were plant flows low? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in clearwell water temperature? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you switch to free chlorine recently as the primary disinfectant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was the inactivation of <i>Giardia</i> and/or viruses exceptionally high? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a change in the mixing strategy (i.e., mixers not used, adjustment of tank level)? |

H. Does your plant recycle spent filter backwash or other streams? ☐ Yes ☐ No

If NO, proceed to item I. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Did a change in the recycle stream quality contribute to increased DBP precursor loading that was not addressed by treatment plant processes? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did a recycle event result in flows in excess of typical or design flows? |

Treatment Process Evaluation Checklist

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- I. Do you inject a disinfectant after your clearwell to maintain a distribution system residual? ☐ Yes ☐ No

If NO, proceed to item J. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

- ☐ ☐ Was there a sudden increase in the amount of chlorine fed?
- ☐ ☐ Was there a switch from chloramines to free chlorine for a burnout period?
- ☐ ☐ If using chloramines, was the chlorine to ammonia ratio in the proper range?
- ☐ ☐ Was there a problem with either chlorine or ammonia mixing?

- J. Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the LT2ESWTR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by other treatment targets/requirements in your ability to control precursors in coagulation/flocculation? ☐ Yes ☐ No

If NO, proceed to item K. If YES, explain below and consult EPA's *Simultaneous Compliance Guidance Manual* for alternative compliance approaches.

K. Conclusion

- Did treatment factors and/or variations in the plant performance contribute to the OEL exceedance(s)? ☐ Yes ☐ No
- ☐ Possibly

If YES or POSSIBLY, explain below.

Distribution System Evaluation Checklist

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System Name: _____

Checklist Completed by: _____ Date: _____

- A. Do you have disinfectant residual or temperature data for the monitoring location where you experienced the OEL exceedance? ☐ Yes ☐ No

If NO, proceed to item B. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

- ☐ ☐ Was the water temperature higher than normal for that time of the year at that location?
- ☐ ☐ Was the disinfectant residual lower than normal for that time of the year at that location?
- ☐ ☐ Was the disinfectant residual higher than normal for that time of the year at that location?

- B. Do you have maintenance records available for the time period just prior to the OEL exceedance? ☐ Yes ☐ No

If NO, proceed to item C. If YES, answer the following questions:

Yes No

- ☐ ☐ Did any line breaks or replacements occur in the vicinity of the exceedance?
- ☐ ☐ Were any storage tanks or reservoirs taken off-line and cleaned?
- ☐ ☐ Did flushing or other hydraulic disturbances (e.g., fires) occur in the vicinity of the exceedance?
- ☐ ☐ Were any valves operated in the vicinity of the OEL exceedances?

- C. If your system is metered, do you have access to historical records showing water use at individual service connections? ☐ Yes ☐ No

If NO, proceed to item D. If YES, was overall water use in your system unusually low, indicating higher than normal water age? ☐ Yes ☐ No

- D. Do you have high-volume customers in your system (e.g., an industrial processing plant)? ☐ Yes ☐ No

If NO, proceed to item E. If YES, was there a change in water use by a high-volume customer? ☐ Yes ☐ No

- E. Is there a finished water storage facility hydraulically upstream from the monitoring location where you experienced the OEL exceedance? ☐ Yes ☐ No

If NO, proceed to item F. If YES, review storage facility operations and water quality data to answer the following questions for the period in which the OEL exceedance occurred:

Yes No

- ☐ ☐ Was a disinfectant residual detected in the stored water or at the tank outlet?
- ☐ ☐ Do you know of any mixing problems with the tank or reservoir?
- ☐ ☐ Does the facility operate in "last in-first out" mode?
- ☐ ☐ Was the tank or reservoir drawn down more than usual prior to OEL exceedance, indicating a possible discharge of stagnant water?
- ☐ ☐ Was there a change in water level fluctuations that would have resulted in increased water age within the tank or reservoir?

Distribution System Evaluation Checklist

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F. Does your system practice booster chlorination? ☐ Yes ☐ No

If NO, proceed to item G. If YES, was there an increase in booster chlorination feed rates?

☐ Yes ☐ No

G. Did you have customer complaints in the vicinity of the OEL exceedance? ☐ Yes ☐ No

If NO, proceed to item H. If YES, explain.

H. Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the TCR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by the need to maintain a detectable disinfectant residual in your ability to control DBP levels in the distribution system? ☐ Yes ☐ No

If NO, proceed to item I. If YES, explain below and consult EPA's *Simultaneous Compliance Guidance Manual* for alternative compliance approaches.

I. Conclusion

Did the distribution system cause or contribute to the OEL exceedance(s)?

☐ Yes ☐ No

☐ Possibly

If NO, proceed to evaluations of treatment systems and source water. If YES or POSSIBLY, explain below.
