

Appendix D

Chapter 10: Disinfectants and Disinfection Byproduct Rule

Operational Evaluation Level Forms

- Additional OEL Information
- Operational Evaluation Level Forms
 - Operational Evaluation Report*
 - Source Water Checklist*
 - Treatment Process Evaluation Checklist*
 - Distributional System Evaluation Checklist*

Systems are required to complete all of the following forms if they exceed the OEL. If your water system exceeds the OEL, you must conduct an operational evaluation and submit a written report of the evaluation to the Illinois EPA no later than 90 days after being notified of the analytical result that causes it to exceed the OEL. A water system may request to limit the scope of their evaluation if they are able to identify the cause of the operational evaluation level exceedence.


Operational Evaluation Reporting Form

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I. GENERAL INFORMATION**A. Facility Information**

Facility Name: Village of Mt. Zion PWSID: IL1150350
Facility Address: 1400 Mt Zion Parkway
City: Mt. Zion State: IL Zip: 62549

B. Report Prepared by:

(Print): Michael Buzicky, P.E. Date prepared: 4/30/24
(Signature): 
Contact Telephone Number: 217-403-3373

II. MONITORING RESULTS**A. Provide the Compliance Monitoring Site(s) where the OEL was Exceeded.**S2HT1

Note: The site name or number should correspond to a site in your Stage 2 DBPR compliance monitoring plan.

B. Monitoring Results for the Site(s) Identified in II.A (include duplicate pages if there was more than one exceedance)

1. Check TTHM or HAA5 to indicate which result caused the OEL exceedance. ☒ TTHM ☐ HAA5

2. Enter your results for TTHM or HAA5 (whichever you checked above).

	Quarter			Operational Evaluation Value
	Results from Two Quarters Ago	Prior Quarter's Results	Current Quarter	
	A	B	C	
				$D = (A+B+(2 \times C))/4$
Date sample was collected	8/3/23	11/20/24	2/14/24	
TTHM (mg/L)	0.101	0.074	0.111	0.099
HAA5 (mg/L)	0.0259	0.0237	0.0472	0.036

Note: The operational evaluation value is calculated by summing the two previous quarters of TTHM or HAA5 values plus twice the current quarter value, divided by four. If the value exceeds 0.080 mg/L for TTHM or 0.060 mg/L for HAA5, an OEL exceedance has occurred.

C. Has an OEL exceedance occurred at this location in the past? ☒ Yes ☐ No

If YES, when did exceedance occur?

Was the cause determined for the previous exceedance(s)? ☒ Yes ☐ No

Are the previous evaluations/determinations applicable to the current OEL exceedance? ☒ Yes ☐ No

Operational Evaluation Reporting Form

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III. OPERATIONAL EVALUATION FINDINGS

- A. Did the State allow you to limit the scope of the operational evaluation? ☐ Yes ☒ No
If NO, proceed to item B. If YES, attach written correspondence from the State.

- B. Did the **distribution system** cause or contribute to your OEL exceedance(s)? ☐ Yes ☐ No
☒ Possibly
If NO, proceed to item C. If YES or POSSIBLY, explain (attach additional pages if necessary):
The water distribution system in the location of the sample sites is older, corroded and has hydraulic issues with water age and looping. The water main materials in the location of the sample site is conducive to corroding, mineral build up and TTHM formation.

- C. Did the **treatment** system cause or contribute to your OEL exceedance(s)? ☐ Yes ☒ No
☐ Possibly
If NO, proceed to item D. If YES or POSSIBLY, explain (attach additional pages if necessary):
The Village of Mt. Zion does not have a WTP. Rather the Village purchases bulk source water from the City of Decatur. The City does have a WTP and has future plans for WTP improvements to reduce TTHM in the source water.

- D. Did **source water quality** cause or contribute to your OEL exceedance(s)? ☐ Yes ☐ No
☒ Possibly
If NO, proceed to item E. If YES or POSSIBLY, explain (attach additional pages if necessary):
Yes, the source water from the City of Decatur does have varying levels of TTHM, Cl residuals, and organics. The Village cannot control the incoming level of TTHM. The City's source water is Lake Decatur, which sees high organics and algae.

- E. Attach all supporting operational or other data that support the determination of the cause(s) of your OEL exceedance(s).

- F. If you are unable to determine the cause(s) of the OEL exceedance(s), list the steps that you can use to better identify the cause(s) in the future (attach additional pages if necessary):
The Village has increased sampling of Cl residuals, organics and TTHM in the source water and Village system. The increased monitoring helps make operational actions. The Village has increased flushing of the water distribution system.

- G. List steps that could be considered to minimize future OEL exceedances (attach additional pages if necessary)
Due to poor material condition, age, corrosion, size of the water mains and hydraulic limitations near the sample site, the Village has requested a new TTHM sample site and completed install of this new sample station. Looping water main also completed.

- H. Total **Number of Pages** Submitted, Including Attachments and Checklists: 3

This Agency is authorized to require this information under 415 ILCS 5. Failure to disclose this information may result in a civil penalty of not to exceed \$50,000 for the violation and an additional civil penalty of not to exceed \$10,000 for each day during which the violation continues (415 ILCS 5/42). This has been approved by the Forms Management Center.

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PWS 292 01/2013

Source Water Evaluation Checklist

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☒ NO DATA AVAILABLE

System Name: City of Decatur Water

Checklist Completed by: _____ Date: _____

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.

The Village of Mt. Zion does not have the City of Decatur Source Water Data for this section.

The source water does contribute to the OEL Exceedance as there is TTHM coming in as bulk purchased water prior to entering the Village water distribution system.

The City's source is Lake Decatur, which may contribute to higher organic levels, which reacts to form TTHM. This fall 2023, saw drought conditions in Central Illinois, including Lake Decatur. The Lake was lower in these drought conditions, concentrating organics and seeing higher levels of algae growth. Both of which contributes to THM formation. The City The City is planning added treatment to its source water, in an effort to reduce organics and algae from the source water. These treatment additions are expected in 2025.

Treatment Process Evaluation Checklist

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☒ NO DATA AVAILABLE

Facility Name: City of Decatur Water

Checklist Completed by: _____ Date: _____

- 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? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Was finished water pH higher or lower than normal? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Was the finished water temperature higher than normal? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Was finished water turbidity higher than normal? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Was the disinfectant concentration leaving the plant(s) higher than normal? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Were finished water TTHM/HAA5 levels higher than normal? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Were operational and water quality data available to the system operator for effective decision making? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

- B. Does the treatment process include pre-disinfection? ☐ 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 | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Was disinfected raw water stored for an unusually long time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were treatment plant flows lower than normal? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were treatment plant flows equally distributed among different trains? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were water temperatures high or warmer than usual? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were chlorine feed rates outside the normal range? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was a disinfectant residual present in the treatment train following predisinfection? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were online instruments utilized for process control? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you switch to free chlorine as the oxidant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a recent change (or addition) of pre-oxidant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you change the location of the pre-disinfection 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 | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Were flows low? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were flows high? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were online instruments utilized for process control? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was sludge removed from the presedimentation basin? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was sludge allowed to accumulate for an excessively long time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you add a coagulant to your presedimentation basin? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a problem with the coagulant feed? |

Treatment Process Evaluation Checklist

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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 creating 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.

The Village of Mt. Zion does not have the City of Decatur Treatment Process Data for this section. It is presumed that since there is TTHM in the City's source water, that some level of contribution of OEL Exceedance is from the WTP. The City has stated that they plan on a future WTP improvement aimed at TTHM reduction. This upgrade is anticipated in 2025.

Distribution System Evaluation Checklist

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System Name: Village of Mt. Zion

Checklist Completed by: Michael Buzicky

Date: 4/30/24

- 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.

The Village does have to balance Chlorine residual levels, so as to meet the minimum required residual levels by Code, with trying to also minimize Chlorine feed levels to reduce Disinfection By-Product formation. The Village's system has 1 Chlorine feed location for a large, oddly shaped and routed water system. Chlorine feed is a challenge when balancing these two ends of the spectrum.

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.

The Village's Water Distribution System is large, oddly shaped or routed, with some older, smaller, poor quality water mains in locations. These worse mains happen to be were the sample sites are, which contributes to localized issues with TTHM formation.

The Village of Mt. Zion has completed their CCA improvements, including new water looping near the S2HH1 site and new sample site for S2HT1. The Village now wants to see results

after completing these improvements.

This Agency is authorized to require this information under 415 ILCS 5. Failure to disclose this information may result in a civil penalty of not to exceed \$50,000 for the violation and an additional civil penalty of not to exceed \$10,000 for each day during which the violation continues (415 ILCS 5/42). This has been approved by the Forms Management Center.

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