

Instructions for Completing the Monthly Operating Report (MOR) Addendum for Membrane Filtration

General

Membrane filtration is defined as a pressure- or vacuum-driven separation process in which particulate matter larger than 1 µm is rejected by an engineered barrier primarily through a size exclusion mechanism and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition is intended to include the common membrane technology classifications: Microfiltration (MF), Ultrafiltration (UF), Nanofiltration (NF), and Reverse Osmosis (RO). In addition, any cartridge filtration device that meets the definition of membrane filtration and which can be subject to direct integrity testing in accordance with rule requirements would also be eligible for Cryptosporidium removal credit as a membrane filtration process. The regulatory basis for a membrane filtration process to receive treatment credit for Cryptosporidium is the demonstration of removal efficiency through challenge testing and the verification of membrane system integrity through routine direct integrity testing and continuous indirect integrity monitoring. These criteria form the basis for the potential for membrane filtration systems to be awarded up to a maximum of 5.5 log Cryptosporidium removal credit for complying with the requirements of the previously promulgated surface water treatment rules in combination with any additional Cryptosporidium treatment credit that may be required under the LT2ESWTR (*U.S. EPA Membrane Filtration Guidance Manual*, EPA 815-R-06-009, November 2005). Each public water system that uses a surface water source, in whole or in part, and seeking membrane filtration credit, shall submit a monthly report to the appropriate Ohio EPA district office. The monthly report must indicate that the system is verifying the membrane integrity through routine direct integrity testing and continuous indirect integrity monitoring. One monthly report form must be completed for each membrane unit each month. For systems using membrane filtration to meet LT2 requirements, the level of treatment credit a system receives is equal to the lower of the following values:

- The removal efficiency demonstrated during challenge testing conducted under the conditions in **OAC 3745-81-68(K)(2)**; or,
- The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in **OAC 3745-81-68(K)(3)**.

Instructions for Completing Report:

Public Water System Information

- (A) Public Water System Name: Print or type name of Public Water System (PWS).
- (B) PWS ID: Enter the PWS ID Number.
- (C) STU ID: Enter the STU ID Number.
- (D) Reporting Period: Enter the month and year in which data was collected.
- (E) Membrane Unit Number: Enter Membrane Unit Number (One form must be filled out for each membrane unit each month).

Direct Integrity Testing Results

- (F) Upper Control Limit (psi/min): Enter the Upper Control Limit (UCL) as designated in plan approval (for pressure decay rate). This will be the same number every month.
- (G) Minimum Applied Pressure: Enter the Minimum Applied Pressure as designated in plan approval. This will be the same number every month.
- (H) Test Duration: Enter the duration of pressure decay test (in minutes).
- (I) Applied Initial Pressure: Enter the initial test pressure for the direct integrity test.

(Note: This number must be greater than or equal to the Minimum Applied Pressure in item (G) above.)
- (J) Final Pressure: Enter the final test pressure for the direct integrity test.
- (K) ΔP_{test} (psi/min): Enter the rate of pressure decay during the integrity test.

(Note: If the pressure decay test result (ΔP_{test}) is greater than the UCL, the membrane must be shut down because it is not meeting the log removal for which it was given credit.)
- (L) Within UCL: Was the direct integrity test result within the UCL? Yes or No
- (M) Date/Time removed from service: Enter the date and time the membrane unit was removed from service.

(Note: If the ΔP_{test} exceeds the UCL, the system shall remove the membrane unit from service. Systems shall conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.)

(N) Description of repair work: Describe the corrective action taken/repair work completed as a result of the UCL exceedance.

(O) Applied Initial Pressure: Enter the initial test pressure for the direct integrity test following repair work.

(P) Final Pressure: Enter the final test pressure for the direct integrity test following repair work.

(Q) ΔP_{test} (psi/min): Enter the rate of pressure decay during the direct integrity test.

(R) Within UCL ? Was the direct integrity test result within the UCL? Yes or No

(S) Date/Time returned to service: Enter the date and time the membrane unit was returned to service following repair work and an acceptable direct integrity test result.

Indirect Integrity Testing Results (Turbidity Monitoring)

(T) Was the membrane unit monitored separately and continuously (every 15 minutes) for the month? Enter Yes or No. If no, explain.

(U) Was the continuous membrane monitoring or recording (every 15 minutes) offline during the month? Enter Yes or No. If yes, indicate the date(s), duration and individual membrane grab sampling frequency on a separate sheet.

(V) Was the turbidimeter calibrated this month per manufacturer's specifications? Enter Yes or No.

(W) Did the turbidity results from the membrane unit exceed 0.15 NTU in two consecutive measurements taken 15 minutes apart? Enter Yes or No. If yes, complete the table located at the bottom of MOR.

(X) Date: Enter the date that turbidity results from the membrane unit exceeded 0.15 NTU in two consecutive measurements taken 15 minutes apart.

(Y) Times: Enter the times that turbidity results from the membrane unit exceeded 0.15 NTU in two consecutive measurements taken 15 minutes apart.

(Z) Turbidity Measurements (NTU): Enter the turbidity results that exceeded 0.15 NTU in two consecutive measurements taken 15 minutes apart.

(AA) Date/Time removed from service: Enter the date and time the membrane unit was removed from service. Membrane units must be immediately taken offline for direct

integrity testing if turbidity results exceed 0.15 NTU in two consecutive measurements taken 15 minutes apart.

(BB) Applied initial pressure: Enter the initial test pressure for direct integrity test.

(CC) Final pressure: Enter the final test pressure for the direct integrity test.

(DD) ΔP_{test} (psi/min): Enter the rate of pressure decay during the integrity test.

(EE) Within UCL ? Was ΔP_{test} within the UCL? Enter Yes or No.

(FF) Description of repair work: Describe the corrective action taken/repair work completed as a result of the UCL exceedance.

(GG) Applied initial pressure: Enter the initial test pressure for the direct integrity test following repair work.

(HH) Final Pressure: Enter the final test pressure for the direct integrity test following repair work.

(II) ΔP_{test} (psi/min): Enter the rate of pressure decay during the direct integrity test.

(JJ) Within UCL? Was the direct integrity test result within the UCL? Enter Yes or No.

Operator of Record Print the name and certification number of the Operator of Record, the signature of the Operator of Record and the date the report was completed