

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

PTR SECTION STAFF GUIDANCE

**REMOVAL CREDIT FOR REVERSE OSMOSIS
MEMBRANES**

Rules Affected: Title 30 Texas Administrative Code (30 TAC) §290.42(g)(3)(A), §290.42(g)(3)(B), and §290.111

Applicability:

Systems that treat surface water, groundwater under the influence of surface water, or rain water must achieve at least a 2.0-log (99%) removal or inactivation of *Cryptosporidium parvum*, 3.0-log (99.9%) removal or inactivation of *Giardia lamblia*, and a 4.0-log (99.99%) removal or inactivation of viruses. This Staff Guidance document applies to systems which use Reverse Osmosis (RO) membranes as a means of removing dissolved contaminants. The TCEQ has determined spiral wound membranes such as RO, at this time, cannot be given pathogen removal credit for the following reasons:

- Membrane modules must undergo challenge testing to evaluate removal efficiency of microbes as required in 30 TAC 290.42(g)(3)(A).
- Membrane systems must perform direct integrity testing (DIT) to demonstrate pathogen removal is equal to or greater than the removal credits awarded to the membrane by the TCEQ as required in 30 TAC 290.42(g)(3)(B).

Until spiral wound system DITs become commercially available to satisfy the above regulatory requirements, the TCEQ will be unable to give pathogen removal credit for RO membrane systems. If a DIT method becomes available, credit will be considered on a case-by-case basis.

This Staff Guidance document is intended to help Plan and Technical Review (PTR) section staff prepare Concentration-Time Studies (CT Study) to meet the treatment technique requirements for *Cryptosporidium*, *Giardia*, and viruses. In addition, this Staff Guidance is to be used (in conjunction with the plan approval letter and the CT Study approval letter) by field inspectors during the sanitary survey of systems that use spiral wound membranes.

Glossary:

*Reverse Osmosis*_(a)

- 1) the reverse of the natural osmosis process – i.e., the passage of a solvent (e.g., water) through a semi-permeable membrane from a solution of higher concentration to a solution of lower concentration against the concentration gradient, achieved by applying pressure greater than the osmotic pressure to the more concentrated solution; also,
- 2) the pressure-driven membrane separation process that employs the principles of reverse osmosis to remove dissolved contaminants from water.

Bibliography:

(a) *Membrane Filtration Guidance Manual*, EPA 815-R-06-009, November 2005.

Finalized and Approved by:

Ada Lichaa P.G., Plan and Technical Review Section Manager, 9/11/2013

If no formal expiration date has been established for this staff guidance, it will remain in effect until superseded or canceled.

Revision History:

Date	Action	Action by
7/11/2013	Written	Tamira Konkin-Garcia
08/09/2013	Peer reviewed	Marlo Berg
08/13/2013	Management Reviewed	Joel Klumpp
08/13/2013	Management Reviewed	James Beauchamp
08/26/2013	Management Reviewed	Ada Lichaa
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