

Bureau of Reclamation  
Science and Technology Program

# Membrane Pretreatment with Ion Exchange for Natural Organic Matter (NOM) Removal

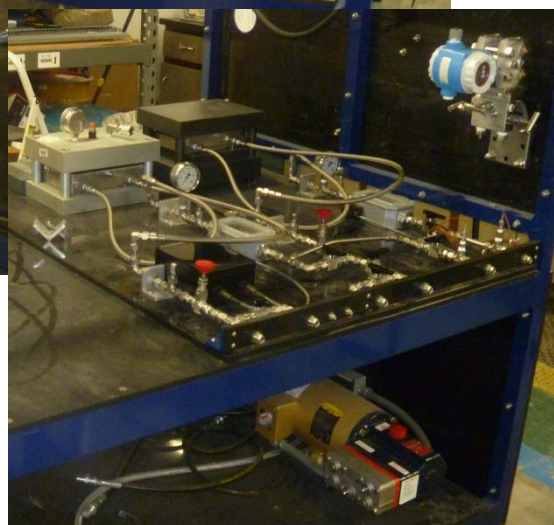
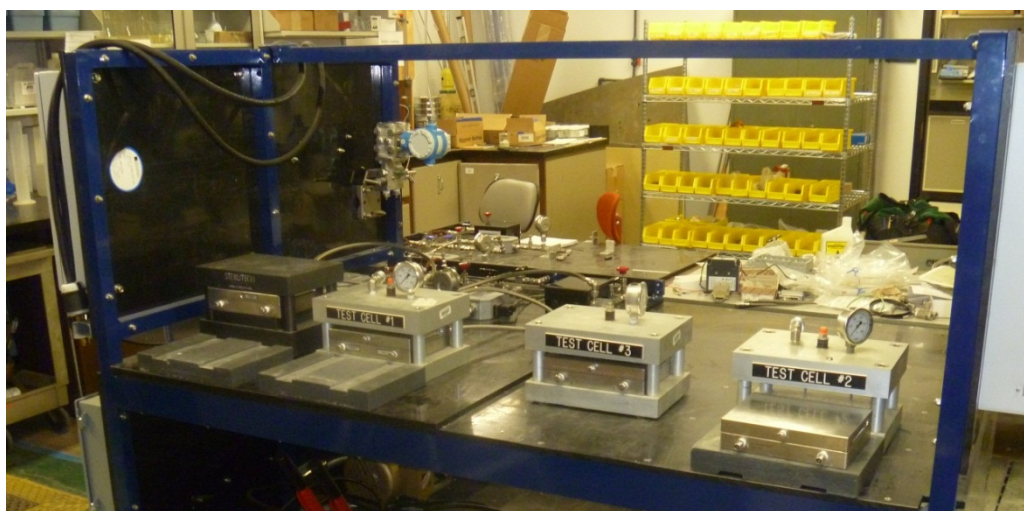
## Final Report

### Summary

Year Funded: 2010-2012

Funding Amount: \$82,576

This project moved to the point of establishing a CRADA with the project partner, Orica Watercare and constructing a significant portion of the Membrane Swatch Test Unit (MSTU), the flat sheet membrane testing apparatus to be used for the research. However, funding limitations did not allow for all instrumentation needed on the MSTU or construction of additional testing equipment. Therefore, the research project did not continue, but the MSTU is available for future research. The MSTU is flexible enough to be used for membrane swatch testing or easily modified for other experiments.



## **Background**

(original research plan)

This project intended to answer two questions 1)What portion of NOM is responsible for membrane fouling in pretreatment and desalination systems? and 2) Provided with this answer, what are potential methods to remove this NOM or NOM fraction?

Natural organic matter (NOM) is known to be a substantial cause for membrane fouling. However, the exact causes of membrane fouling within the category of NOM fouling are not entirely known. Previous work by Orica employee and project partner Miguel Arias shows substantial membrane fouling reduction through the use of a proprietary ion exchange pretreatment system (MIEX). This is witnessed by substantially lower membrane cleaning times.

Through the use of NOM fractionation techniques, Reclamation and Orica hoped to determine what fraction of organic matter needs to be treated to reduce membrane fouling. If this can be determined, possible treatment techniques (both proprietary and non-proprietary) could be recommended. Reclamation would use its in-house expertise in XAD fractionation and lab facilities including membrane test equipment and Orica would use its prior knowledge on this subject and MIEX treatment system.

Since removal of all NOM can be difficult and expensive, removing a certain fraction of NOM may be more desirable and less expensive. Therefore, Reclamation research in this topic represents a potential cost savings for all Reclamation clients that use a membrane filtration process for water treatment. Reclamation water treatment design engineers are almost always faced with some amount of NOM removal required when designing water treatment plants.