

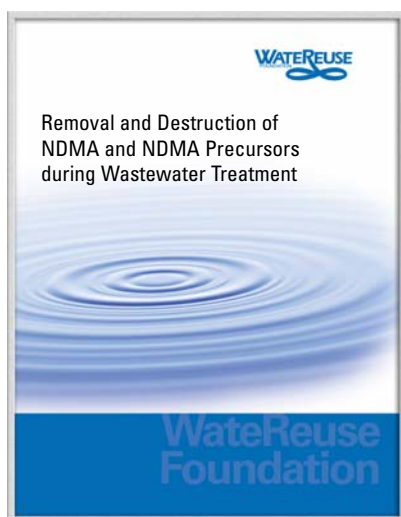
Project PROFILE



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Advancing the Science of Water Reuse and Desalination through Research

Removal and Destruction of NDMA and NDMA Precursors during Wastewater Treatment



Product Number: 01-002-01

WRF Subscribers: \$15

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Project Number

WRF-01-002

Principal Investigators

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NDMA is a probable human carcinogen with a California drinking water notification level of 10 ng/L. In response to growing scrutiny of NDMA impacts, wastewater utilities that are practicing water reuse may need to evaluate NDMA sources, formation, removal and advanced treatment processes specific to NDMA in order to reliably and cost-effectively reduce concentrations in the final

product water. The project was conducted over a three-year period by Malcolm Pirnie, UC Berkeley, and six utilities.

Objectives

The project objectives were as follows:

- Assess the importance of industrial sources of NDMA and NDMA precursors entering wastewater treatment plants.
- Investigate the fate and formation of NDMA and NDMA precursors during conventional and advanced wastewater treatment.
- Select and validate a model to predict NDMA destruction using ultraviolet (UV) technology.
- Conduct a brief occurrence study and laboratory study on NDMA formation in nonpotable reuse systems.
- Communicate results to water utilities and other environmental professionals.

The original project scope was amended to include a Project Addendum to investigate NDMA occurrence and formation in nonpotable water reuse systems. Wastewater utilities may need to address NDMA in nonpotable water reuse systems due to the potential for NDMA formed in such systems to enter potable water supplies.

Benefits

This report provides utilities practicing indirect potable reuse with a scientific framework for managing NDMA and assessing the need for additional testing, improvements to existing treatment processes, and the need for advanced treatment. Advanced MF/RO/UV treatment effectively removes NDMA and NDMA precursors. Utilities without advanced treatment can learn scientifically tested methods to reduce NDMA effluent concentrations.

Highlights

- NDMA concentrations entering wastewater treatment plants are higher in industrial areas than in residential settings.
- Conventional wastewater treatment does not effectively remove NDMA.
- NDMA forms when wastewater is chloraminated. Formation can be reduced by nitrification prior to the addition of free chlorine or by preforming chloramines.
- MF/RO/UV is effective for removing NDMA and NDMA precursors.
- Utilities can predict UV system performance and costs using a simple photolysis model.
- NDMA concentrations are significantly higher than 10 ng/L in nonpotable reuse systems due to greater chlorine doses, NDMA precursor concentrations, and ammonia concentrations.

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About the Foundation

The mission of the WaterReuse Foundation is to conduct and promote applied research on the reclamation, recycling, reuse, and desalination of water.