

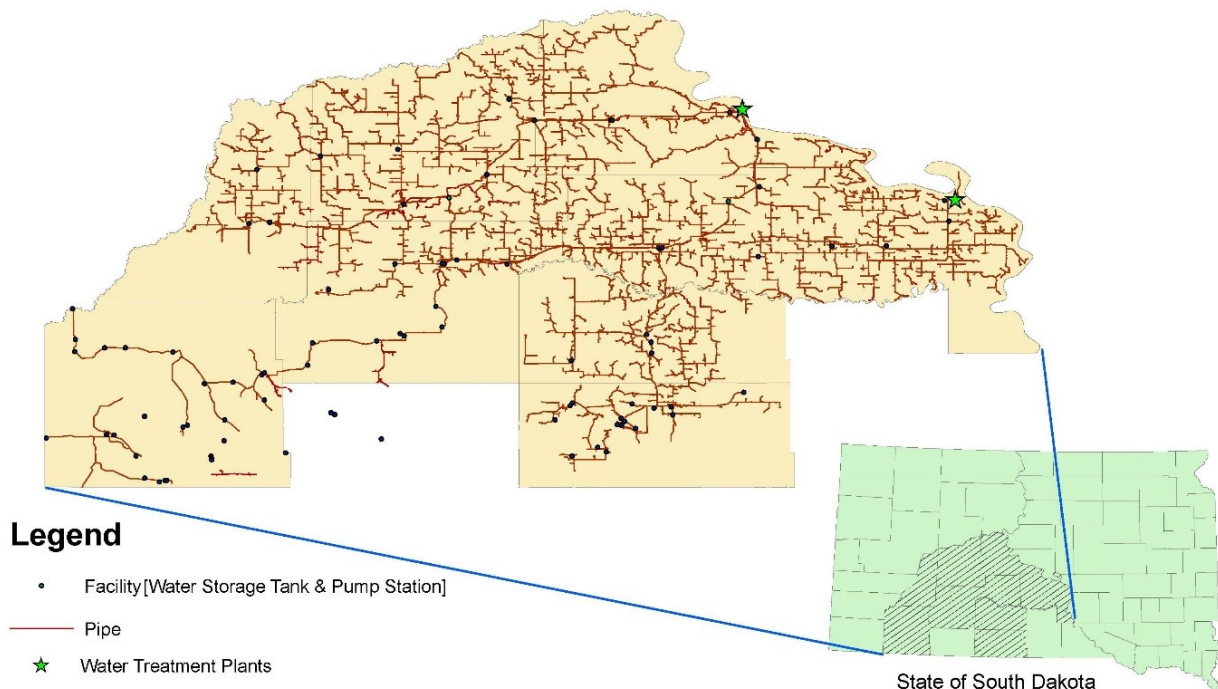
RECLAMATION

Managing Water in the West

Identifying Nitrosamines as Disinfection Byproducts in Regional Rural Water Systems: A Mni Wiconi Rural Water System Case Study

Research and Development Office
Science and Technology Program
(Concluding Report) ST-2018-8154-01

Mni Wiconi Rural Water Supply System



Mission Statements

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BUREAU OF RECLAMATION

Research and Development Office
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Identifying Nitrosamines as Disinfection Byproducts in Regional Rural Water Systems: A Mni Wiconi Case Study



Prepared by: Stacy Myhre, P.E.

Deputy Manager, Rural Water Engineer, Dakotas Area Office, DK-2100



Peer Review: Dean Karsky, P.E.

Manager, Rural Water, Dakotas Area Office, DK-2000

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BACKGROUND

This S&T research project was a case study to determine if nitrosamines are present in the Mni Wiconi Rural Water System and evaluate a preferred method of action for reducing the formation of this disinfection byproduct, if required. Nitrosamines are suspected human carcinogens identified by the Environmental Protection Agency and the agency was considering possible future regulatory action of this contaminant. Reclamation was hopeful the methodology developed and tested in this case study could be applied to other Reclamation authorized regional rural water systems such as Fort Peck Reservation/Dry Prairie Rural Water System, Rocky Boys/North Central Rural Water System and others, as a means of addressing this potential issue.

Phase I sampling included the collection of water samples on a quarterly basis throughout the distribution system. NDMA was found in the water distribution system at levels that exceed public notification levels promulgated by the State of California. In response to the results of the Phase I water sampling and the recommendation that further research be conducted, additional sampling was planned as part of Phase II. This sampling was designed to focus on the water treatment process, from raw water to finished water, to test for precursors that interact with nitrogenous substances to form nitrosamines.

Standard sampling guidelines and protocol for currently regulated disinfection by products were inadequate for the determination of and the mitigation of the formation of nitrosamines. Phase II of this project was to develop sampling protocols and methods for the formation of the nitrosamines. Raw water samples, post sedimentation and filter effluents were to be analyzed for the precursors di- and tri-methylamine which would be accomplished by working in concert with a national laboratory to develop a new testing method so these precursors could be measured to the nanogram per liter level. This testing regime was necessary to determine if the precursors are naturally occurring or if a treatment plant process or chemical additions are contributing to nitrosamine formation.

ACHIEVEMENTS

- As a result of Phase I analyses, DKAO identified constituents of concern in the treated water throughout the Mni Wiconi distribution system. These constituents are not currently regulated; however, regulations could be established in the future and it is good to be proactive in addressing such issues. Other managers and operators of regional rural water systems were supportive of Reclamation in this effort.
- By involving stakeholders we learned several systems are concerned about the future regulations of the nitrosamines. In addition, other studies similar this have been completed in other areas of the country.
- Gained an awareness of the water quality/water treatment challenges facing operators of large regional water systems.

CHALLENGES ENCOUNTERED

- Reclamation has limited laboratory facilities to conduct cutting-edge research of this type and when a research project has to secure the services of a qualified national laboratory to develop methods and conduct the analysis it requires significant resources (personnel, Regional Office contracting services, funding and time) to achieve the results.
- Procuring services was a more lengthy process than anticipated. DKAO was unable to find a laboratory capable of doing all of the analyses required for the study so several procurement actions were needed.
- Contracting for outside highly technical services that ensure scientific integrity of the results turned out to be more complex than originally envisioned. This resulted in problems with the administration of the contract.
- The procured laboratory's communications and documentation of the sampling method development and their initial analysis proved to be more difficult than anticipated which affected Reclamation's assurances that the scientific integrity could be maintained throughout future sampling and analysis phase.
- The contract laboratory was hesitant to provide more detailed information on their QA/QC process in support of the testing methods due to the higher costs they would incur to develop the information. Reclamation and the contractor would have to negotiate a change order at additional cost to attain the information and proceed with the laboratory testing.

- Based on the fact that negotiation of a change order would take additional staff time and funding resources, along with the uncertainty of whether scientific integrity could be assured through the testing process, the decision was made to conclude the study.

APPLICATIONS OF LESSONS LEARNED

- Internal Application - S&T grant related projects may benefit from more interaction and communication amongst technical lead and procurement staff. Technical leads need to have a basic understanding of the procurement processes, options for procuring services, timelines built into the process, etc. This will allow them to plan more effectively and provide procurement staff with the information and documentation needed so they can take action. Improved communications would also allow the procurement staff to gain a better understanding of what services are needed, the timelines established by the study proposal so together they can be successful in meeting the needs of the S&T project.
- Project Application – Results of this study confirmed the presence of Nitrosamines within the distribution system of the Mni Wiconi Rural Water System. The Nitrosamine levels are not regulated under the Safe Drinking Water Act at this time; however, the levels detected did exceed regulations adopted by the State of California. It is likely this substance will be regulated in the future; however that timeline is uncertain. In the meantime, Reclamation will work with the Mni Wiconi project sponsors to adjust the water treatment chemicals within the system to reduce nitrosamines formation based on what was learned through this S&T research study.

