Brine Spill Remediation

Public Value Statement
Brine spills result in agricultural lands that have reduced productivity or, in some cases, removed from production. Returning these lands to production will ensure the long-term sustainability of North Dakota’s agriculture operations and rural communities, while enhancing food security. In addition, reclamation of these lands will improve ecological functions leading to enhanced biodiversity, wildlife habitat, air quality and water quality.

The Situation
Global population growth and industrialization have greatly increased the demand for both food and energy. This increasing demand for both agricultural products and energy has led to unprecedented economic growth and development in the state of North Dakota. While proving to be economically beneficial, oil and gas production poses significant risks to agriculturally dominated regions in the form of produced water or “brine” spills. Brine is a solution consisting of high levels of dissolved salts, primarily NaCl, and is the primary byproduct of oil production. On average in North Dakota, as many as 18 barrels of brine are produced for every barrel of crude oil. Brine-contaminated soils often exhibit structural and edaphic properties that severely inhibit the growth of vegetation. In the period between 2001 and 2015, over 6,000 brine spills with an average volume of 3,400 gallons occurred in North Dakota. Without active remediation, the effect of salts on soil and vegetation can last many years.

Extension Response
NDSU Extension initiated a program to educate industry and landowners about the impacts of brine spill, strategies for remediation, and awareness about their consequences if left untreated in 2017. A multifaceted approach that included eight brine discussions, three conferences and 12 presentations, and one tour was utilized to disseminate program curriculum to landowners, industry and other stakeholders. These efforts reached 1,044 people, including 81 private landowners, 129 industry representatives, 146 government officials.

Impacts
The brine discussions were informal events that brought together landowners, industry and government representatives to discuss brine spills and directed programming efforts. Topics discussed at these events included the impacts of brine spills, spill reporting, spill response, technologies used to prevent and mitigate spills, and updates on spill remediation research. The insights gained from these events resulted in the creation of an Extension publication and the organization of a tour.

The North Dakota Reclamation Conference is an annual event hosted by NDSU Extension in conjunction with BKS Environmental, Dickinson State University, Society for Range Management and the North Dakota Department of Environmental Quality. Surveys of participants reported increased knowledge of spill reporting, soil remediation techniques and vegetation establish. In addition, 72% of survey respondents intended to modify their current reclamation practices as a result of the knowledge gained at the 2019 conference.
NDSU Extension hosted a Brine Spill Remediation Tour in 2019 in response to input received during the Brine Discussions. Post tour surveys of participants revealed:

- 95% increased their knowledge of the impacts of brine.
- 95% increased their knowledge of methods that can be used to evaluate a brine spill.
- 100% increased their knowledge of soil remediation practices.
- 100% increased their knowledge of bioremediation practices.

Feedback

“There is a need for education for landowners, oil industry, our legislators and government officials. NDSU has made a huge effort to pull us all together with their round table discussions, I can’t express how important I feel it has been to be able to sit at a table with all groups involved and to be able to have a frank discussion on our concerns and to try to understand where the other parties stand on issues. I find that when there is no communication you have a tendency to think the worse. NDSU needs a big “Thank You” for initiating a lot of communication. Going on that tour has reinforced the need for continued education, we all need to understand what is happening around us. We need to keep the lines of communication open between all parties. “Thank You” NDSU.” – Patty Jensen, landowner, Tioga, ND

“The Brine Extension program has done an excellent job connecting technical information with concerned landowners. This benefits both parties, providing sound technical information and updates on recent research to ag producers, and giving feedback to NDSU educators and researchers on the real world concerns.” – Karl Rockeman, Director, Division of Water Quality, North Dakota Dept. of Environmental Quality

“The Northwest Landowners Association seeks to educate the public about surface rights by organizing public information meetings while continuing to work with state agencies in developing new guidelines and policies for bonding, pipeline technologies, and reclamation and remediation. Our partnership with the NDSU Extension in hosting brine spill discussions and a tour is beneficial for the NWLA board of directors to be a part of and properly gauge the needs and concerns of landowners. NDSU Extension’s efforts to educate the public on reclamation have been fruitful; landowners are more proactive and better educated on what to do when a spill is discovered.” – Troy Coons, Chairman, Northwest Landowners Association

“We feel the reclamation conference is critical in our ability to state our best practices with state and industry leads, as well as learn from everyone else. It’s a critical component to continuing to improve what we do.” – Anonymous Industry Representative

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Resource Links

https://www.ag.ndsu.edu/naturalresources/reclamation