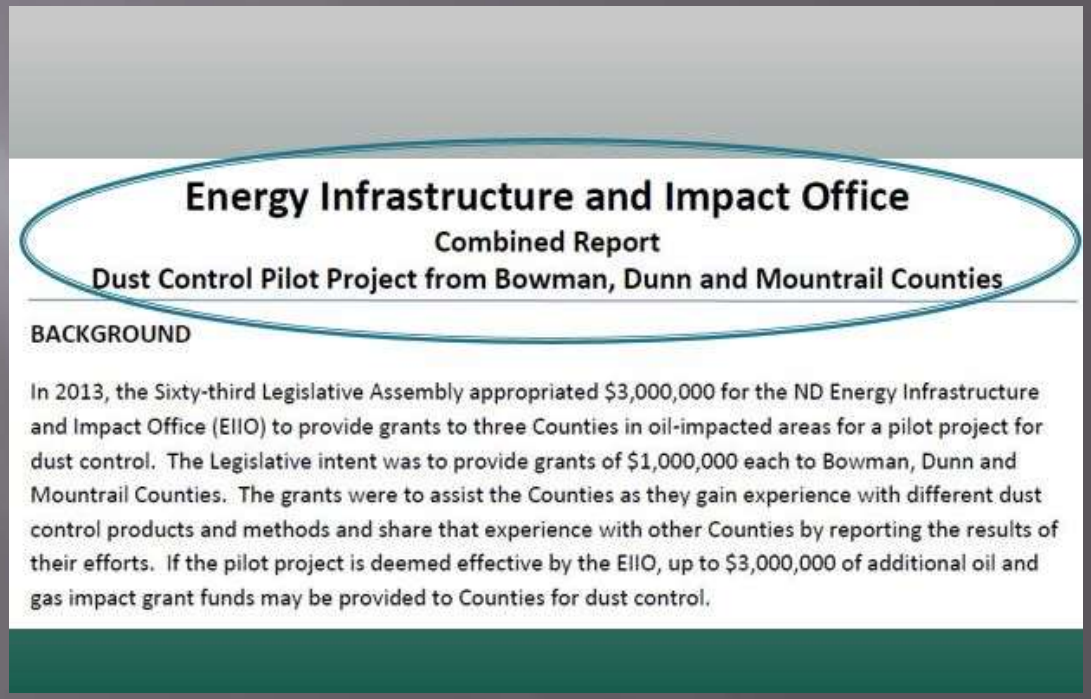
Brine use for dust and ice control

Energy Infrastructure and Impact Office Combined Report

- Bowman County has used Stabilock, a natural occurring by-product of the vegetable oil refining process for 4 years.
- The product is spray applied at a rate of 42.3 oz per sq yard after the surface aggregate is scarified to a depth of 1-2 inches using stinger teeth on a mother grader.
- The product is then mixed with the aggregate by motor grader, relayed and packed with a rubber tired roller to finish the road crown
- Enough aggregate must be mixed with the product to adequately absorb the product. The product may bleed to the surface in hot weather if not properly incorporated



Energy Infrastructure and Impact Office

Combined Report

Dust Control Pilot Project from Bowman, Dunn and Mountrail Counties

BACKGROUND

In 2013, the Sixty-third Legislative Assembly appropriated $3,000,000 for the ND Energy Infrastructure and Impact Office (EIIO) to provide grants to three Counties in oil-impacted areas for a pilot project for dust control. The Legislative intent was to provide grants of $1,000,000 each to Bowman, Dunn and Mountrail Counties. The grants were to assist the Counties as they gain experience with different dust control products and methods and share that experience with other Counties by reporting the results of their efforts. If the pilot project is deemed effective by the EIIO, up to $3,000,000 of additional oil and gas impact grant funds may be provided to Counties for dust control.

Studies show brine application is very similar to conventional applications

- Researchers observed that treatments lowered dust levels improving visibility, air quality, and safety conditions
- Dust levels decreased with increased surface moisture
- A secondary benefit observed that treatments reduced the need for grading by an estimated 50%

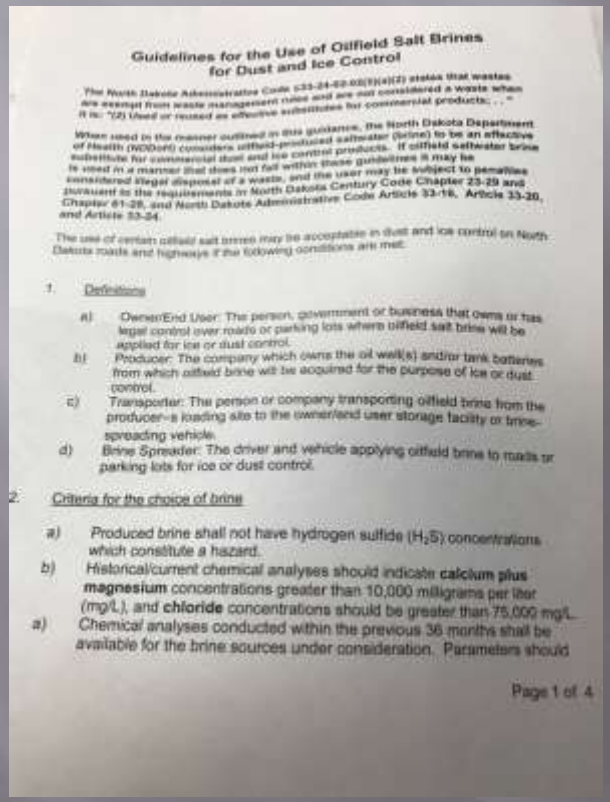
Deptartment of Health Guidelines and Rules

North Dakota Department of Health guidelines for the use of oilfield salt brines in dust and ice control

https://www.ndhealth.gov/WQ/rules.htm

Guidelines and Requirements

GUIDELINES FOR USE OF OILFIELD SALT BRINES



Guidelines for the Use of Oilfield Salt Brines for Dust and Ice Control

The North Dakota Administrative Code §33-24-02.6(3)(4)(2) states that wastes are exempt from waste management rules and are not considered a waste when it is: "(2) Used or reused as effective substitutes for commercial products. . ."

When used in the manner outlined in this guidance, the North Dakota Department of Health (NDDoH) considers oilfield-produced saltwater (brine) to be an effective substitute for commercial dust and ice control products. If oilfield saltwater brine is used in a manner that does not fall within these guidelines it may be considered illegal disposal of a waste, and the user may be subject to penalties pursuant to the requirements in North Dakota Century Code Chapter 23-29 and Chapter 61-28, and North Dakota Administrative Code Article 33-16, Article 33-20, and Article 33-24.

The use of certain oilfield salt brines may be acceptable in dust and ice control on North Dakota roads and highways if the following conditions are met:

1. Definitions

a) Owner/End User: The person, government or business that owns or has legal control over roads or parking lots where oilfield salt brine will be applied for ice or dust control.

b) Producer: The company which owns the oil well(s) and/or tank batteries from which oilfield brine will be acquired for the purpose of ice or dust control.

c) Transporter: The person or company transporting oilfield brine from the producer's loading site to the owner/end user storage facility or brine-spreading vehicle.

d) Brine Spreader: The driver and vehicle applying oilfield brine to roads or parking lots for ice or dust control.

2. Criteria for the choice of brine

a) Produced brine shall not have hydrogen sulfide (H_2S) concentrations which constitute a hazard.

b) Historical/current chemical analyses should indicate **calcium plus magnesium** concentrations greater than 10,000 milligrams per liter (mg/L), and **chloride** concentrations should be greater than 75,000 mg/L.

a) Chemical analyses conducted within the previous 36 months shall be available for the brine sources under consideration. Parameters should

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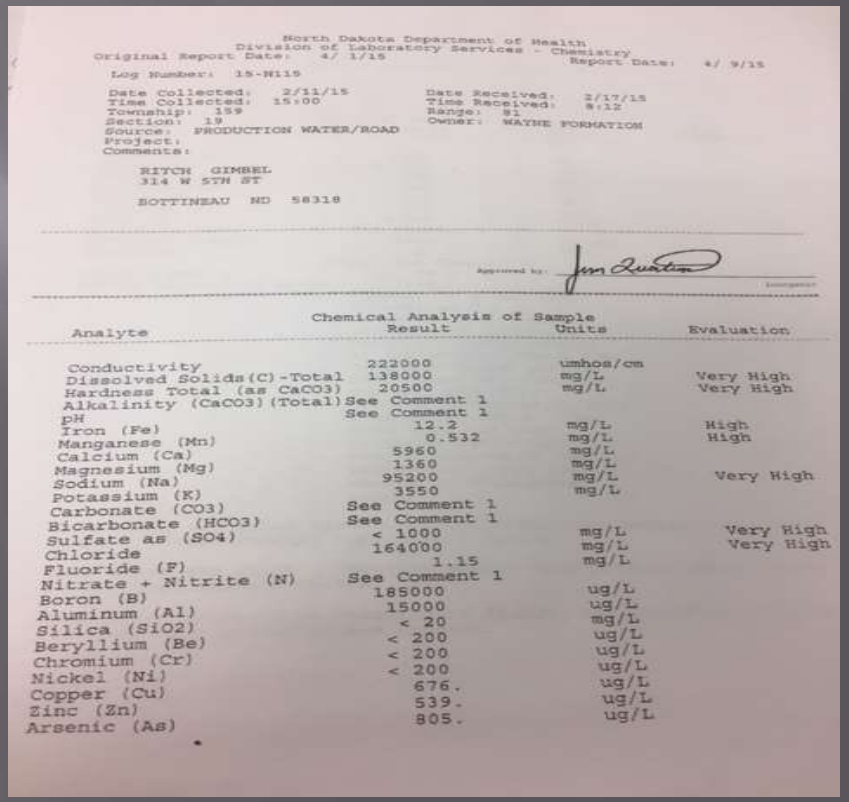
DEPARTMENT OF HEALTH REQUIREMENTS



North Dakota Department of Health
Division of Laboratory Services - Chemistry

Original Report Date: 4/ 1/15 Report Date: 4/ 9/15

Log Number: 15-N119

Date Collected: 2/11/15 Date Received: 2/17/15
Time Collected: 15:00 Time Received: 8:12
Township: 159 Range: 81
Section: 19 Owner: WAYNE FORMATION
Source: PRODUCTION WATER/ROAD
Project:
Comments:

RITCH GIMBEL
314 W 5TH ST

BOTTINEAU ND 58318

Approved by:

Analyte	Chemical Analysis of Sample Result	Units	Evaluation
Conductivity	222000	umhos/cm	
Dissolved Solids(C)-Total	138000	mg/L	Very High
Hardness Total (as CaCO3)	20500	mg/L	Very High
Alkalinity (CaCO3)(Total)	See Comment 1		
pH	See Comment 1		
Iron (Fe)	12.2	mg/L	High
Manganese (Mn)	0.532	mg/L	High
Calcium (Ca)	5960	mg/L	
Magnesium (Mg)	1360	mg/L	
Sodium (Na)	95200	mg/L	Very High
Potassium (K)	3550	mg/L	
Carbonate (CO3)	See Comment 1		
Bicarbonate (HCO3)	See Comment 1		
Sulfate as (SO4)	< 1000	mg/L	Very High
Chloride	164000	mg/L	Very High
Fluoride (F)	1.15	mg/L	
Nitrate + Nitrite (N)	See Comment 1		
Boron (B)	185000	ug/L	
Aluminum (Al)	15000	ug/L	
Silica (SiO2)	< 20	mg/L	
Beryllium (Be)	< 200	ug/L	
Chromium (Cr)	< 200	ug/L	
Nickel (Ni)	< 200	ug/L	
Copper (Cu)	676.	ug/L	
Zinc (Zn)	539.	ug/L	
Arsenic (As)	805.	ug/L	

Guidelines for the use of oilfield salt brines for Dust & ice control

- Produced brine shall not have hydrogen sulfide concentrations which constitute a hazard
- Historical/current chemical analyses should indicate calcium plus magnesium concentrations greater than 10,000 milligrams per liter (mg/L), and chloride concentrations should be greater than 75,000 mg/L.
- Chemical analyses conducted within the previous 36 months shall be available for the brine sources under consideration

Bottineau County Chemical Analysis Results

North Dakota Department of Health
Division of Laboratory Services - Chemistry

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314 W 5TH ST

BOTTINEAU ND 58318

Approved by: Jim Deaton

Chemical Analysis of Sample

Analyte	Result	Units	Evaluation
Conductivity	222000	umhos/cm	
Dissolved Solids(C)-Total	138000	mg/L	Very High
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Alkalinity (CaCO3)(Total)	See Comment 1		
pH	See Comment 1		
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Magnesium (Mg)	1360	mg/L	
Sodium (Na)	95200	mg/L	Very High
Potassium (K)	3550	mg/L	
Carbonate (CO3)	See Comment 1		
Bicarbonate (HCO3)	See Comment 1		
Sulfate as (SO4)	< 1000	mg/L	Very High
Chloride	164000	mg/L	Very High
Fluoride (F)	1.15	mg/L	
Nitrate + Nitrite (N)	See Comment 1		
Boron (B)	185000	ug/L	
Aluminum (Al)	15000	ug/L	
Silica (SiO2)	< 20	mg/L	
Beryllium (Be)	< 200	ug/L	
Chromium (Cr)	< 200	ug/L	
Nickel (Ni)	< 200	ug/L	
Copper (Cu)	676.	ug/L	
Zinc (Zn)	539.	ug/L	
Arsenic (As)	805.	ug/L	

Application for Brine or Dust Control use

Notification of Oil Field Brine Use for Ice or Dust Control **(Produced Water Only)**

Mailing Address	City	Zip
101 Ohmer St	Bottineau	58318

Bottineau County RD Dept

Cell Phone	E-mail Address	Office Location
701-263-1607	richgindel@co.bottineau.nd.us	Bottineau

Rich Gindel — 701-228-3678

Yes | No

Date(s) of Chemical Analysis: 2/17/15

Brine Source/Producer: Ballard Petrolem

Special Comments on Brine, Brine Source, or Sample?

Will be doing farm to market 57 4 mile strech monthly

Brine Source Location (twp, rng, sec, QQQ): 159N 81W sec 19

Brine Storage Location (Twp, rng, sec, QQQ): Bottineau

Geologic Formation(s) of Brine Source: Wayne Formation

Vehicles Engaged in Spreading the Brine: 1982 Ford LTL 9000

Vehicles Clearly Marked (yes/no): yes

Log Maintained in Each Vehicle and Collected Each Week (yes/no): yes

Describe proposed spreading rate (gallons per square yard) and anticipated application frequency

Dust Control: 1/3 gal of gal/sq² on first pass Then .17gals/sq yd for Top coat for total of 1/2 gal

Ice Control

Owner Certifies that all spreading for ice or dust control will abide by Guidelines provided by North Dakota Department of Health

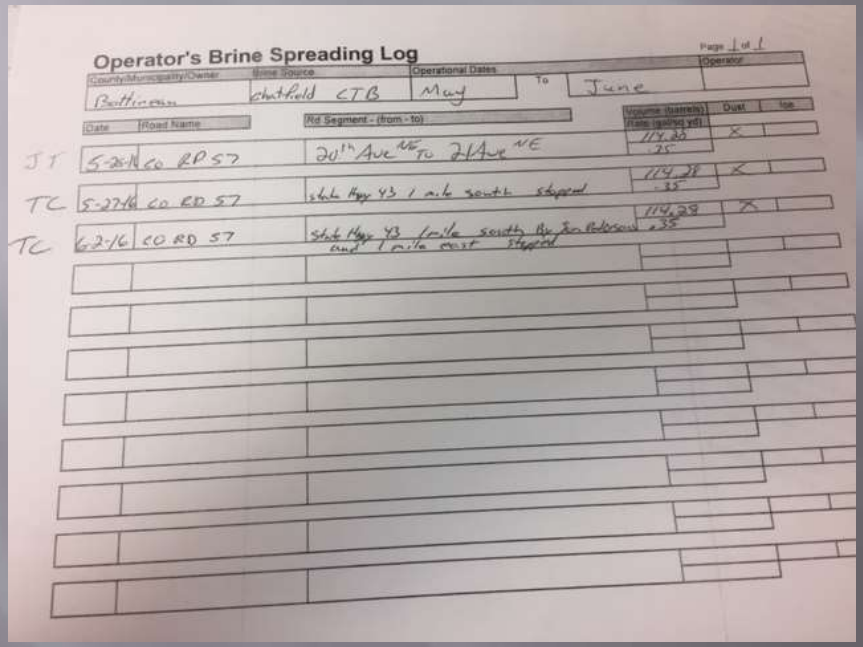
Signature:

Date of Signature: 6/2/16

Title: Road Supervisor

Instructions:

Operators Log for Brine use



Operator's Brine Spreading Log

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County/Municipality/Owner	Brine Source	Operational Dates			Operator
Bottineau	Chatfield CTB	May	To	June	

	Date	Road Name	Rd Segment - (from - to)	Volume (barrels) / Rate (gal/sq yd)	Dust	Ice
JT	5-26-16	CO RD 57	20th Ave NE to 2 Ave NE	114.28 .25	X	
TC	5-27-16	CO RD 57	State Hwy 43 1 mile south stopped	114.28 .35	X	
TC	6-2-16	CO RD 57	State Hwy 43 1 mile south then to Robinson and 1 mile west stopped	114.28 .35	X	

Bottineau County Roads after Dust Control

Bottineau County Road 57 Long Lake Loop

Bottineau County Dust Control Pilot Picture comparison

Base one Stabilizer being used on a Bottineau County Township road

Bottineau County's Water Truck

Digital Monitoring System

Dual use

Veritech industries – installation

Storage Tanks and Facilities

Local Oil companies donated storage tanks

Brine water costs nothing

Only fee is trucking expenses

Bottineau County Rates VS. Conventional Rates

- Bottineau County charges .25 cents per foot.
- Conventional dust control charges $1.00 or more per foot.

Ice Control Benefits: Cost saving for the County

In conclusion

- The commissioners and public are very happy with the results of the water truck
- Many private parties are asking for the County to do their roads and driveways, however we are not ready to compete with local contractors
- While the application process may seem long the initial cost benefits we have seen out-weighs the paperwork.