

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.

Efforts to control dust were well underway in all Counties when they were notified of the grant awards in August 2013.

WEATHER

Precipitation in 2013 was significantly greater than normal in all three Counties. The wet conditions helped reduce the amount of dust from County roads and decreased the number of miles that needed dust control treatments. It also delayed some of the experimentation with dust control products and methods the Counties had originally intended to carry out this summer. The wet conditions also softened the roads which increased rutting and required the Counties to do more maintenance and repairs on the roads.

2013 PRECIPITATION IN INCHES

MONTH	BOWMAN		DUNN		MOUNTRAIL	
	AVG	2013	AVG	2013	AVG	2013
May	2.47	10.61	2.33	10.18	2.55	3.64
June	3.08	3.08	3.13	2.12	3.64	6.14
July	2.16	2.40	2.54	4.84	3.03	3.46
August	1.07	1.99	1.66	2.53	2.12	1.49
September	1.29	6.12	1.44	6.31	1.70	1.83
October	1.38	3.28	1.32	3.35	1.30	2.22
TOTAL	11.45	27.48	12.42	29.33	14.34	18.78

BOWMAN COUNTY

Bowman County treated a total of 18 miles of County roads for dust control in 2013. The County used Stabilock to treat about 11.5 miles of the Loop Road and two quarter mile segments near the City of Bowman. One segment was by a truck stop and the other segment was a frontage road off Highway 12. The County also used magnesium chloride to treat 5 miles of the Steig Road which is 144th Ave SW, 90th St SW and 142nd Ave SW. In addition, calcium chloride was used for spot dust control near rural residences along Old 12 or 86th St SW where the County received dust complaints.

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Bowman County has used Stabilock, a naturally occurring by-product of the vegetable oil refining process, for four years. The product is spray applied at a rate of 42.3 ounces per square yard after the surface aggregate is scarified to a depth of 1 to 2 inches using stinger teeth on a motor 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. The Loop Road is surfaced with a class 13 aggregate and has been treated with Stabilock on an annual basis.

Bowman County indicated that Stabilock did reduce dust on the Loop Road. The County also indicated the Stabilock will hold the surface aggregate in place by binding the aggregate particles together on the surface of the road which reduced wash boarding and potholing. Enough aggregate must be mixed with the product to adequately absorb the product and prevent raveling of the aggregate until it cures. The product may also bleed to the surface during hot weather if it is not properly incorporated. Bleeding of the product may require the road be sanded to reduce the raveling of the product by motorists. The cost for using the Stabilock is \$15,294 per mile for the product and application. The County feels that mixing the Stabilock deeper into the road surface with carbide tipped stinger teeth on the motor grader may prolong its life and may allow for less frequent treatment of the road.

Where the County applied the Stabilock around the truck stop, it was mixed into the scoria based aggregate to a depth of 4 inches by milling. Because of the volume of truck traffic at this facility, which is approximately 400 vehicles per day, the County was trying to treat a deeper base of material to withstand the traffic loading. The County applied 6768 gallons of Stabilock over the 0.2 mile segment. This application was not successful in controlling dust as it appears the scoria broke down from the truck traffic and there was not enough Stabilock available to bind the finer scoria particles that were created over time. The cost for the product to treat this segment was \$30,659.

The 0.23 mile segment of frontage road along Highway 12 was treated with 6920 gallons of Stabilock. The product was milled into the top 4 inches of class 13 aggregate and then compacted. This treatment process did control dust on this segment and improved stability of the road. The cost of the product to treat this segment was \$31,347.

The calcium chloride and magnesium chloride provided good dust suppression on the roads where these two products were applied. The calcium chloride was applied on about 1 mile of County road where the traffic count was about 250 vehicles per day. The magnesium chloride was applied on 5 miles of road where the traffic count was about 145 vehicles per day. Both products were applied by loosening and grading the road to proper crown, and wetting with fresh water before application of the chloride solution. Both products were used for spot dust control near rural residences. On some segments, the aggregate had been worn off and the road was down to the sub base dirt and rock. Even on those poor road conditions, the calcium chloride solution did control the dust. The road segments where the magnesium chloride was used had a Class 13 surface aggregate although the fines in the aggregate passing the No. 200 sieve averaged 19.2% which is slightly high. The Plasticity Index on that aggregate was not known. The cost for the magnesium chloride was \$5520 per mile and the cost for the calcium chloride was \$5300 per mile.

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Surfactant was mixed with some of the magnesium chloride to determine if it would help improve penetration of the solution into the road profile. Surfactant reduces the surface tension of the chloride solution allowing it to be more readily absorbed by the aggregate. The surfactant did help the chloride soak into the road and seemed to improve the performance of the magnesium chloride.

Bowman County had planned to reconstruct a 14 mile segment of the Camp Crook Road, or 172nd Avenue, from about 10 miles south of Marmarth to the South Dakota line by adding a 4 inch lift of new gravel. This road is a main north/south road in western Bowman County that is used heavily by oil field traffic and local ranchers. Unfortunately, this project was only partially completed as the wet weather didn't allow the work to proceed as originally scheduled. The County had received permission to use oil field produced water from Continental Resources oil wells in the immediate vicinity of the project in a demonstration project.

The County proposed to use oil field brine in several different test segments during road construction. Each test segment would be several miles in length so an adequate evaluation of the test segment can occur. Road aggregate will be tested and analyzed to determine aggregate quality. The oil field brine has been sampled and was analyzed in the ND Department of Health Laboratory. It was determined that water from the Big Gumbo and Davis salt water disposal wells would be sources of produced water for the demonstration project as their water was acceptable to the Department of Health and they were close to the project area. The calcium concentration in these two wells is about 1,000 ppm and the sodium concentration is about 8,000 ppm.

The County proposed the following test segments:

1. All fresh water is used in laying the aggregate. This would be a control segment as this is the conventional method for road construction.
2. All fresh water is used in laying the aggregate and magnesium chloride is incorporated into the road surface as a dust control agent at a rate of 0.5 gal/sq.yd.
3. Fresh water is used in laying the aggregate and brine is incorporated into the road surface as a dust control agent at a rate of 0.5 gal/sq.yd.
4. Fresh water is used in the bottom 2" lift and brine is used in the top 2" lift to provide a chloride concentration for dust control.
5. Brine is used throughout the 4" lift.
6. Brine is used throughout the 4" lift and magnesium chloride is incorporated into the road surface.

Sufficient quantities of water will be used in all test segments to provide adequate compaction. The brine applications in the deeper lifts will likely exceed the 0.5 gal/sq.ft rate but will only be applied at a rate necessary for compaction. Calcium and sodium loading rates will be determined and correlated to commercial product loading rates.

Bowman County will comply with the Department of Health's *Guidelines for the Use of Oilfield Salt brines for Dust and Ice Control*. This includes submitting a "Notification of Oilfield Brine Use for Ice or Dust Control" to the Department prior to application of the oilfield brine. When applying the oilfield

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brine, the County and its contractor will apply the brine to the aggregate in accordance with Section 4 of the Guidelines, including using water trucks equipped with a spreader bar and shut-off controls accessible from the cab of the truck.

The County was only able to complete about 5 miles of the graveling project before winter freeze up. The contractor did not use any of the oil field produced water as the aggregate had enough moisture in it from the stockpile, so no new construction water was added. The County will attempt to complete the demonstration project in the spring as weather permits.

Bowman County has used oil field produced water in past construction projects with success. In the 1980's, several road construction projects used produced water for construction purposes because of the limited supplies of fresh water in the County. Those roads turned very hard after repeated applications of produced water and withstood traffic and weather. The roads constructed in that manner are now covered by a double asphalt chip seal which eliminates nearly all dust.

The County has used some soil stabilizers, such as Permazyme and soil cement, on test segments in prior years. Both products were applied in cooler weather in the fall of 2012 and it took several weeks for the Permazyme to completely set up. The road was somewhat soft until that occurred. The soil cement did stabilize the road bed and both test segments were top coated with double asphalt chip seal. The cost for the Permazyme was \$69,806 per mile and the soil cement was \$116,166 per mile. The double asphalt chip seal cost \$80,000 per mile in 2012.

DUNN COUNTY

Dunn County treated 220 miles of gravel roads with magnesium chloride during the summer of 2013. The total cost of the product including application was \$1,554,000 for an average application cost of \$7,064 per mile. Traffic counts were not available for the Dunn County roads although oil field truck traffic is very heavy on most main County roads. The visual air quality in the County has been improved due to the dust control efforts and increased precipitation in 2013.

During the dust control treatment process, Dunn County loosened the surface aggregate about 1" to 2" deep with stinger teeth on the motor grader blade, bladed and shaped the road and watered the road prior to the application of the magnesium chloride solution. The application rate was 0.5 gallons per square yard. Later in the season, the County started adding surfactant to the magnesium chloride as it seemed to reduce the evaporative losses on the surface of the road. This allowed more time for the chloride solution to penetrate into the surface aggregate. It also decreased the surface tension of the solution which allowed the solution to more readily soak into the aggregate. This was especially true during hot dry weather when road surfaces dry quickly.

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Dunn County experimented by compacting the road with rubber tired rollers prior to the magnesium chloride treatment and leaving the road uncompacted after the road was shaped. It did not appear to affect the results as the traffic quickly packed the aggregate down after the treatment.

The County also indicated that the chloride solution seems to work better on new gravel versus old gravel. It is likely that the new gravel has more fines than the old gravel as traffic has not had a chance to remove the fines from the road in the form of dust. This allows the chloride solution to bind those fine particles in the aggregate and keep them in place on the road.

Although the chloride solution works better in the new gravel, the new gravel requires more frequent treatments. Repeat applications of magnesium chloride enhance performance as a residual amount from prior treatments remains in the aggregate. New gravel may need to be treated twice the first year whereas old gravel may only need one treatment per year because of the buildup of magnesium chloride from prior applications.

It is estimated that dust on about 50% of the gravel roads in Dunn County can be adequately controlled with a single application of magnesium chloride. The other 50% of the gravel roads need two applications per year due to traffic volumes and precipitation events.

Dunn County did note that the magnesium chloride treated roads remained wetter longer in the spring but packed down harder as they dry. They also felt the treated roads stayed harder and shed the rain water more quickly during shower events. However, during periods of prolonged precipitation, such as soaking rains over several days, the treated roads became more sloppy and splashed more fines onto vehicles and road shoulders. Small potholes develop which further retain water on the road surface. This caused removal of the fines from the aggregate much the same as under dry and dusty conditions.

During freezing rain or under frozen conditions, treated roadways may need to be sanded at highway intersections as there tends to be less loose material on top of the road surface to provide traction.

The County has not noted any vegetation killed in road ditches where the magnesium chloride has been applied. The only vegetation affected has been on top of the road surface where it was sprayed during application of the chloride solution.

On 22nd Street SW, the County added a 4" lift of new gravel and then applied the magnesium chloride in July, 2013. The treatment did provide good dust control through most of the season although the first two miles west from Highway 8 did start dusting in late fall. This was primarily related to very heavy truck traffic from trucks hauling gravel from a pit two miles west of Highway 8.

On 12th Street SW, some segments of the road had new gravel added and some had old gravel in place. The old gravel was treated once with magnesium chloride but the treatment did not adequately control dust over time. Where the new gravel was added in the fall of 2012, the road was treated in the fall and again this spring. This segment was holding together and controlling dust very well. The County did not have data on the quality of the gravel on this road but they are in the process of obtaining that information.

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The South Heart Road or 113th Avenue NW had new gravel applied in the fall of 2012. The road was then treated with magnesium chloride. In 2013, the road was treated with 3 more applications of chloride solution to adequately control dust along this segment. There are more farms and rural residences along this segment, which required additional treatments to control the dust. The road surface was very tight and did not have as many potholes as 12th Street did even though the two roads had the same surface gravel.

On 110th Avenue NW, south of the Killdeer Mountains, two different aggregates were applied this year. The road then received one treatment of magnesium chloride. This single treatment is providing good dust control. It was noted that treated segments only need maintenance once per year whereas untreated segments need repeated maintenance to keep proper crown and reduce wash boarding.

Dunn County applied a 4 inch lift of new gravel from the Knutson Pit on 1st Street SW in 2012. The road was then treated with one application of magnesium chloride in 2012 and one application in 2013. This road is holding together well and dust is very minimal. The Knutson Pit aggregate is a Class 13 aggregate with a Plasticity Index of 8.2.

Dunn County is very interested in using oil field produced water for dust control and road construction water. In reviewing the water quality information on oil field produced water, it appears that the calcium concentration in produced water varies significantly. The magnesium concentration does not vary as much as the calcium concentration. The calcium concentration in the commercial calcium chloride solution is about 175,000 ppm. Dunn County has been able to identify one source in the County where the water produced from the Red River formation has a calcium concentration of 75,000 ppm. The County has also identified a number of other wells where the produced water has calcium concentrations from 20,000 ppm to 48,000 ppm. Some Bakken formation wells can have calcium concentrations in the 20,000 to 30,000 ppm range.

The County had planned on experimenting with different sources and quality of produced water for dust control, but the wet fall precluded that from happening. Those experiments will be conducted in 2014.

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Mountrail County Road and Bridge Department

Dust Control Pilot Program 2013

Grant Award Number: G140029

The aim of this pilot program was to evaluate the effectiveness of dust control products when applied to a variety of gravel surface roads at various schedules. Mountrail County applied dust control product from Envirotech Services, INC on all unpaved County Roads and majority of township roads in between June 2013 – October 2013 to reduce the amount of dust and to reduce maintenance on our gravel roads. Two dust control products were evaluated: calcium chloride, durablend and combination of both. Product was sprayed evenly onto the road from tank truck. Two treatments were applied during this period of time and dust levels were monitored. Please see attached map for detail information.

Road Preparation:

- Prior to applying dust control Mountrail County graveled all unpaved gravel roads with class 13 gravel (750 yards/mile).
- Gravel roads were bladed to have a good crown in the driving surface
- Good shoulder drainage
- Water application
- Dust control application
- Packing

Product applied:

- Calcium Chloride (2,348,171 gals of CaCl 35%)
- Durablend (471,043 gals of Duarblend C)

See attachment – application rate, calcium & sodium content, application cost

Calcium Chloride and Durablend were applied under the direction of Envirotech and Mountrail County Road and Bridge Department in quantities that generally span the range of common practice in the industry, manufacturer's recommendations. All chemicals tested exhibited average control efficiencies of approximately 50% or more over the first 30 days after application.

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Results:

- Overall researchers observed that treatments lowered dust levels, which improved visibility, air quality and safety conditions on gravel roads.
- The surface moisture of roads was the best predictor of treatment effectiveness. Dust levels decreased with increased surface moisture
- A secondary benefit was observed in that treatments reduced the need for grading by a conservative estimate of 50 percent. Participants also perceived a reduction in the frequency of gravel replenishment.



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- Application Rate Summary
 - Topical Compaction Aid Application – 18% RoadSaver-C : 0.50 gal/yd²
 - Topical durablend- C Application: 0.30 gal/yd²

- Compaction Aid Application – 18% Cal
 - 0.50 gal/yd² Topical Application of Compaction Aid solution
 - The Compaction Aid solution is 18% RoadSaver C
 - Concentration of RoadSaver is achieved by combining 1 part RoadSaver-C with 1 part water.
 - Allow Compaction Aid Solution to completely absorb before beginning compaction. Typically absorption is complete in 10 – 15 minutes.
 - You want just enough moisture to promote compaction and minimize pick-up. You do not want the road too wet or sloppy.

- Compaction of the Road
 - This can be achieved on new gravel by using either a steel drum compactor, rubber tire roller or both.
 - In some cases, compaction will be achieved by allowing road traffic on the road for 24-48 hours before capping with durablend-C

- 0.30 gal/yd² Topical Application of durablend-C
 - Weather conditions and moisture content in the road will determine how much water to apply ahead of the topical durablend application
 - Drier the conditions ⇒ closer the water truck is to the applicator truck
 - The road should look uniformly wet but not sloppy with standing water.
 - Keep the water truck on hand after the topical application.
 - If the durablend has not fully absorbed by 30 minutes after application apply a light amount of water.
 - This will promote absorption and mitigate pull-up of the aggregate road base.

Mountrail County

(2013 dust control summary)

- **RoadSaver C – 35% Calcium Chloride**
 - **Mountrail County bid - \$0.90 / gallon supplied and applied by EnviroTech Services**
 - **Typical Application Rate - .5 gals/ sq yrd**
 - **Typical Cost per Mile (24 foot wide road) - \$6336/ mile**
 - **Miles applied (Undetermined)**
 - **Many roads were sprayed more than once**
 - **Variable applications rates were used on the resprays**
 - **Gallons applied - Pending**
- **General Notes**
 - The attached study concludes that 34.5% calcium chloride is equal to 30% magnesium chloride.
 - EnviroTech Services bid and spray 35% calcium chloride. 35% calcium chloride performs *at least* as well as 30% magnesium chloride.
 - After testing 35% calcium chloride in 2012, both John Sauber and Scott Stammen concluded that the calcium chloride roads sprayed by ESI seem darker and controlled the dust better than the magnesium chloride roads.
 - I can supply photos if further documentation is necessary

durablend C – Polymer enhanced Calcium Chloride

- **Mountrail County bid - \$1.39/ gallon supplied and applied by EnviroTech Services**
- **Typical Application Rate - .25 - .33 gals/ sq yrd**
- **Typical Cost per Mile (24 foot wide road) - \$4892 - \$6458/ mile**
- **Miles applied (Undetermined)**
 - **Many roads were sprayed more than once**
 - **Variable applications rates were used on the resprays**
- **Gallons applied - Pending**
- **General Notes**
 - When installed properly, durablend can deliver superior performance over chloride products for the same or less cost per mile.
 - 101st Avenue, south of Hwy 2 is a prime example of durablend reducing the number of dust control applications, reducing gravel loss and reduced road maintenance costs, while at the same time increasing the road performance. In 2012, this road was sprayed every 2-3 weeks. The durablend has lasted over 3 months. (see attached picture).
 - Durablend should always be installed on a “tight” (rolled) “damp” road. We want the durablend to sit in the top inch of gravel.
 - Durablend roads will perform better if EnviroTech application procedures are followed. (see attached “Stabilize and Cap” document)

PRODUCT SPECIFICATIONS

DURABLEND™ - C CALCIUM CHLORIDE

CHEMICAL PROPERTIES

Chemical Composition	Typical Analysis (%)	Range (%)
Calcium Chloride	35.0	34.0-36.0
Proprietary Additive	0.30	0.15 – 0.35
Magnesium Chloride	<0.5%	<0.5%
Sodium Chloride	0.50	<1.0%

PHYSICAL PROPERTIES

- clear to slight yellow
- 10.85 – 11.65 lb. per gallon
- 5 – 10 pH as shipped
- Specific Gravity, 1.30 – 1.39



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PRODUCT SPECIFICATIONS

CALCIUM CHLORIDE

CHEMICAL PROPERTIES

Chemical Composition	Typical Analysis (%)	Range (%)
Calcium Chloride	35.0 - 38.0	34.0-40.0
Magnesium Chloride	<0.5	<0.5
Sodium Chloride	0.50	<1.0

TYPICAL ANALYSIS

Testing per Pacific Northwest States Methods (ppm)

Constituent	Detected Level	Constituent	Detected Level
Phosphorus	< 2500	Chromium	<1.0
Cyanide	< 0.20	Cadmium	< 0.20
Arsenic	< 5.00	Barium	< 100.0
Copper	< 1.00	Selenium	< 5.0
Lead	< 1.00	Zinc	< 10.00
Mercury	< 0.05		

PHYSICAL PROPERTIES

- Clear to slight yellow
- 10.85 – 11.60 lb. per gallon
- 5 – 10 pH as shipped
- Specific Gravity, 1.30 – 1.39
- Concentration blended to customer request



DUST CONTROL

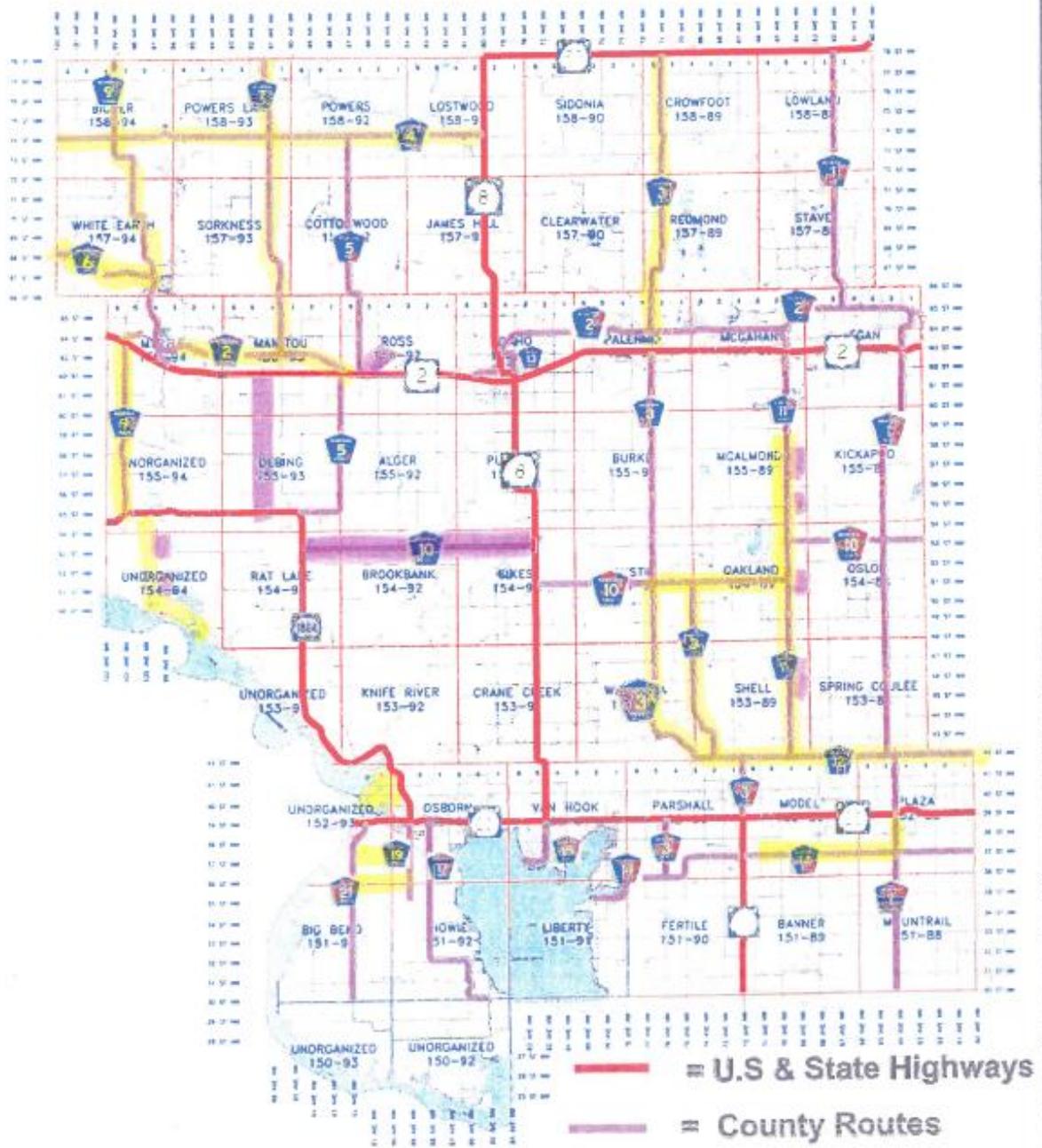
MOUNTRAIL COUNTY

NORTH DAKOTA

COUNTY ROAD MAP

DURA BLEND

CALCIUM



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OTHER DUST CONTROL ACTIVITIES

Several roads in McKenzie County were treated with oil field produced water for dust control and road stabilization. Some of these roads were Township roads and some were oilfield roads leading to oil well production sites.

McKenzie County Road 17 was reconstructed in 2012 using oilfield brine. The road was ripped 12" deep and rebuilt using produced water for compaction along with a pad foot roller. A geo-grid was placed over the base and 10" of gravel with high Plasticity Index was placed on top of the geo-grid using production water to bring to optimum moisture. The gravel was bladed and compacted with a smooth drum roller. The County blades and applies magnesium chloride twice per year to control dust. This road is holding together well under heavy oil field traffic as this road serves as an arterial to the Tobacco Garden area. 38th Street NW, also in McKenzie County was rebuilt using the same process except an aggregate with lower Plasticity Index was used for the surface gravel. This road is bladed several times per year to maintain the road surface.

41st Street NW in McKenzie County provides access to a new oil production area and receives heavy truck traffic. This road was constructed in 2012 using 12" of soil cement base with 6% cement mechanically pulverized with existing materials. The road was compacted and a 2" to 3" lift of new gravel was added as a surface aggregate. This aggregate was placed using oil field produced water for construction water. This road has held up very well and has not been bladed since it was constructed in August of 2012. The thin layer of surface aggregate does show some minor pot holing but has remained intact and produces little dust.

In 2013, several additional roads in McKenzie County were surfaced with aggregate using oil field produced water for the construction water. 40th Street NW had 3" of new gravel applied to the road and 25,200 gallons of produced water were used during construction. The brine water was applied in four separate applications for a total of 0.813 gal/sq.yd. The calcium concentration in this water was 26,280 ppm and the sodium was 74,451 ppm.

This same water was used was used to treat gravel that was applied to the West Tobacco Garden Road a week ahead of time. The gravel was the same as that used on 40th Street NW. The gravel was loosened to a 2" depth and produced water was applied in four separate applications at a total rate of 0.793 gal/sq.yd. The two roads have similar amounts of oil field traffic but the results were noticeably different. Where the produced water was used for construction purposes, the gravel held together much better than where it was just applied in the top 2" of surface gravel. It appears the produced water provides some stabilization of the road aggregate when thoroughly mixed with the aggregate. Bowman and Dunn County will continue to experiment with produced water to determine if it does improve road performance.

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SUMMARY OF DUST CONTROL MEASURES IN WESTERN NORTH DAKOTA

This is a brief summary of what Counties in western North Dakota are doing to control dust from gravel roads impacted by oil field truck traffic during the summer of 2013.

Several Counties are using a surfactant or wetting agent with the chloride treatments to increase the speed and depth of chloride penetration into the road surface. In some cases, the surfactant is also used to decrease the amount of water that is applied before the chloride treatment.

Generally, most Counties loosen and shape the surface aggregate prior to application of any dust control agent. Roads are also watered ahead of the application.

BILLINGS: The County has used Coherex – a petroleum resin and water emulsion- as a spot treatment for several years. They also use magnesium and calcium chlorides.

BOTTINEAU: The County is interested in using oilfield produced water.

BOWMAN: The County has used both magnesium and calcium chlorides as spot treatments by rural residences and as general treatments on long road segments. The County has also used Stabilock –a vegetable based oil- for several years on the same road segments. The Stabilock should be mixed into the road aggregate to provide better results and keep the material from raveling and sticking to vehicles. They have also used asphalt paving and asphalt seal coating to control dust on heavily used roads.

BURKE: The County uses magnesium chloride for spot treatments around rural residences. They have tried a lignin product that didn't perform well.

DIVIDE: The County is using magnesium chloride and may be interested in using oil field produced water.

DUNN: The County uses magnesium chloride and is pursuing the use of oil field produced water.

GOLDEN VALLEY: The County does limited dust control using water and packers to treat areas around rural residences where they receive complaints. The County has used Base 1 with a seal coat on several small projects.

MCKENZIE: The County uses magnesium chloride. There have been 5 Township projects where oil field produced brine was used during construction as the surface aggregate was placed.

MOUNTRAIL: The County uses calcium chloride and Durablend – a calcium chloride and polymer blend. After the road is reshaped, the calcium chloride is applied and the road is then compacted using a rubber tire roller and a vibratory steel drum roller. After several days, the Durablend is applied to the compacted road surface.

RENVILLE: Provides limited dust control – primarily near rural residences when they receive a complaint.

SLOPE: No dust control is done at this time.

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STARK: The County uses magnesium chloride and is interested in using oil field produced water.

WARD: No dust control is done at this time.

WILLIAMS: The County uses Permazyme as a road stabilizer. After the road has been treated and traffic resumes, soft spots are reworked for a year or longer. The road may be seal coated if traffic and road conditions indicate a need.

Starting with good gravel is the key to having an effective dust control program. Counties must specify the quality of gravel they want to purchase and use. That includes having adequate PI (Plasticity Index) to bind the gravel together and hold it on the road.