CaCl\(_2\) Stabilization

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• What is calcium chloride
• Forms of calcium chloride
• Methods and benefits of calcium chloride stabilization
• FHWA history with calcium chloride
• 2020 CaCl2 projects in ND
Calcium Chloride

- A salt that draws moisture from the air.
- Liquid or Solid
- Liquid has lower concentration rates (<40%)
- Solid has higher concentration rates (>90%)
Liquid Form
Solid Form
Chloride Treatment Techniques

Purpose

- Reduce dust
- Reduce rock resource depletion
- Reduce costs (less blading & rock replacement)

Annual Dust Treatments

Heavy Stabilization Treatment
• Western Federal Lands
  – Test Sections – 2008 & 2009
  – Trial Contract - 2009
  – Expanded Use – 2012 and 2014
2008 – 3 sections of 650 ft length; CaCL2 rates from 1.7 - 2.7% added to aggregate @ 4” depth
2009 – 2 segments of one mile length; CaCL2 rate of 2% added to aggregate @ 3” depth.
Test Sections

• 2009 – 12 miles/4 routes; CaCL2 rate of 2% mixed into imported (new) surface aggregate.
G-11 – Mountrail
Calcium Chloride Application
Calcium Chloride Application
Calcium Chloride Application
3 inches total

D-03 - Ward
C-10 - McLean
Calcium Chloride Application
Calcium Chloride Application
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION
CHEMICALLY STABILIZED GRAVEL SURFACING
PROJECT ROM-0300(142) - PCN 22448

Description

This work consists of constructing a stabilized aggregate layer with crushed gravel, surfacing aggregate or in-place aggregate. The aggregate layer is constructed incorporating a solid form of calcium chloride.

Equipment

Conform to the following:

- **Pugmill**: Use a stationary pugmill with weighing or metering equipment capable of accurately controlling the material entering the mixer.
- **Reclaimer**: Section 153.01

  Calcium Chloride Spreading Equipment. Use distributor equipment capable of closely metering the application rate from the operator's cab. As an alternative, rotary mixing machines capable of closely metering calcium chloride and additional mixing water into the mixing process may be used, provided the required application rates are met and the application rates can be continuously monitored from the operator's cab.

- **Pneumatic Tired Rollers**: Section 151.01A
- **Smooth Faced Steel Wheel Rollers**: Section 151.01B
- **Trucks**: Section 152.01

Material

Conform to the following:

- **Calcium chloride flake**: Conform to ASTM D98 Type S, Grade 3, Class B
- **Imported Gravel Surfacing aggregate**: SP 714 (14)
- **Water**: Section 218

This document was originally issued and sealed by Ezra Balmond, Registration Number F-7326, on 08/04/19 and the original document is stored at the North Dakota Department of Transportation.
Special Provision

Construction Requirements

A. Proportioning

1. Imported gravel surfacing aggregate. Determine the maximum density and optimum moisture content according to ND T 180, Method D for the imported surface course aggregate in two ways: first for the aggregate without calcium chloride, and second for the aggregate mixture including calcium chloride at the target percentage. The Proctor with calcium chloride will be used to monitor yield and final compaction of the mixture. The target calcium chloride content, based on flakes with 100 percent salt, is 1.85 percent by weight of the aggregate mixture at 95 percent of the maximum dry density. The target water content at the time of mixing is from 2 percent below the optimum moisture content to optimum moisture content.

2. In-place aggregate course. Determine the maximum density and optimum moisture content according to ND T 180, Method D for the in-place surface course aggregate in two ways: first for the aggregate without additional calcium chloride, and second for the aggregate mixture including additional calcium chloride at the target percentage. The Proctor with calcium chloride will be used to monitor yield and final compaction of the mixture. The target calcium chloride content, based on flakes with 100 percent salt, is 1.85 percent by weight of the aggregate at 95 percent of the maximum dry density. The target water content at the time of mixing is from 2 percent below the optimum moisture content to optimum moisture content.

B. General

Store calcium chloride in closed, weatherproof containers. Schedule the work according to Section 108.03 to have all calcium chloride placed onto the roadway before September 15. Begin application or mixing operations only when the ambient air temperature is 40 °F or above, and is not expected to fall below 40 °F within 48 hours. Do not construct the stabilized aggregate layer when the underlying surface is frozen, muddy, during precipitation, or if precipitation is forecasted within 24 hours. Do not discharge calcium chloride into any waters of the U.S.

Prior to calcium chloride placement, schedule a review of the project with the Engineer to determine areas that need calcium chloride content adjustments due to environmental or drainage conditions. Site specific calcium chloride content adjustments within the specification range provided in Subsection D.1 will be considered if requested in writing after the review and prior to calcium chloride placement.

The Engineer will arrange an off-site informational session prior to stabilization work to discuss aggregate stabilization practices. The attendance of the project superintendent, work foreman, key stabilization personnel, and Engineer is required at the informational session. Conduct an on-site pre-work meeting, prior to beginning work on calcium chloride stabilization.
Special Provision

1. **Stabilization agent.** Calcium chloride will be evaluated by visual inspection of the material and a review of submitted certificates from the supplier.

2. **Imported gravel surfacing aggregate.** Aggregate gradation, plasticity index, fractured faces, liquid limit and other aggregate quality properties will be evaluated based on conformance to SP 714(14).

3. **Construction.** Aggregate stabilization construction will be observed and evaluated by the **Engineer**.

4. **Project Inspections.** An intermediate inspection of each road will take place within 15 days of aggregate stabilization completion. The results of the intermediate inspection are not to be interpreted as final acceptance of the road. Correct all defects that arise after the intermediate inspection and prior to final acceptance by the **Engineer**, according to Subsection E.5.

5. **Reshaping Roadway.** Preparation of the surface for imported surface course aggregate placement or in-place stabilization will be observed and evaluated by the **Engineer**.

G. **Pre-Installation Meeting.** Hold a pre-installation meeting at minimum 1 month before beginning installation with Steve Monlux (406)-544-1919 (stevenmonlux@gmail.com) and the **Engineer** to discuss the following:

- Installation Procedures
- Manufacturer’s instructions, and
- A list of services to invite to further trainings

H. **Training.** Hold classroom and field training sessions with Steve Monlux (406)-544-1919 (stevenmonlux@gmail.com) Contact the Engineer 1 week before the training to allow the Engineer to invite the appropriate agencies. Provide the Engineer an electronic copy of the training material and any videos or links showing repair techniques. Supply each participant a complete set of course handouts and the manufacturer’s installation and maintenance manual.

**Measurement**

Measure the Section items listed in the bid schedule and the following as applicable.

When measuring surface course aggregate by the ton, deduct the computed mass of calcium chloride from the measured quantity, if the material is pugmill mixed and weighed as a mixture. In this case, compute the mass of calcium chloride using the actual percentage added to accepted quantities of surface course aggregate.

Measure water as provided for under Section 216.
• Counties will maintain as recommended in the training.
• Counties will monitor the success
Questions

Thank you