

Summary of BNSF/UP Super Trial 2010

Over a seven-month period from March – September 2010, BNSF Railway Company (BNSF) and Union Pacific Railroad Company (UP) facilitated a field evaluation of coal dust suppressants in the Powder River Basin. The purpose of this “Super Trial” was to develop and provide to coal shippers information on coal dust suppression technologies that the shippers can use to implement effective coal dust curtailment measures.

Super Trial Procedures

The Super Trial tested the effectiveness of seven different chemical agents in suppressing coal dust emissions from loaded trains. Four of the chemical agents were used in a “body treatment,” where the chemical was applied to the coal before the coal was loaded into the railcars. Five of the chemical agents were used in a “topical treatment,” where the chemical was applied to the coal after the coal was loaded into railcars. Two of the chemical agents were tested both in a body treatment and a topical treatment. The concentration and application rates for each chemical agent were established by the individual chemical vendors. Most of the vendors whose products were tested were selected by coal shippers and their mines. Attachment 1 to this Summary identifies the seven chemical agents tested in the Super Trial.

Altogether, 1,633 trains were treated with a coal dust suppression agent in either a body treatment or a topical treatment during the Super Trial. Each of these trains was tested under real world operating conditions to determine the effectiveness of the treatment agent in suppressing coal dust emissions. The treatments were applied on participating coal shippers’ trains loaded at six Wyoming coal mines.

Of these 1,633 trains, 115 trains were tested using Passive Dust Collectors and portable weather stations. Attachment 2 shows the equipment used to conduct these tests. On each of these 115 trains, half of the cars were treated with a coal dust suppression agent and the other half were left untreated. Passive Dust Collectors were attached to the rear sill of seven treated and seven untreated cars on each train. The coal dust collected from the Passive Dust Collectors during the train’s movement was then analyzed to compare the amount of coal dust emitted from the treated and untreated cars.

The remaining 1,518 trains were treated with a coal dust suppression agent in either a body treatment or a topical treatment and monitored at TrackSide Monitors located at Milepost 90.7 (on the Orin Line) and Milepost 558.2 (on the Black Hills Subdivision). Attachment 3 contains a photograph of a TrackSide Monitor. An electronic dust monitor mounted on the TrackSide Monitor measures the amount of coal dust emitted while the train passes the dust monitor and an Integrated Dust Value (IDV.2) is determined for the train. In some cases, such as where two trains passed the TrackSide Monitor at the same time, the IDV.2 data were excluded from the study because the coal dust measured by the TrackSide Monitor could not be reliably associated with a test train.

Super Trial Results

At the beginning of the Super Trial, tests were carried out using two of the chemical agents to determine whether there was a correlation between coal dust measured by the TrackSide Monitors and coal dust measured by the Passive Dust Collectors. These tests showed that the results of both monitoring approaches were correlated. This correlation is confirmed by the overall results of the Trackside Monitor and Passive Dust Collector tests.

The results of the TrackSide Monitor tests showed that that the use of a topical treatment substantially reduces the amount of coal dust emitted from a loaded coal car. As shown in Attachment 4, 90 percent of the trains that received a topical treatment had IDV.2 readings at Milepost 90.7 below 91. (BNSF's IDV.2 coal dust standard for Milepost 90.7 is 300.) The corresponding IDV.2 value for untreated trains was 332, more than three times higher. For the trains monitored at Milepost 558.2, more than 90 percent of the trains that received a topical treatment had no measurable IDV.2 value at all. At both Milepost 90.7 and 558.2, the number of trains showing any measurable amount of coal dust emissions dropped significantly when a topical treatment was applied to the train. Trains that received a body treatment showed only a limited reduction in coal dust emissions.

The results of the Passive Dust Collector tests on the 115 tested trains confirmed that the use of a topical treatment substantially reduces coal dust emissions. Attachment 5 shows the percentage reduction of coal dust for each tested chemical agent. As shown in Attachment 5, there is significant variation in the effectiveness of different topical treatments. The coal dust reductions ranged from 75 to 93 percent depending on the topical treatment used in the test. Three topical treatment agents showed coal dust reductions of 85 percent or more -- AKJ CTS-100, Midwest Soil-Sement and Nalco Dustbind Plus. As shown in Attachment 5, the Passive Dust Collector tests also showed that there was no statistically significant reduction in coal dust emissions in trains that received a body treatment.

Finally, during the course of the Super Trial, field audits of treated trains showed that there was at times significant variation in the quality and consistency of the physical application of topical treatments at the mines. This was not surprising due to the fact that the application procedures were being done on a test basis with temporary facilities. However, the quality of application of the topical treatment could make a significant difference in the effectiveness of the application in suppressing coal dust emissions. In addition, audits of the load profile show that proper load profiling is not being consistently achieved at the mines. Effective coal dust reduction will require that careful attention be given to controlling the quality of the application process and the load profiling when coal dust suppression measures are implemented.

An additional phase of the Super Trial is planned to commence in early 2011 to test a railcar compaction and shaping prototype. The prototype is designed to apply physical forces to a loaded railcar to drive coal fines away from the open top of a railcar, displacing coal dust particles from the upper profile of a loaded car, which is most vulnerable to winds during transport. Final results from this portion of the Super Trial are expected to be available in mid-2011.

ATTACHMENT 1

Dust Suppressants Used During Super Trial

| Test Period | Body Treatment | Topical Treatment |
|-------------------------|-----------------------|--------------------------|
| March – May 2010 | GE DC-9144 | Rantec Capture 3000L |
| June 2010 | Freedom CTS-1000 | Midwest SoilSement |
| July 2010 | Benetech BT-553 | AKJ CTS-100 |
| August 2010 | Nalco DustBind Plus | Freedom CTS-1000 |
| September 2010 | N/A | Nalco DustBind Plus |

ATTACHMENT 2

Equipment Used to Determine the Effectiveness of In-Transit Dust Suppressants

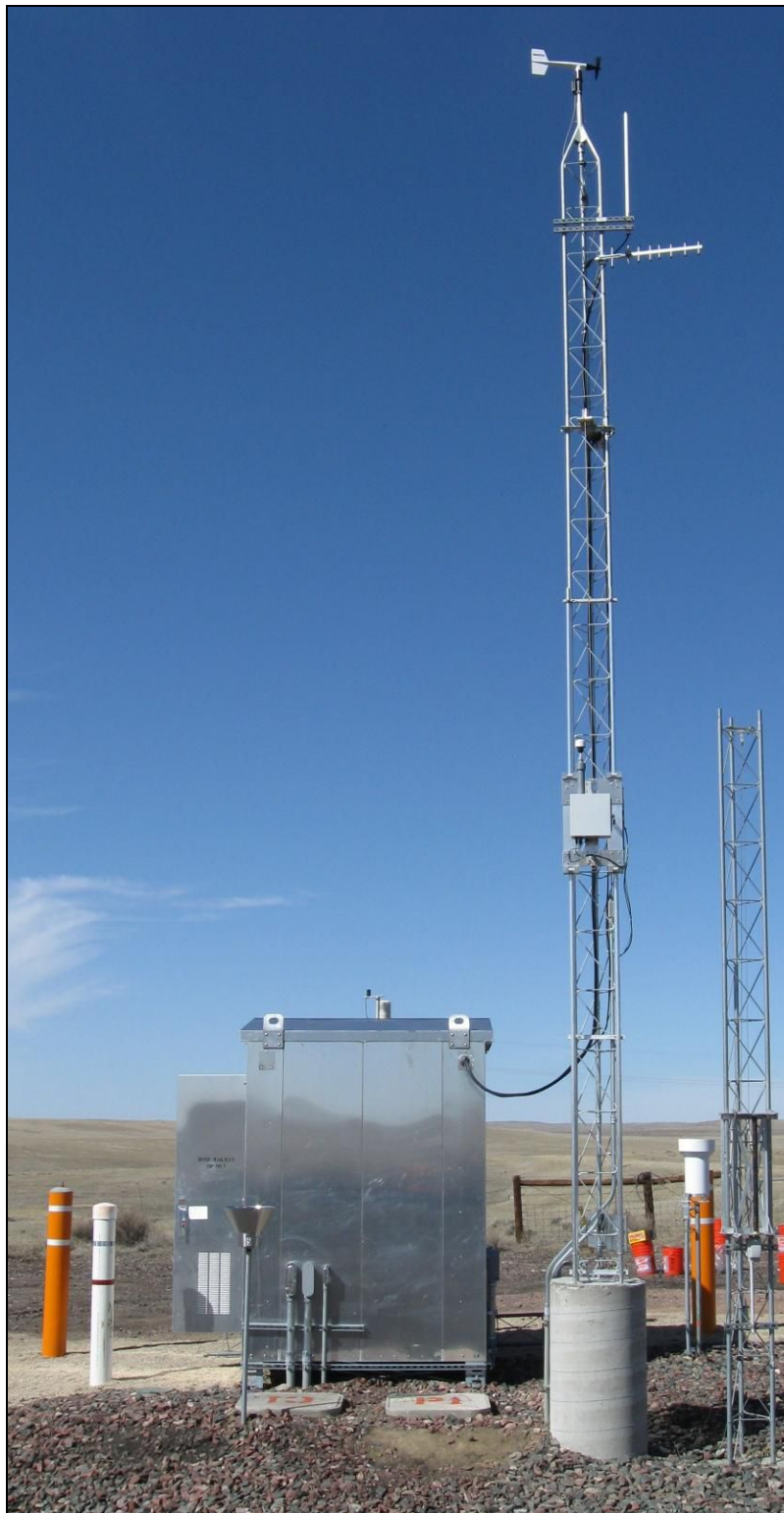


Rail Transport Emission Profiling System (RTEPS)



Passive Collector

TrackSide Monitoring System



TrackSide Monitor (TSM) weather/aerosol monitoring station. The TSM includes a real-time aerosol monitor anemometer, temperature/relative humidity sensor, and rain gage.

ATTACHMENT 4

**TrackSide Monitor Results of Dust Suppressants Used During Super Trial
(March - September 2010)**

Topical Treatment

| | MP 90.7 | | MP 558.2 | |
|---|-----------------------|---|-----------------------|---|
| | Treated Trains | Untreated Trains from Topper- Treating Mines | Treated Trains | Untreated Trains from Topper- Treating Mines |
| Number of Usable Trains: | 249 | 1466 | 230 | 700 |
| 90% of trains have IDV.2 values below this level: | 91 | 332 | 0 | 74 |
| Percentage of trains with measurable dusting events: | 24.9 | 39.4 | 7.0 | 23.3 |

Body Treatment

| | MP 90.7 | | MP 558.2 | |
|---|-----------------------|---|-----------------------|---|
| | Treated Trains | Untreated Trains From Body- Treating Mines | Treated Trains | Untreated Trains From Body- Treating Mines |
| Number of Usable Trains: | 243 | 1827 | 20 | 142 |
| 90% of trains have IDV.2 values below this level: | 136 | 223 | 93 | 183 |
| Percentage of trains with measurable dusting events: | 25.5 | 32.8 | 20.0 | 26.8 |

ATTACHMENT 5

Passive Collector Results of Coal Dust Suppressants

| Topical Treatment | Topical Treatment Dust Reduction |
|--------------------------|---|
| Rantec Capture 3000L | 73% |
| Midwest SoilSement | 92% |
| AKJ CTS-100 | 85% |
| Freedom CTS-1000 | 75% |
| Nalco DustBind Plus | 93% |

| Body Treatment | Body Treatment Dust Reduction |
|-----------------------|--|
| GE/Crown DC-9144 | No Statistical Difference From Untreated |
| Freedom CTS-1000 | No Statistical Difference From Untreated |
| Benetech BT-553 | No Statistical Difference From Untreated |
| Nalco DustBind Plus | No Statistical Difference From Untreated |