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April 30, 2010

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Ms. Cynthia Brown
Chief, Section of Administration
Office of Proceedings
Surface Transportation Board
395 E Street, SW
Washington, DC 20423-0001

Re: *Petition of Arkansas Electric Cooperative for a Declaratory Order*, STB Finance Docket 35305

Dear Ms. Brown:

Enclosed for filing in the above-captioned matter are the original and ten copies of the public version of BNSF Railway Company's Reply Evidence and Argument. Please note that the public version contains color images. In addition, Exhibit 1 to the Reply Verified Statement of William VanHook includes a CD with a short video clip.

We have included one unbound copy of the public volume to be uploaded onto the Board's webpage.

We are also filing under separate cover the confidential and highly confidential versions of BNSF Railway Company's Reply Evidence and Argument.

Please date stamp and return the extra copy of this letter to our messenger.

If you have any questions, please do not hesitate to contact me.

Regards,

Samuel Sipe (KG)

Samuel M. Sipe, Jr.

Enclosures

cc: Parties of Record

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PUBLIC

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Docket No. 35305

PETITION OF ARKANSAS ELECTRIC COOPERATIVE CORPORATION FOR A DECLARATORY ORDER

BNSF RAILWAY COMPANY'S
REPLY EVIDENCE AND ARGUMENT

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BNSF RAILWAY COMPANY

April 30, 2010

TABLE OF CONTENTS

Counsel's Reply Argument

BNSF RAILWAY COMPANY'S REPLY EVIDENCE AND ARGUMENT

BNSF Railway Company ("BNSF") hereby submits its Reply Evidence and Argument in this declaratory order proceeding. BNSF submitted Opening Evidence and Argument on March 16, 2010. In its Opening Evidence and Argument, BNSF described in detail the nature of the coal dust problem in the Powder River Basin ("PRB") and BNSF's efforts over the past five years to understand the scope of coal dust fouling in the PRB, to evaluate the operating risks associated with coal dust, and to develop a standard for coal dust emissions from moving coal trains. BNSF urged the Board to find that BNSF is entitled to establish operating rules that limit coal dust emissions from loaded coal cars and to find that the specific standards set out in the operating rule at issue here—BNSF's Rules Publication 6041-B, Items 100 and 101—are not unreasonable.

Several shippers and shipper associations also filed opening evidence and argument on March 16, 2010.

- Arkansas Electric Cooperative Corporation ("AECC") focused its comments on the causes of the 2005 derailments in the PRB, arguing that coal dust in the track ballast did not cause the derailments.
- Ameren Energy Fuels and Services Company ("AFS") claimed that while it is open to reasonable measures to solve ballast fouling problems, it has concerns about the specific standards that BNSF has set.
- American Public Power Association ("APPA"), Edison Electric Institute ("EEI"), and National Rural Electric Cooperative Association ("NRECA") raised a number of questions that they claim should be considered in evaluating BNSF's coal dust emissions standards, including whether the Board has jurisdiction over the unreasonable practices claim.
- National Coal Transportation Association ("NCTA") presented a study by an engineering firm retained by NCTA in 2008 to evaluate the methodology and assumptions underlying BNSF's coal dust standards, in which technical questions were raised about BNSF's approach.

- Texas Municipal Power Agency ("TMPA") focused its comments on the impact of BNSF's standards on TMPA given that TMPA's transportation is subject to a rate prescription.
- TUCO Inc. ("TUCO") argued that BNSF should be required to show that periodic maintenance is not sufficient to address the adverse effects of coal dust.
- Western Coal Traffic League/Concerned Captive Coal Shippers ("WCTL/CCCS") presented the most expansive comments, arguing that BNSF's coal dust emission standards are unreasonable and would impose undue burdens on coal shippers.

In this Reply Evidence and Argument, BNSF responds to the claims made by these shippers and shipper associations.

COUNSEL'S REPLY ARGUMENT AND SUMMARY OF EVIDENCE

In their various filings, the shippers and their associations try to obscure the obvious fact that there is a coal dust problem that needs to be addressed with a flurry of technical questions and objections to BNSF's coal dust emission standards. But there are certain fundamental and undeniable facts that require action to curtail coal dust emission from coal trains in transit:

(1) Coal dust comes off of the top of loaded coal cars in very large quantities. The photographic evidence is beyond dispute. Every other jurisdiction that has looked at the problem of coal dust has concluded that large amounts of coal are lost from the top of moving coal cars. It does not take a rigorous scientific analysis to know that some of that coal will be deposited directly onto the tracks, ballast and surrounding areas, and some of the coal that is deposited farther from the tracks will eventually be blown onto the ballast.

(2) Coal dust is extremely bad for rail ballast. The properties of coal dust—it absorbs water, expands when exposed to water and acts as a lubricant—make it a particularly pernicious foulant of rail ballast. Even in very small quantities, coal dust can weaken the strength, stability and load-bearing capacity of rail ballast. Weakened track structure on PRB rail lines, which are among the highest density heavy-haul rail lines in the world, can produce service interruptions that would affect the coal supply chain in the United States.

(3) Enhanced maintenance is not sufficient to address the impact of coal dust on the track structure. Coal dust does not accumulate in even, predictable amounts. When it is embedded in the ballast, coal dust cannot easily be detected with existing technology. Expanded maintenance programs, which create capacity constraints and impose operating inefficiencies, cannot prevent coal dust from accumulating in the ballast. Unless coal dust is kept out of the ballast in the first place, there will be an unacceptable risk of service interruption.

(4) If the Board does not allow BNSF to take measures to require shippers to keep their coal in the rail cars, nothing will get done to address the problem. As is evident from the shippers' comments in this proceeding, the shippers either deny that there is a problem or hope to put off any action as long as possible. Unless shippers as a group know that they will be subject to a common requirement to curtail coal dust emissions, starting with common carrier shippers, no shipper is likely to adopt curtailment measures. If the Board denies BNSF the authority to impose reasonable operating rules to curtail coal dust emissions, coal dust will continue to be deposited in the PRB rail ballast, and the risks from these coal dust deposits will increase as coal volumes increase.

The shippers' focus on hypotheticals and technical details ignores these obvious considerations. BNSF acknowledges that there is some imprecision in any environmental monitoring system, and coal dust monitoring is no different. The need to make coal dust measurements in the field makes it challenging to develop a coal dust monitoring protocol. But these challenges do not justify inaction. Moreover, many of the technical questions result from BNSF's decision to adopt a "performance-based" standard, where BNSF established a specified limit on coal dust emissions and the shippers are given the flexibility to determine how best to meet that limit. BNSF chose not to pursue an "activity-based" approach, where a specific mitigation approach, like the required use of car covers, is prescribed. BNSF's performance-based standard is intended to give shippers flexibility and to prompt the market to come up with the most efficient and cost-effective dust curtailment approaches.

Most of the technical questions raised by the shippers about BNSF's performance-based standard appear designed to generate confusion about BNSF's underlying methodology and assumptions. As BNSF's reply witnesses explain, the shippers' technical questions and concerns are without merit. But the Board does not need to referee the technical debate between BNSF's and the shippers' witnesses. The Board is not establishing coal dust standards. The only questions here are whether BNSF can adopt operating rules intended to limit coal dust emissions and whether BNSF's operating rules regarding coal dust are unreasonable. The Board does not need to become an expert in airflow dynamics, optical dust sensors or regression theory to address that question.

The shippers' fallback argument is that if they are required to curtail coal dust emissions, then BNSF should be required to "share" the costs of the curtailment measures. The shippers' discussion of cost sharing is highly misleading. As a common carrier, BNSF is required to provide coal transportation in response to a coal shipper's reasonable requests, but the coal shipper is clearly responsible for the costs of that transportation. If by "cost sharing" the shippers mean that BNSF should absorb part of the cost of the coal transportation service and spread that cost to non-coal shippers or to BNSF's owners, the suggestion is obviously inappropriate and untenable. If BNSF were required to pay for surfactant application, or even for a portion of the surfactant application, BNSF would clearly be entitled to include in its coal transportation rates a charge to each shipper to cover the surfactant cost. The far more efficient alternative is to let the shippers decide how they want to comply with the coal dust emission standards and make their own arrangements with suppliers of the necessary services and materials.

These issues are discussed in greater detail below and in the reply verified statements of five witnesses that accompany this reply evidence and argument:

- **William VanHook:** Mr. VanHook, BNSF's Assistant Vice-President and Chief Engineer- Systems Maintenance and Planning, submitted a verified statement on opening. On reply, Mr. VanHook responds to shippers' questions about the extent of the coal dust problem in the PRB and shippers' claims that a requirement to keep coal dust in the coal cars would impose undue costs and burdens on coal shippers.

- **Craig Sloggett:** Mr. Sloggett, BNSF's General Director Maintenance with responsibility for maintenance and maintenance planning on BNSF's Powder River Division, also submitted a verified statement on opening. On reply, Mr. Sloggett responds to shippers' claims that coal dust can and should be addressed through routine maintenance of the rail lines. Mr. Sloggett describes in detail the extraordinary maintenance and inspection activities that BNSF has been required to undertake to address the coal dust fouling on and around the rail lines in the PRB.

- **Terry D. Smith:** Mr. Smith is BNSF's General Superintendent Transportation, Central Region. His primary responsibility is to manage day-to-day rail operations in the PRB. He describes in his verified statement the operating disruptions and delays that result from the expanded coal dust maintenance activities on PRB lines and on BNSF lines outside the PRB that handle PRB coal trains.

- **Charles Sultana:** Mr. Sultana, a Six Sigma Specialist in BNSF's Mechanical Department, submitted an opening verified statement in which he described the process by which the standards at issue here were developed. In his reply verified statement, Mr. Sultana responds to shippers' questions about the use of an IDV.2 standard to monitor coal dust levels on passing trains and about the methodology used to develop the specific IDV.2 standards set out in the challenged rules.

- **G. David Emmitt:** Dr. Emmitt, the President and Senior Scientist of Simpson Weather Associates ("SWA"), also submitted an opening statement. On reply, Dr. Emmitt responds to the shippers' questions about the approach adopted by BNSF to monitor coal dust from passing coal trains and the equipment used to monitor coal dust emissions.

ARGUMENT

I. Coal Dust Emissions From Loaded Railcars in Transit Are Not a BNSF "Fixation," But a Real and Serious Problem.

The shippers' denial of the obvious is most clearly reflected in WCTL/CCCS' claim that BNSF is "fixated on coal dust." WCTL/CCCS Op. at 19.[1] Anyone who has spent time in the PRB knows that coal dust emissions from moving coal trains are a major problem and that BNSF's efforts to address coal dust are not the result of some delusional "fixation." WCTL/CCCS' own witness, Richard McDonald, acknowledges that "[i]t is no secret that coal dust blows off loaded coal trains, or that more dust comes from coal trains on the Joint Line than in other areas due to the very high volume of coal traffic that moves from mines served by (or reached via) the Joint Line." WCTL/CCCS Op., McDonald Op. V.S. at 4. WCTL/CCCS apparently hope that the Board's knowledge of the PRB is insufficient to give the Board a basis to evaluate the extent of the problem.

But the photographic evidence is undeniable. BNSF presented numerous photographs and videos of coal dust being blown off of moving coal trains on opening. *See, e.g.*, BNSF Op., Counsel's Ex. 4; VanHook Op. V.S., Ex. 3. Mr. VanHook's reply verified statement includes additional photographic evidence. Dr. Emmitt includes photographs taken by a video camera installed at Milepost 90.7, where BNSF has established its coal dust monitoring station for the Joint Line. Emmitt Reply V.S., Ex. 9. The photographs show that coal dust comes off of the top of loaded coal cars in dark plumes of dust. There are over 60 loaded coal trains a day moving on the Joint Line. It is true that coal dust emissions are episodic and that not every coal train emits

[1] BNSF refers to the parties' opening evidence and argument as "Op." and to verified statements as "V.S."

coal dust in large quantities at every location along the Joint Line. But it does not require the kind of scientific analyses or "statistical certainty" demanded by the shippers to know that the coal dust that is episodically blown from the top of trains operating over this extremely high density rail network will rapidly accumulate along the right of way and eventually make its way into the rail ballast. BNSF presented several pictures of coal dust along the Joint Line right-of-way showing thick coal dust deposits between the tracks. *See, e.g.*, Sloggett Op. V.S. Exs. 1-3.

BNSF is not alone in determining that coal dust losses from the top of coal cars are a serious problem. As noted by Dr. Emmitt and Mr. VanHook, other jurisdictions where there is heavy coal train density have determined that coal is lost from the top of coal cars in transit in large quantities and have adopted measures to curtail those coal dust emissions. Coal dust curtailment programs have been implemented in Australia, Canada and Colombia. The Canadians and the Australians use surfactants to reduce coal dust emissions. The Colombians use a roller and compaction technology that is similar to technologies that are being tested now for use in the PRB. In addition, coal dust monitoring stations have been adopted by Queensland Rail in Australia that are strikingly similar to the Trackside Monitors that BNSF has established in the PRB. The shippers' suggestion that BNSF is doing something unprecedented is simply not the case.

The State of Virginia requires that steps be taken to curtail coal dust emissions from moving coal trains. In 1997, the Virginia General Assembly adopted a Joint Resolution requesting that "railroad companies having information about coal dust blown from moving coal trains in Virginia" make annual reports to the General Assembly of their efforts to reduce coal dust emissions. *See* Va. Sen. Joint Resolution No. 257 (1997).[2] In response, Norfolk Southern established a Performance Monitoring Plan involving, among other things, the use of a Trackside Monitor that records dust emissions from trains as they pass. A summary report identifies the mine believed to be responsible for the dusting train, and the railroad works with participating mines to improve dust reduction through use of surfactants. *See* NS 2008 Annual Coal Dust Report.[3] NS has continued to make improvements in its monitoring system over time. Sensor upgrades have been made on the Trackside Monitors, additional Trackside Monitors have been added in new locations, and a real time dust collector system was installed at Norfolk Southern's rotary dumper facility to evaluate dust mitigation techniques at the mine. *See id.*

Shippers' claims that BNSF is arbitrarily fixated on coal dust are also belied by their own experience with coal dust. Coal dust blows off of stationary coal stockpiles in sufficient quantities to make it the target of federal and state regulation. In 2009, the United States Environmental Protection Agency ("EPA") amended its standards for coal dust emissions in coal preparation and processing plants. Standards of Performance for Coal Preparation and Processing Plants, 74 Fed. Reg. 51,950 (Oct. 8, 2009) (to be codified at 40 C.F.R. pt. 60). Under the new rules, owners and operators of open coal storage piles are required to spray chemical suppressants or take other recommended measures to reduce coal dust emissions from their piles.

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[2] *Available at* http://leg2.state.va.us/dls/h&sdocs.nsf/fc86c2b17a1cf388852570f9006f1299/1be89c860e382263 85257402005f6d6b/$FILE/RD105.pdf.

[3] Norfolk Southern Corporation's 2008 Annual Report to the Joint Subcommittee Studying Measures to Reduce Emissions from Coal-Carrying Railroad Cars Per Senate Resolution No. 257 ("NS 2008 Annual Coal Dust Report"), *available at* http://leg2.state.va.us/dls/h&sdocs.nsf/fc86c2b17a1cf388852570f9006f1299/1be89c860e382263 85257402005f6d6b/$FILE/RD105.pdf.

40 C.F.R. ¶ 60.254(c). Coal burning utility companies strenuously objected to these regulations, but the EPA concluded that "coal storage piles are significant sources of emissions...." 74 Fed. Reg. at 51,967. Since significant quantities of coal dust blow off of stationary coal stockpiles, it is not credible for the shippers to suggest that coal dust blowing off of coal *in moving coal cars* is just a BNSF "fixation."

It has proved difficult to determine with precision the amount of coal that is lost from the top of moving coal cars. But this cannot be an excuse for inaction. Scales used to weigh coal cars are not accurate enough to measure coal losses in transit with precision. Therefore, BNSF conducted tests with laser measurements of the volume of coal in coal cars before and after train movements, and those tests are described by Dr. Emmitt in his reply verified statement. Substantial coal losses, in the range of 500 pounds per car, were demonstrated by those tests. BNSF acknowledges that more testing would be required to have a high degree of confidence in the quantification of coal losses. But imprecision does not mean that common sense should be abandoned. As Mr. VanHook explains, if only a quarter inch of coal on average was lost from the top of coal cars, the losses would approximate 500 pounds per car over the course of a train trip. The photographs BNSF has presented of plumes of coal dust from moving coal cars at a single location make it easy to see how over the course of several hundred miles, coal cars moving at speeds of over 40 mph during variable wind conditions could lose a quarter inch of coal from the top of the cars. Photographs of erosion in the coal loaded in a coal car, included in Mr. VanHook's reply verified statement, confirm that substantial quantities of coal are lost from loaded coal cars in transit.

The shippers also argue that coal dust accumulations in the ballast are not large enough to be of concern. First, the shippers ignore the emerging academic research showing that coal dust fouls ballast at much smaller amounts than other traditional ballast foulants. BNSF presented in its opening evidence a verified statement by the leading researcher on these issues, Dr. Erol Tutumluer. Moreover, Mr. VanHook explains that the shippers' selective use of BNSF documents to suggest that coal dust fouling is not an issue is highly misleading and overlooks numerous documents showing that there are high concentrations of coal dust in ballast on PRB lines. The shippers' reliance on a few references to small concentrations of coal dust (including references to the unremarkable fact that coal dust was found in low quantities in ballast that had just been cleaned) also overlooks the fact that even very small amounts of coal dust can present serious ballast problems depending on where the coal dust is located, how old the ballast is, and whether other contaminants are present.

Finally, WCTL/CCCS claim that BNSF has not shown with "statistically valid samples" that the coal in the ballast is coal that came off of the top of the cars as opposed to coal that escaped from the bottom of bottom-dump cars. At the very beginning of BNSF's efforts to get a handle on coal dust in the PRB, BNSF realized that it was important to determine the extent to which coal dust was attributable to coal losses from bottom-dump cars. While bottom-dump cars are only a minority of the car fleet, any losses from those cars would contribute to the coal dust problem. BNSF described on opening the tests that BNSF conducted to determine the amount of coal lost from bottom-dump cars. VanHook Op. V.S. at 10-11. While those coal losses were significant, they were nowhere near the amount of coal that is lost from the top of moving coal cars.

In any event, BNSF immediately took action to improve maintenance and inspection of bottom-dump cars, as explained by Mr. VanHook in his opening verified statement. *Id.* New procedures have been established that reduce the chance that coal will be emitted out of the bottom of bottom-dump cars. Moreover, as described by Dr. Emmitt in his reply verified statement, data that BNSF has collected from dustfall collectors and Trackside Monitors, as well as visual observations, confirm that the predominant source of coal dust in the PRB is coal that has been blown off of the top of loaded coal cars. While coal losses out of the bottom of bottom-dump cars was an issue, BNSF has addressed that issue. That issue does not justify ignoring coal dust coming off of the top of moving coal cars.

II. Coal Dust Accumulations in the Ballast Cannot Responsibly Be Addressed Through Expanded Maintenance.

The shippers argue that cleaning up coal dust from the railroad right-of-way and the ballast is just "regular maintenance paid for by shippers through their rail rates." TUCO Op. at 3. According to AECC,

> Coal dust is one of a number of well-known challenges to the track structure that railroads routinely handle in the course of inspections and maintenance. Coal dust is not some mysterious substance that magically and unexpectedly undermines the track structure and causes it to fail.

AECC Op. at 8. The shippers would have the Board treat coal dust contamination just like the normal wear and tear on rails that is addressed through regular, periodic maintenance, or like weed control that is regularly addressed in a railroad's maintenance plan. Based on their premise that cleaning up coal dust deposits is just part of the normal maintenance of a railroad, WCTL/CCCS claim that BNSF's coal dust standard is just another effort by railroads "to reduce their service costs, including their maintenance costs." WCTL/CCCS Op. at 19.

Historically, coal dust emissions from coal cars were addressed through normal maintenance. But historical movements of coal bear little resemblance to current coal transportation, particularly in the PRB. Coal historically was handled in much smaller carload quantities over much lower density line segments. Under those circumstances, coal dust was a nuisance to railroad operators, but it did not require fundamental changes in operating or maintenance practices. Coal operations in the PRB, however, are unique. The PRB originates over 60 loaded unit trains of coal a day, with each loaded unit train over a mile long. The PRB is one of the highest density segments of railroad in the world, and it handles almost exclusively coal trains. While coal dust could be accommodated in the past on lower density lines through normal maintenance practices, coal dust is emitted from PRB coal trains in such large volumes that it is impossible to deal with it through normal maintenance. BNSF's coal dust emissions standards are addressed to a unique problem that arises from the nature and volume of PRB coal traffic and the importance of PRB coal transportation to the U.S. energy supply chain.

As explained on opening by BNSF's witness Craig Sloggett, BNSF's General Director Maintenance for the Powder River Division, there is nothing normal about the maintenance that BNSF has been required to undertake in recent years to deal with the large accumulations of coal dust along the right-of-way and in the rail ballast. BNSF's reply evidence also includes a reply verified statement of Mr. Sloggett, in which he describes further the extraordinary measures that BNSF has been required to undertake to deal with coal dust in the PRB. Mr. Sloggett describes the specialized equipment that is needed to remove coal from contaminated ballast and from exposed areas on the track and the extensive efforts associated with the increased frequency of maintenance and inspection activities that BNSF has been required to undertake.

In addition, BNSF's reply evidence includes a verified statement by Terry D. Smith, BNSF's General Superintendent Transportation responsible for operations on BNSF's Powder River Division. Mr. Smith describes the impact that this expanded maintenance has had on railroad operations on lines within the PRB and on lines extending from the PRB that handle large volumes of coal traffic. As Mr. Smith explains, the number of maintenance windows and slow orders have increased as a result of coal dust, even on lines hundreds of miles outside of the PRB. For example, Mr. Smith explains that on BNSF's Sand Hills Subdivision—which includes BNSF's lines heading east from Alliance, Nebraska— BNSF has had to schedule maintenance windows, which typically require that a line segment be taken completely out of service in 8-hour increments, for every day this year until December 25. This increased level of maintenance is the direct result of coal dust fouling. Mr. Smith describes the impact of this expanded maintenance activity on coal train staging, cycle times, longer routing of coal trains, and additional crew costs, among other things. The increased number of maintenance windows that are required to deal with coal dust and the slow orders that require reduced train speeds on lines that have been destabilized by coal dust dramatically reduce the capacity of BNSF's coal network and interfere with the efficient operation of coal trains.

The shippers mischaracterize the issue when they accuse BNSF of trying to avoid responsibility for normal maintenance costs. BNSF will continue to perform high levels of maintenance on PRB lines even after coal dust emissions have been controlled. High density lines require high levels of maintenance. BNSF's coal dust standards will have no impact on BNSF's normal maintenance costs on such high density lines. What BNSF is trying to avoid is the risk of service interruption that flows from the presence of large amounts of coal dust on the right-of-way and in the ballast and the inefficiencies and capacity constraints created by the extraordinary maintenance required to address coal dust.

Moreover, expanded maintenance cannot eliminate the risk of a service interruption. As BNSF explained in its opening evidence, BNSF has been surprised at the rate of coal dust accumulation in recently built or recently cleaned areas. Coal dust accumulations in the ballast are difficult to detect and are often not apparent from visual inspection. Further complicating maintenance efforts is the fact that coal dust has different effects on ballast stability under different circumstances, such as weather conditions, age of the ballast and location of the coal dust deposits within the ballast. Since even small quantities of coal dust can make ballast unstable, as Professor Tutumluer explained, the risk of derailments cannot be eliminated just by increasing the frequency of maintenance.

WCTL/CCCS and AECC spend much effort in their opening evidence seeking to demonstrate that the 2005 derailments were caused by something other than coal dust, and they present several theories. But their discussion of this issue is a red herring. BNSF has not claimed that coal dust was the sole cause of the 2005 derailments. The possibility that there were other contributing causes of the derailments is not relevant in this proceeding. The important fact here, which is undeniable, is that coal dust was found in the ballast at the derailment sites in substantial quantities and that under the extreme weather conditions at the time, that coal dust contributed to the weakening of the track structure that led to the derailments.

In response to the shippers' extensive comments on this issue, Mr. VanHook addresses in his reply verified statement the claims of WCTL/CCCS and AECC witnesses about the supposed causes of the 2005 derailments. In addition, Appendix A to this Counsel's Reply Argument addresses the documents on which WCTL/CCCS counsel base their claim that the 2005 derailments were caused by failures in BNSF's maintenance and inspection practices, rather than by any effects of coal dust. As explained in that Appendix, WCTL/CCCS' citations to the documents are selective and misleading. As Mr. Fox explained in his opening verified statement, if BNSF had understood the full impact of coal dust on the track structure, BNSF would have undertaken additional and extraordinary measures that might have prevented the derailments. But based on what was known about coal dust at the time, BNSF's maintenance and inspection practices at the time cannot be faulted.

III. The Shippers' Claim That Maintenance is the Most Cost-Effective Way of Dealing With Coal Dust Ignores Critical Policy Objectives and Unquantifiable Social Costs Associated With Service Interruptions.

The shippers also argue that BNSF should be required to deal with coal dust through maintenance of the rail lines because it costs less to clean up coal dust after it has fallen out of the coal cars than it costs to keep the coal in the car in the first place. As a preliminary matter, there is something fundamentally wrong with the argument that a railroad should be forced to clean up after the shipper because it is less expensive than requiring that the shippers' freight remain in the car. BNSF does not let any other shipper's freight spill out of the car onto the railroad's right of way, regardless of how much it costs to clean up the spilled freight. A railroad cannot operate efficiently without loading rules that will keep the shippers' freight in the railcars. A comparative cost analysis is not the proper way to evaluate the reasonableness of loading rules designed to keep a shipper's freight in the railcar.[4]

More important, the cost comparison that the shippers urge the Board to make ignores critical policies that are implicated by BNSF's coal dust emission standards. As discussed above, BNSF's standards are intended to avoid service interruptions and to ensure efficient rail operations. By statute, the Board is required to consider these important policies. Congress has

[4] As explained in BNSF's Opening Evidence, BNSF has a legitimate interest in preventing its property from being degraded by coal dust contamination. The heavy emissions of coal dust that BNSF has experienced are the effective equivalent of having coal dumped on BNSF's right of way without its permission. *See* BNSF's Op. at 19 n.1. That it might cost less to clean up after a trespasser who has entered one's property than it costs the trespasser to avoid the trespass does not legitimize the act of trespassing.

stated that "it is the policy of the United States Government – . . . (3) to promote a safe and efficient rail transportation system . . . [and] (4) to ensure the development and continuation of a sound rail transportation system . . . to meet the needs of the public and the national defense." 49 U.S.C. § 10101. Moreover, it is a basic principle of federal administrative law that agencies performing cost analyses must take into account all of the material costs, even if the extent of some of the costs is uncertain or difficult to quantify. *See, e.g., Ctr. for Biological Diversity v. Nat'l Highway Transp. Safety Admin.*, 538 F.3d 1172, 1200 (9th Cir. 2008) (criticizing NHTSA's cost-benefit analysis because "[t]he value of carbon emissions reduction is nowhere accounted for in the agency's analysis, whether quantitatively or qualitatively").

WCTL/CCCS and AECC present specific cost analyses comparing the costs of surfactant application to the costs of incremental maintenance that would be avoided by the application of surfactants. WCTL/CCCS present their cost analysis through Thomas Crowley. Crowley estimated that the cost to shippers of surfactant application is {{ }}[5] million annually, assuming movement of {{ }} million tons of coal a year, and estimated that the incremental cost of maintaining "PRB lines" to deal with coal dust is only {{ }} million annually. Crowley Op. V.S. at 17. AECC concluded that BNSF's estimates of the maintenance costs {{ }} while the cost to shippers of complying with the coal dust emission standards range from {{ }} million per year. Nelson Op. V.S. at 26-27.

Both cost analyses are meaningless because they ignore the costs of possible service interruptions caused by coal dust fouling and they ignore the impact of increased maintenance on PRB rail capacity that is already tight. The lack of any consideration of the impact of coal dust

[5] Confidential materials are designated by a single bracket—"{"—and Highly Confidential materials are designated with double brackets—"{{".

on the reliability of the energy supply chain on its own renders these comparisons meaningless. The Board has stated that it "views the reliability of the nation's energy supply as crucial to this nation's economic and national security, and the transportation by rail of coal and other energy resources as a vital link in the energy supply chain." *Establishment of a Rail Energy Transportation Advisory Committee*, STB Ex Parte No. 670, at 2 (served July 17, 2007). The coal shippers themselves have recognized that service disruptions on the high-volume PRB lines have far-reaching adverse consequences. *See* AFS Op. at 3 (stating that the 2005 derailments on the Joint Line "caus[ed] hundreds of millions of dollars in additional costs to utilities"); WCTL/CCCS' April 16, 2007, Comments, *Establishment of a Rail Energy Transportation Advisory Committee*, STB Ex Parte No. 670, at 7 (same). Despite this widespread recognition that reliable rail service is crucial to the American economy, the coal shippers' cost analyses ignore the issue altogether.

Similarly, the coal shippers' cost analyses ignore the impact of extraordinary maintenance activity necessary to deal with coal dust accumulations on the capacity of the high-volume PRB lines. As discussed above, the increased maintenance activity associated with coal dust substantially interferes with operations throughout the PRB and on other lines that handle coal trains. Increased maintenance reduces the effective capacity of the rail lines. The Board has repeatedly acknowledged that adequate capacity is crucial to meeting America's energy needs. As recently as 2007, the Board was concerned about a "developing rail capacity crisis."[6] Although the recent economic recession has reduced these concerns in the short term, the Board

[6] Francis P. Mulvey, Comm'r, S.T.B., Public Sector Role in Transportation Infrastructure Financing (Mar. 6, 2007), at 9, *available at* http://www.stb.dot.gov/TestAndSpeech.nsf/219d1aee5889780b85256e59005edefe/63e35f49ed35c5ef852572ac0066eb49/$FILE/MULVEY,SPCH,PALMSPRNGS,3-6-07.pdf.

has recognized that a return to robust economic growth could result in capacity shortfalls.[7] The impact of extraordinary maintenance needed to deal with coal dust on track capacity cannot be ignored. Even if the shippers' cost analyses tried to take account of capacity costs, adding capacity just to be able to maintain the existing network is clearly not an appropriate solution to the coal dust problem. As the Rail Energy Transportation Advisory Committee has noted, railroads' ability to expand or shift capacity "is hindered by the time needed to develop such capacity, as well as by uncertainty in the return on investment due to the significant cost of capacity investment and uncertain revenue streams."[8] It is essential that the existing rail infrastructure be used efficiently so that capacity is maximized.

Finally, the shippers' cost analyses are highly misleading, even without considering the critical policies and associated costs discussed above. Mr. VanHook discusses the WCTL/CCCS cost analysis in detail in his reply verified statement and shows that the relationship between maintenance and surfactant costs is dramatically reversed if errors and oversights in the shippers' spreadsheets are corrected. Mr. VanHook adjusted the simplistic analysis relied on by Mr. Crowley by: (1) updating the maintenance cost assumptions to include current unit costs and current miles, (2) including the opportunity costs associated with longer cycle times that Mr. Crowley arbitrarily excluded, (3) expanding the analysis to include BNSF's entire coal loop—BNSF's lines through both Guernsey, Wyoming, and Alliance, Nebraska—and other lines directly affected by coal dust emissions, and (4) estimating realistic surfactant costs that are

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[7] Francis P. Mulvey, Acting Chairman, S.T.B., Transportation, Research, and the Surface Transportation Board (May 27, 2009), at 3, *available at* http://www.stb.dot.gov/TestAndSpeech.nsf/9c0ecd4a0be1c80f852570ff004b208a/a662c05723d4743485257634005a6f4c/$FILE/MULVEY,SPCH,DENVER,052709.pdf.

[8] Rail Energy Transportation Advisory Committee, Capacity Planning Subcommittee, Capacity White Paper (Mar. 4, 2009), at 2, *available at* http://www.stb.dot.gov/stb/rail/RETAC.html.

consistent with costs in the current surfactant trial being conducted in the PRB.[9] Even without considering the substantial costs to UP for expanded maintenance on UP's high-density east-west line through North Platte, Nebraska, Mr. VanHook shows that the incremental maintenance costs associated with coal dust from PRB trains exceeds the cost of surfactant application by a substantial margin.

It is not necessary for the Board to bless Mr. VanHook's cost analyses for purposes of this proceeding. For the reasons set out above, BNSF does not believe the reasonableness of the challenged coal dust emissions standards can or should be evaluated based on a comparison of the type put forward by WCTL/CCCS or AECC. There is no doubt that the assumptions used in Mr. VanHook's analysis could be debated. Mr. VanHook simply used the basic spreadsheet at the heart of Mr. Crowley's analysis to show that other plausible scenarios and assumptions produce results that are totally contrary to the conclusions reached by the shippers on the relative costs of maintenance versus surfactants. Limits on coal dust emissions are necessary not because

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}} All documents referred to herein that contain a document reference number were produced in discovery and copies are contained on the CD that is included in Appendix B to the Counsel's Reply Argument.

increased maintenance is more costly than surfactant application but because limits on coal dust emissions are critical to ensuring a safe and efficient rail transportation system.

IV. The E-Sampler Dust Monitors Used to Monitor Compliance With the Coal Dust Standards Are Well Suited to This Task and Are Being Used Properly.

As BNSF explained on opening, Trackside Monitors ("TSMs") have been set up at Milepost 90.7 on the Joint Line and at Milepost 558 on BNSF's Black Hills Subdivision to monitor compliance with BNSF's coal dust emission standards. BNSF and SWA have mounted electronic dust monitors, called E-Samplers, on the TSMs to measure the dust in the air when trains pass by. The E-Samplers use a light scatter system to measure dust in the air. Air is continuously drawn into a chamber. A laser is directed into the air sample containing dust particles and those particles scatter the light onto photo detector diodes surrounding the measurement chamber. The photo diodes convert the scattered light into an electric signal whose strength is proportional to the amount of dust in the air. The E-Sampler takes dust readings at five-second intervals. The readings are made before, during and after the passage of a train, and they are sent to SWA where the data are integrated to produce an Integrated Dust Value ("IDV.2") for each train. The IDV.2 for each train is the sum of the E-Sampler's five-second readings for that train with adjustments to eliminate dust readings associated with background dust and the diesel locomotives. The IDV.2 value for each train determines whether the train produced coal dust within the limits set out in BNSF's coal dust emission standards.

The shippers argue that the E-Samplers have too many shortcomings to be used to monitor compliance with a coal dust emission standard. Most of the shippers' criticisms are misplaced, as explained below. But even if the E-Samplers were less than perfect, the question here is not whether the E-Samplers are flawless dust-monitoring devices, but whether they can reasonably be used to identify trains that emit dust in excess of the limits set out in BNSF's coal dust emissions standards. Years of data gathered by BNSF in its study of the coal dust problem, as well as confirmation from the manufacturer of the E-Samplers, show that the E-Samplers are well suited for that purpose.

While the shippers are quick to criticize the E-Samplers, they offer no alternatives to these devices, which are the best available dust-monitoring devices for field monitoring of dust levels. If the shippers were correct that the E-Samplers are too flawed to be used to measure the amount of dust emitted by passing coal trains, then the obvious alternative would be to impose an activity-based standard, *i.e.,* a requirement that all shippers adopt a specific coal dust suppression method like car covers. But BNSF chose the more flexible alternative of a performance-based standard that sets only a specified limit on coal dust, so that individual shippers have flexibility to choose a coal dust suppression approach and the market can work to make available efficient, low-cost alternatives. If the shippers were correct that the E-Samplers are inadequate to monitor performance, BNSF would have to adopt a less flexible activity-based standard. Doing nothing is not an acceptable alternative.

In any event, the shippers' claims about the supposed flaws in the E-Samplers and BNSF/SWA's use of that equipment are unfounded.

Criticism 1: The E-Samplers are not measuring the coal dust that is being deposited directly onto the tracks or into the ballast.

WCTL/CCCS criticize BNSF's monitoring approach on grounds that the E-Samplers are mounted on TSMs that are 60 feet away from the tracks and are located several feet above the ground. According to WCTL/CCCS, given the location of the E-Samplers, they cannot be measuring the coal dust that is actually deposited onto the tracks.

Dr. Emmitt explains that, as a matter of common sense, if the wind has blown smaller coal dust particles into the air 60 feet from the ballast, it has blown larger coal particles that do not remain airborne quite as long onto the right of way closer to the ballast. Dr. Emmitt explains that the dustfall collectors that BNSF and SWA set up at various locations along the Joint Line confirm that the airborne dust measured by the E-Samplers is directly related to the coal being deposited in the ballast. As Dr. Emmitt points out, {

}. By monitoring coal dust in the air, BNSF is looking at a covariate of coal deposition in the ballast, a common measurement technique when it is difficult for practical reasons to make direct measurements. It would be preferable to measure coal dust using instruments located on or near the ballast, but such an approach is not practicable.

Criticism 2: It is uncertain whether the materials recorded by the E-Samplers are coal or some other material.

As Dr. Emmitt explains, there is abundant evidence that the E-Samplers are measuring coal dust. Dr. Emmitt presents visual evidence from a video camera mounted on the TSM showing that high IDV.2 readings for passing trains are correlated with obvious emissions of coal dust. Dr. Emmitt presents other visual evidence that directly relates high dust value readings from the E-Sampler with coal dust from the top of moving trains. Dr. Emmitt also explains that if the dust readings on the E-Samplers were associated with something other than coal, one would not expect to see a significant difference between the E-Sampler readings for loaded and empty coal cars, but empty cars passing the TSM produce very low dust readings.

AFS and other shippers suggest that the E-Sampler may just be reading dust associated with the diesel locomotives. As Dr. Emmitt explains, the dust associated with diesel locomotives has a distinct signature in the E-Sampler readings and SWA is able to eliminate the dust from the IDV.2 calculations associated with the locomotives. AFS notes that {{

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Criticism 3: SWA failed to use a filter and a "K-Factor" to determine the mass of dust measured by the E-Sampler.

The thrust of WCTL/CCCS' criticism of BNSF/SWA's use of the E-Samplers, put forward by their witness Mark Viz, is that BNSF and SWA failed to use a filter to derive a "K-factor" for the E-Samplers. Dr. Viz' argument is highly technical, but his technical arguments obscure a very simple aspect of BNSF/SWA's monitoring approach. BNSF is using the E-Samplers to determine the *relative* dustiness of passing trains, not to determine the *absolute* amount of dust given off by a particular train. BNSF's coal dust emission limits were set by reference to the highest dusting trains that historically accounted for 85%-95% of the dust emissions at a particular site. Because BNSF based its emissions standards on these historical data, BNSF was able to establish limits based on a relative measure of the level of dust from a passing train, expressed in dust units, rather than based on an absolute measurement of dust in weight, which would be expressed in milligrams per cubic meter. The filter and K-Factor are only needed if the E-Samplers are being used to determine the absolute amount of dust in a sample.

Dr. Emmitt explains why the E-Samplers can be used to determine the relative dustiness of a train without converting the E-Sampler data into a weight measurement. As noted above, the E-Sampler uses a laser to produce light scatter from the dust in a sample. The light scatter is registered by light sensitive diodes that produce a voltage signal that is proportional to the amount of dust in the air. A higher voltage signal from the diodes means a higher level of dust. A voltage signal of 10X means that the sample has ten times the amount of dust as a voltage signal of X. If one wanted to translate that voltage signal into specific units of weight—milligrams per cubic meter—it would be necessary to use a filter to develop a K-Factor, which is just a multiplier that would be applied to the electric voltage signal produced by the E-Sampler. Since BNSF is not interested in the specific weight of the dust but only in the relative dust level, SWA looks only at the voltage level of the diode readings expressed in dust units. As Dr. Emmitt explains, the manufacturer of the E-Samplers confirms that this is an appropriate use of the equipment.

Criticism 4: SWA failed to calibrate the E-Samplers.

Dr. Viz raises a number of questions about SWA's approach to calibration of the E-Samplers, *i.e.*, SWA's efforts to ensure that the E-Samplers are functioning properly and producing accurate dust readings. Dr. Emmitt addresses those questions and explains that the E-Samplers have sophisticated internal self-calibration processes that Dr. Viz overlooked. Dr. Emmitt also explains that SWA has taken additional measures to ensure proper calibration of the E-Samplers. Specifically, BNSF and SWA decided to rely more heavily on calibration by the manufacturer than by carrying out field calibration. Therefore, BNSF and SWA have adopted a far more aggressive schedule for returning the E-Samplers to the manufacturer for recalibration than recommended by the manufacturer. There is no basis for any concern about improper calibration of the E-Samplers.

Criticism 5: The E-Samplers produce dust readings that are too variable to be used to monitor dust emissions.

Finally, WCTL/CCCS' witnesses Mark Viz and Gary Andrew address the fact that the E-Samplers may produce different dust readings from a single sample of dusty air. Dr. Viz talks about this variability in the E-Samplers as an issue about the proper "calibration" of the equipment and Dr. Andrew talks about variability in terms of the "accuracy" of the E-Sampler readings. Both witnesses miss the point. Dr. Emmitt and Mr. Sultana, BNSF's Six Sigma Specialist responsible for the standards at issue here, explain in their reply verified statements that a perfectly calibrated E-Sampler may produce two different readings from a single sample because any given sample of dust will have dust particles of different size, shape and distribution within the air sample. It is inevitable that two readings from the same air sample will on occasion produce different dust level readings. This is a common problem in dust monitoring, but it can be addressed by taking the inherent variability of dust readings into account in setting a proper dust limit, as BNSF has done.

Measuring the dustiness of a particular air sample is inherently subject to uncontrollable environmental factors. As noted previously, the operators of coal-fired electric generating facilities are required by federal regulation to suppress dust from their stationary coal stockpiles. In 2008, the EPA proposed to tighten the allowable limits on coal dust from coal processing and conveying equipment from an "opacity" limit of 20% to 5%. Several commenting parties, including mines and electric utilities, opposed the tightening of the standards on grounds, among other things, that the equipment used to measure the dust was too inaccurate and subject to too many uncontrollable environmental factors. The EPA recognized these concerns, but rather than abandon its proposed rules, it simply changed the opacity limit from 5% to 10% to deal with the factors that caused variability in the measurements. *See* Standards of Performance for Coal Preparation and Processing Plants, 74 Fed. Reg. 51,950, 51,953 (Oct. 8, 2009) (to be codified at 40 C.F.R. pt. 60) ("An opacity limit of 10% will allow for control equipment degradation, adverse conditions, and variability that would not be reflected in initial compliance tests").

As discussed below and in Mr. Sultana's reply verified statement, BNSF did extensive tests with the E-Samplers to determine the range of variability in dust readings from a single source of dust. BNSF expressly accounted for that variability in the standards at issue here.

V. The IDV.2 Standard Is a Reasonable Benchmark For Identifying Loaded Coal Trains That Emit Excessive Amounts of Coal Dust.

Apart from their complaints about the equipment used to monitor coal dust emissions, WCTL/CCCS, through their witnesses Viz and Andrew, challenge the reasonableness of BNSF's use of an IDV.2 standard based on data from the E-Samplers to measure coal dust emissions. As noted previously, the IDV.2 for a particular train is just the sum of the E-Sampler five-second dust level readings over the period of time during which the train passes the TSM where the E-Sampler is mounted. SWA removes background dust readings from the sum of the dust readings and also removes dust readings associated with the diesel locomotives at the front and rear of the train. The result is an IDV.2 calculation that identifies the relative dustiness of a particular train as compared to thousands of other trains that have been measured at that location.

Dr. Viz criticizes the IDV.2 standard on grounds that it is not a standard that has been academically accepted or peer reviewed. This criticism is irrelevant. BNSF and SWA are not engaged in academic research. The IDV.2 standard is a practical application of coal dust monitoring technology that uses the data that BNSF and SWA have gathered over several years of studying the coal dust problem. Since there are no technical or academic studies that propose alternative monitoring approaches, Dr. Viz' criticism is a barely disguised excuse for doing nothing.

Dr. Viz also criticizes the IDV.2 standard as being the product of a "black box" calculation by SWA from the E-Sampler data. WCTL/CCCS complain that BNSF has not produced the proprietary software program that SWA developed to make the IDV.2 calculations.

This argument is a red herring. BNSF/SWA have made available to the shippers the detailed logic and assumptions used to produce IDV.2 calculations. The shippers do not need to have access to SWA's proprietary codes to understand the IDV.2 calculations.

Dr. Andrew presents a particularly confusing and jargon-laden critique of Mr. Sultana's use of regression analysis to develop the specific IDV.2 standards at issue here. As explained by Mr. Sultana, the main problem with Dr. Andrew's critique is that he has confused the accuracy of the E-Samplers—which BNSF and SWA ensure through a highly aggressive manufacturer calibration schedule—with the variability of E-Sampler readings due to environmental factors that cannot be controlled. As discussed above, the fact that two readings of the same air sample by side-by-side E-Samplers may differ does not mean the E-Samplers are inaccurate or uncalibrated. The variability of the dust level readings is simply a factor that must be measured and accounted for in setting a standard. As Mr. Sultana explains, BNSF conducted numerous side-by-side tests with the E-Samplers to determine the variability of the readings of a single dust sample, and Mr. Sultana accounted for that variability in the standards that BNSF set.

Dr. Andrew also criticizes the regression analysis that was used by Mr. Sultana to account for E-Sampler variability. Dr. Andrew's principal criticism of Mr. Sultana's regression analysis is that regression analyses cannot be made when the amount of variation in the data set is not relatively constant over the full range of data. As Mr. Sultana explains, the theoretical point made by Dr. Andrew is valid, but Dr. Andrew failed to note that there are widely used computer programs available to test whether the variability in the data set is sufficiently constant, and Mr. Sultana used those programs when he established BNSF's emissions standards and determined that the variability in the data was sufficiently constant to use regression analysis. Dr. Andrew presents a highly misleading graph to suggest that variability increases with the increase in IDV.2 value, but Mr. Sultana shows that Dr. Andrew cherry picked data and failed to use accepted methods of calculating standard error in producing the graph.

VI. Coal Shippers Cannot Expect BNSF's Owners or Other Shippers On BNSF's Rail Network to Pay For the Costs of Curtailing Coal Dust Emissions Through Cost "Sharing."

The shippers argue that BNSF should be required to shoulder at least some of the costs of any coal dust curtailment program. Some suggest that BNSF should be required to undertake the curtailment measures in the first instance, absorbing the full cost of those measures. *See, e.g.*, AFS Op. at 10. Others suggest that BNSF should be required to reimburse the shippers for the costs of curtailing dust emissions. *See, e.g.*, WCTL/CCCS Op. at 50. Others vaguely suggest there should be some type of "equitable apportionment" of the costs to curtail coal dust. *See e.g.*, TUCO Op. at 6. The arguments make no sense.

A. Shippers Are Ultimately Responsible For the Full Costs of Providing Their Transportation Service.

As a common carrier, BNSF must provide coal transportation in response to reasonable requests, but the costs of that transportation service must be paid for by the shippers receiving the service. In some instances, the costs associated with a particular transportation service are paid directly by the shippers in the first instance. Loading of freight is a clear example of this type of expense. "The duty of loading and of unloading carload shipments rests upon the shipper or consignee." *Penn. R.R. Co. v. Kittanning Iron & Steel Mfg. Co.*, 253 U.S. 319, 323 (1920); *see also R.R. Retirement Bd. v. Duquesne Warehouse Co.*, 326 U.S. 446, 453 (1946) ("The duty of unloading car freight ordinarily rests with the shipper or consignee."). A shipper's loading duty generally includes the duty to load cargo securely so that it does not escape from railcars. *See In re W. Trunk Line Rules, Regulations, and Exceptions to Classifications*, 34

I.C.C. 554, 578 (1915) (allowing rail carrier to issue rule requiring that bulk flaxseed shipments be "loaded in cars which have been properly lined at shipper's expense to prevent loss by leakage").

Other costs associated with transportation are incurred in the first instance by the railroad but then recovered from the shippers in the rates charged. Transportation functions that are in the control of the railroad, like crew salaries or locomotive costs, are incurred by the railroad and recovered through the transportation rates. But it is a fundamental principle in the governing statute that a railroad is entitled to recover the costs it incurs to provide the transportation, so long as the costs are incurred "under honest, economical, and efficient management." 49 U.S.C. § 10704(a)(2). Congress has specifically mandated that the Board seek to ensure that the railroads earn revenues "that are adequate . . . to cover total operating expenses, including depreciation and obsolescence, plus a reasonable and economic profit or return (or both) on capital." *Id.*

Thus, if BNSF were to apply surfactants or undertake other coal dust curtailment measures, BNSF would clearly be entitled to pass through those costs directly to the shippers. But for several reasons, such an approach would be highly inefficient, and ultimately would not serve the shippers' interests.

First, the coal belongs to the shippers. It is loaded at the mines off of the railroad property, and the mines are the agents of the shippers. BNSF does not have the right or the ability to establish infrastructure for surfactant application on mine property. If BNSF were to undertake surfactant application or other curtailment measures, BNSF would have to use mainline track capacity that is otherwise dedicated to providing transportation. The resulting interference with mainline operations would create enormous congestion in the PRB. Second, BNSF is not the appropriate party to make decisions about the chemical agents to apply or other treatment approaches, since those decisions could affect aspects of the utilities' operations. The choice of curtailment approach or chemical agent needs to be in the control of the shipper. Finally, giving the shippers control over the approach taken to curtail coal dust emissions on their own trains should create incentives for innovative and cost-effective approaches to coal dust curtailment. Competition among the shippers and their suppliers will allow the market to work most efficiently.

If the shippers' objective is to require that BNSF undertake curtailment measures and spread the cost of those measures to other users of the rail network, that objective is obviously inappropriate. It is a fundamental premise of Board regulation that a shipper's service should not be subsidized by other users of the railroad network. *See PPL Montana, LLC v. Burlington N. & Santa Fe Ry Co.*, STB Docket No. 42054 (served Aug. 31, 2004), at 4 (noting that the goal of the Board's SAC test "is to eliminate impermissible cross-subsidies").

B. The "Allowance" Provision in the Statute Is Inapplicable.

WCTL states that if the Board determines that BNSF's coal dust tariff is reasonable, the Board should order BNSF "to pay affected coal shippers an allowance equal to the reasonable costs the shippers incur in attempting to meet the profiling and IVD.2 standards." WCTL/CCCS Op. at 50. WCTL/CCCS cite 49 U.S.C. §10745 as support for their claim that the Board could require that such an "allowance" be paid. The "allowance" argument is misplaced.

As noted previously, the coal falling out of the loaded cars is the shippers' coal. BNSF is not responsible for loading the coal or for securing the coal in the loaded cars so that it does not escape during transit. It makes no sense to require BNSF to pay an "allowance" to shippers to cover an activity the shippers should be doing on their own in the first place.

Moreover, the allowance provision simply does not apply here. Under the current version of the allowance statute, 49 U.S.C. § 10745, a rail carrier subject to the Board's jurisdiction "may establish a charge or allowance for transportation or service for property when the owner of the property . . . furnishes a service related to or an instrumentality used in the transportation or service," and "[t]he Board may prescribe the maximum reasonable charge or allowance." One of the principal aims of the allowance statute and its predecessor versions is to prevent rail carriers from discriminating among shippers by offering unpublished rebates to some shippers but not to others. *See, e.g., Cooper-Jarrett, Inc. v. United States*, 226 F. Supp. 318, 324 (W.D. Mo. 1964) (noting that under predecessor allowance statute, rail carriers may make an additional charge for providing additional services and that "such additional charge then becomes available to all who request it"). Thus, to prevent discrimination, the allowance statute does not allow a rail carrier to make an allowance or charge unless such allowance or charge is first published in a tariff. *See, e.g., S. Cotton Oil Co. v. Cent. of Georgia Ry. Co.*, 228 F. 335, 336 (5th Cir. 1915) ("The carrier was not entitled to pay the shipper for such services unless the charges therefor were specified in a duly published schedule or tariff.").

The allowance statute is addressed to the problem of discrimination, which is not an issue here. It is also largely a relic of a past regulatory regime and it does not reflect the fact that railroads have been granted broad flexibility to set rates for particular shippers that vary based on shipper demand and the services provided. For example, in the area of car costs, different rates are often set based on whether the railroad or the shipper provides the cars. Where the rate structure itself recognizes the differences in services provided, the allowance provision is irrelevant.

Moreover, the allowance provision only applies where the railroad holds itself out as providing the transportation-related service at issue and the railroad includes the cost of that service in its rates. *See E.C. Best Co. v. N. Pac. Ry. Co.*, 33 I.C.C. 1, 4 (1915) (noting that the allowance statute "does not apply, however, where it clearly appears from the tariffs or from established practice that the rate published was constructed upon the theory that the shipper would render the service or furnish the instrumentalities for which he seeks the allowance, and the shipper prior to rendering such service took no steps to require the carrier to publish a rate which would include the service or instrumentalities furnished by him"); *In re Ford Motor Co. Terminal Allowance*, 209 I.C.C. 77, 80 (1935) ("An allowance for service not compensated for under line-haul rates is unlawful.") Therefore, the allowance provision would be technically applicable only if BNSF adopted a regime of providing coal dust curtailment services such as surfactant application, included the costs of the surfactant application in its rates, and then allowed some shippers to apply the surfactant on their own.

Finally, even if the statute would allow BNSF to provide an allowance under some circumstances, BNSF would not be required to do so because 49 U.S.C. § 10745 states only that a rail carrier "may establish a charge or allowance." The language of the statute does not require the establishment of such a charge or allowance. WCTL/CCCS rely on the Ninth Circuit's 1979 decision in *Bud Antle, Inc. v. United States*, 593 F.2d 865, 873 (9th Cir. 1979), for the proposition that a rail carrier must pay an allowance if a shipper performs a service related to transportation. WCTL/CCCS Op. at 51. However, as explained in the D.C. Circuit's 2008 opinion in *North America Freight Car Association v. Surface Transportation Board*, 529 F.3d 1166, 1180 n. 14 (D.C. Cir. 2008), the Ninth Circuit's *Bud Antle* decision addressed a predecessor version of the allowance statute that "presumed the existence of a charge or allowance." That version, which has since been repealed, stated that if a shipper provided a service related to transportation, "the charge and allowance therefor *shall* be published in tariffs or schedules filed . . . ." 49 U.S.C. § 15(13), *repealed* by Pub. L. No. 95-473, § 4(b), 92 Stat. 1466 (1980) (emphasis added). In contrast, the language of the current allowance statute is permissive rather than mandatory. As a result, although BNSF may publish an allowance in certain situations not relevant here, it cannot be required to do so.

C. Shippers' Concern About the Future Levels of BNSF's Rates Is Beyond the Scope of This Proceeding.

Underlying the shippers' argument that cost sharing is necessary is a concern about the future level of BNSF's rates. The shippers' logic is that BNSF's coal transportation rates in effect now reflect a certain level of maintenance, but if a dust curtailment program is implemented less maintenance will be required, with the result that rates will be higher than they should be. *See* WCTL/CCCS Op. at 34; TUCO Op. at 5; APPA et al., Op. at 5; AFS Op. at 9. These arguments are completely speculative. If and when a common carrier shipper has a claim that its rates are unreasonably high, the shipper can pursue a rate reasonableness claim.

VII. The Board May Rule On the Reasonableness of BNSF's Coal Dust Tariff Even Though BNSF Has Not Established Penalty or Enforcement Provisions.

WCTL/CCCS argue that the Board should not rule on the reasonableness of BNSF's coal dust tariff unless BNSF first publishes specific penalties for non-compliance. WCTL/CCCS Op. at 48-50. They rely on the ICC's decision in *St. Louis Southwestern Railway Company Arbitration Appeal*, ICC Finance Docket No. 28799 (Sub-No. 9), 1995 WL 479359, at *4-5 (served Aug. 15, 1995), discussing the judicial doctrines of claim preclusion and issue preclusion. WCTL/CCCS Op. at 50. That case is inapposite. Neither of those doctrines is at issue here.

WCTL/CCCS' feigned concern about judicial economy is also misplaced. As BNSF explained in its opening evidence, BNSF has not established an enforcement regimen for the coal dust standards. If the Board finds BNSF's standards to be reasonable, BNSF expects that its common carrier shippers will comply with it and enforcement measures may be unnecessary. If enforcement becomes necessary, BNSF's enforcement approach would turn on an individual common carrier shipper's good faith efforts to comply with the standards. Moreover, the only question that could arise before the Board regarding enforcement of the standards is whether BNSF's *common carrier* shippers can be required to limit coal dust emissions in accordance with the prescribed standards. The application of BNSF's emissions standards to contract shippers is not and could not be before the Board. If the Board finds that BNSF's coal dust standards are not unreasonable and BNSF's common carrier shippers voluntarily comply with the standards, then it may not be necessary for the Board to address enforcement issues.

AFS complains that even if BNSF's coal dust emissions standards are found not to be unreasonable, shippers "are not even sure what they should do." AFS Op. at 10. But as BNSF explained in its opening evidence, when BNSF extended the date for implementing its standards last year, it initiated a large trial in the PRB of surfactants and other compliance measures and invited shippers to participate. The trial is specifically intended to provide shippers with information that will allow them to make informed decisions on curtailment measures. Moreover, as noted above, BNSF's enforcement approach, if one is necessary, would be based on a shipper's good faith efforts to comply with the standards. Under such an approach, BNSF would be willing to provide shippers with a reasonable window of time to test alternative curtailment measures and to fine tune their curtailment approaches.

VIII. The Board Is Not Required to Refer This Matter to the FRA.

Some coal shippers suggest that the Board must refer this matter to the FRA because one of the rationales for BNSF's coal dust tariff—preventing derailments—implicates a safety issue. *See* APPA et al., Op. at 6-7. The jurisdictional argument is misplaced. There is no statute, regulation, or other rule that requires the Board to defer to the FRA or to solicit the FRA's input whenever a safety issue is raised in a rail proceeding. Indeed, "both FRA and STB are vested with authority to ensure safety in the railroad industry." *Regulations on Safety Integration Plans Governing Railroad Consolidations*, 67 Fed. Reg. 11,582, 11,585-86 (Mar. 15, 2002). While it is true that the FRA has "primary jurisdiction, expertise, and oversight responsibility in rail safety matters," under Congress's rail transportation policy "[t]he Board is also responsible for promoting a safe rail transportation system." *Id.*

Federal statutes and regulations do not require the Board to consult the FRA whenever a rail proceeding involves a safety issue. Instead, the Board exercises discretion in such situations. Thus, the Board has sometimes solicited the FRA's input where a rail proceeding involves technical questions or regulations within the FRA's realm of safety expertise. *See Nat'l R.R. Passenger Corp.*, 1999 STB LEXIS 609, at *1 (Oct. 21, 1999) (requesting FRA's participation in a proceeding regarding the appropriate weight of continuous welded rail "[b]ecause the [FRA] has expertise on safety issues such as this one"). However, where there are no such technical questions or regulations, the Board has addressed safety issues without soliciting the FRA's input. For example, in *Granite State Concrete Co. v. S.T.B.*, 417 F.3d 85, 95 (1st Cir. 2005), the First Circuit held that the STB was not required to consult with the FRA in determining the reasonableness of operating restrictions that a rail owner placed on another railroad's use of a line because of safety concerns:

> It is true that the STB has sometimes sought the benefit of the FRA's expertise. . . . But the STB is not required to do so in every case. In this dispute, the STB was not faced with the task of deciding technical questions about railroad safety. The STB did not need to decide whether there was compliance with FRA safety regulations or what measures would be necessary to achieve compliance. The STB simply had to determine whether, on the record, Guilford had good reasons to be concerned about safety and whether its responses to those concerns were *reasonable*.

Granite State Concrete Co. v. Surface Transp. Bd., 417 F.3d 85, 95 (1st Cir. 2005).

Here, there is no reason for the Board to decline to review BNSF's coal dust emissions standards and to defer to the FRA on the issues raised in this proceeding. The FRA may have views on the reasonableness of BNSF's standards, but the FRA has not regulated coal dust or specifically addressed the question of the impact of coal dust on ballast integrity or rail safety. This is not a proceeding that involves technical safety questions or regulations that are within the FRA's realm of expertise. As a result, as in *Granite State*, it is unnecessary here for the Board to refer safety issues to the FRA because the Board "simply ha[s] to determine whether, on the record, [BNSF] ha[s] good reasons to be concerned about safety and whether its responses to those concerns [a]re reasonable." *Id.*

IX. TMPA's "Narrow Issue" Should Be Addressed in a Separate Proceeding

TMPA's Opening Evidence focuses exclusively on the "narrow issue" of whether a rate prescribed by the Board in a stand-alone cost ("SAC") proceeding, *Texas Municipal Power Agency v. The Burlington Northern & Santa Fe Railway Co.*, STB Docket No. 42056, insulates TMPA from the costs of complying with BNSF's coal dust tariff. *See* TMPA's Op. at 2-3. TMPA is correct that the issue raised is a "narrow" one. Indeed, it is an issue limited to TMPA's individual circumstances and it therefore has no place in this proceeding. To address TMPA's issue, TMPA states that the Board would need to review evidence from the prior stand-alone cost case involving TMPA. Such a shipper-specific evidentiary inquiry does not belong in this proceeding. After the Board resolves the more general issues relating to the reasonableness of BNSF's coal dust tariff provisions, TMPA would be free to raise issues specifically relating to its situation in a separate proceeding.

Respectfully submitted,

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April 30, 2010

A

Appendix A to BNSF Railway Company's Reply Evidence and Argument: Reply to Shippers' Arguments Regarding the 2005 Joint Line Derailments

Both AECC and WCTL/CCCS argue in their opening evidence that the 2005 derailments were caused by factors other than coal dust. The shippers' arguments miss the point, as explained in BNSF's Counsel's Reply Argument. BNSF has not claimed that coal dust was the sole cause of the derailments but that the presence of coal dust contributed to the weakening of the track structure that led to the derailments. Mr. VanHook addresses in his reply verified statement several erroneous assertions by the shippers' witnesses on the supposed causes of the 2005 derailments. As discussed below, many of the shippers' arguments are also based in whole or in part on documents or portions of documents that are taken out of context and presented in a misleading fashion.

Misleading Use of Documents to Support the Theory that Coal Dust Was Not a Contributing Factor to the Derailments

WCTL/CCCS cite to a number of documents created shortly after the derailments as support for their claim that lack of adequate inspections and maintenance caused the 2005 derailments. First, they selectively cite to portions of a {{

}}[2] That other factors may have contributed to the derailments is beside the point. Second, WCTL/CCCS selectively cite to {{

[1] All documents referred to herein that contain a document reference number were produced in discovery and copies are contained on the CD that is included in Appendix B to the Counsel's Reply Argument.

[2] Confidential materials are designated by a single bracket -- "{ " -- and Highly Confidential materials are designated with double brackets -- "{{"

}}

In similar fashion, WCTL/CCCS misleadingly cite to {{

}}

Once again, WCTL/CCCS' arguments are beside the point. Certainly if BNSF had realized prior to the derailments the extent to which coal dust combined with excessive moisture in railroad ballast led to track instability, BNSF would have taken more aggressive action. As BNSF witness Greg Fox explained in his opening verified statement:

> In retrospect, if we had understood the full impact coal dust has on the track structure or if we had been able to anticipate the extraordinary weather events of late April/early May, we would have undertaken additional, extraordinary maintenance measures that might have prevented the derailments. But viewing our maintenance of the coal lines based on how we were performing and what we knew up to the time of the derailments, I do not believe our maintenance practices can be faulted.

Fox Op. V.S. at 5-6.

The shippers' arguments that poor inspection and maintenance practices led to the derailments imply that there must have been substandard track conditions on the Joint Line that BNSF either failed to identify or failed to correct. To the contrary, numerous key indicators of railroad reliability in the years preceding the derailments indicated that the Joint Line was performing extremely well. {{

}}

Third, WCTL/CCCS cite to UP correspondence and documents produced in discovery

{{

}} As UP stated in its opening evidence:

> Upon reflection and after thorough investigation and study, Union Pacific has concluded based on what it has learned about the pernicious nature of coal dust, that (1) BNSF was adequately maintaining the Joint Line prior to the May 2005 derailments, (2) the accumulation of coal dust at levels that could threaten the integrity of the ballast throughout the Joint Line was not readily detectable prior to the 2005 derailments, and (3) the potential for sudden and widespread deterioration of the track following heavy precipitation was neither known nor knowable prior to the 2005 derailments.

Connell Op. V.S. at 11.

Fourth, WCTL/CCCS cite to supposed FRA documents as alleged evidence of inadequate maintenance and inspection by BNSF. *See* WCTL/CCCS Op. Appendix B at 6-14. WCTL/CCCS claim that the FRA determined that coal dust was not the primary cause of the BNSF derailment. However, the document cited by WCTL/CCCS for this proposition, the Rail Equipment Accident/Incident Report for the May 14, 2005 derailment, was not prepared by the

FRA. It is an FRA form completed by BNSF and submitted to the FRA. In completing the form, BNSF is required to use certain codes to identify the cause of the derailments. The primary and contributing causes of the first derailment were listed by BNSF as, respectively, "Wide Gage (due to defective or missing cross ties)" and "Deviation from uniform top of rail profile." While BNSF considers these conditions to be the mechanical cause of the derailment – i.e.; the condition of the track that allowed the cars to derail – these conditions were ultimately caused by coal dust fouled ballast that had become unstable and allowed the rails to shift outward (wide gage) and to become cross level (deviation from uniform top of rail profile). As discussed above, other documents produced by BNSF make clear that BNSF considered coal dust and the weather to be contributing factors to the unstable track conditions that allowed the derailment to occur. Mr. VanHook addresses the remaining FRA records cited by WCTL/CCCS in his reply verified statement.

Finally, AECC's witness Mr. Nelson argues that {{

}} *See* Nelson Op. VS. at 13. There are several problems with this argument. {{

}}

Misleading Use of Documents to Support Allegations of Deferred Maintenance

WCTL/CCCS also selectively cite to BNSF documents in an attempt to demonstrate that BNSF accumulated significant "deferred" maintenance in the years preceding 2005. *See* Crowley Op. V.S. at 15-16. Mr. Crowley first references {{

}}

{{

}}

AECC's witness Nelson also alleges that BNSF deferred certain maintenance prior to the derailments. Specifically, Nelson argues that {{

}} *See* Nelson Op. V.S. at 14. In support of this argument, Nelson cites {{

}}

{{

}}

{{

}}

B

Appendix B contains discovery materials that are either Confidential or Highly Confidential.

CERTIFICATE OF SERVICE

I hereby certify that on this 30th day of April, 2010, I caused a copy of the foregoing BNSF's Reply Evidence and Argument, including Confidential and Highly Confidential versions, to be served on the following Parties of Record by hand delivery or by Federal Express:

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BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Finance Docket No. 35305

PETITION OF ARKANSAS ELECTRIC COOPERATIVE FOR A DECLARATORY ORDER

REPLY VERIFIED STATEMENT OF WILLIAM VANHOOK

My name is William VanHook. I previously submitted a verified statement in this proceeding in support of BNSF Railway Company's ("BNSF") opening evidence and argument. As I explained in my opening verified statement, I am Assistant Vice President and Chief Engineer-Systems Maintenance and Planning for BNSF. I have been responsible since 2005 for coordinating and overseeing BNSF's efforts to study the scope of the coal dust problem in the Powder River Basin ("PRB") and investigate measures to curtail coal dust emissions. I have reviewed the opening evidence and argument submitted by several coal shippers and shipper associations. In this reply verified statement, I address four claims raised by the shipper commenters: (1) that BNSF is arbitrarily "fixated" on the problem of coal dust; (2) that the amount of coal dust in the ballast is not sufficient to cause concern; (3) that coal dust was not a significant factor in the 2005 derailments; and (4) that BNSF should deal with coal dust through expanded maintenance because it is less expensive than curtailing coal dust emissions from moving trains.

I. BNSF Has A Valid Concern About Keeping Coal Dust From Blowing Off of the Top of Loaded Coal Cars.

As I stated in my opening verified statement, the extent of the coal dust problem in the PRB is obvious to anyone who has spent time there. Western Coal Traffic League and Concerned Captive Coal Shippers ("WCTL/CCCS") claim that BNSF has an arbitrary fixation on coal dust, but their own witness, Richard McDonald, acknowledges that "[i]t is no secret that coal dust blows off loaded coal trains, or that more dust comes from coal trains on the Joint Line than in other areas due to the very high volume of coal traffic that moves from mines served by (or reached via) the Joint Line." McDonald Op. V.S. at 4. The photographs presented in BNSF's opening evidence show beyond question that coal dust accumulates in large quantities along the Joint Line and that it gets there by being blown off of the top of moving coal cars. *See* BNSF Op. at 2-4 & Counsel Exhibits 1-4; VanHook Op. V.S. Exhibits 2 and 15; *see also* Exhibit 1 attached hereto, which contains an additional video of coal dust blown from a moving coal train.

It is widely acknowledged by others that have studied coal dust that emissions of coal dust from the top of moving coal cars are substantial. As I indicated in my opening statement, research carried out in Canada several years ago concluded that as much as 2 tons of coal could be lost from the top of a coal car in transit. Dr. Emmitt explains in his reply verified statement that research recently conducted in Australia also concluded that a substantial amount of coal is lost from the top of coal cars in transit. Fugitive coal dust from the top of moving coal cars led coal shippers in Colombia to apply compaction rollers to prevent coal losses. (I note that compaction technology is planned to be tested in the context of the large trial going on in the PRB of curtailment technologies.) Surfactants are applied in Canada and Australia to curtail coal dust. The State of Virginia requires Norfolk Southern to submit annual reports on coal dust emitted from moving trains.

In their opening evidence, WCTL/CCCS repeat questions that the shippers have previously raised about the extent to which the contamination of ballast is attributable to coal dust or to some other substance. As BNSF has explained on numerous prior occasions to mines and shippers, there is no question that coal dust contaminates the ballast and that the piles of black sandy material along the right of way are coal dust deposits. The shippers cannot continue to deny the obvious. As Dr. Emmitt explains in his reply verified statement, analyses have been carried out on the materials in dustfall collectors confirming that the materials are coal. Documents cited by the shippers themselves, which I discuss below, confirm that coal is present in the ballast.

While questioning whether there is any coal dust along the right-of-way, WCTL/CCCS also suggest that the coal accumulations along the Joint Line might be attributable to coal lost out of the bottom of bottom-dump cars. As I explained in my opening statement, one of the first things BNSF set out to determine after the 2005 derailments was the extent to which coal was escaping through poorly maintained doors on bottom-dump coal cars. We determined that relatively small, but significant, amounts of coal were lost out of some bottom-dump cars with doors that were not functioning properly. Even though bottom-dump cars are a minority of the total coal car fleet, we nevertheless concluded that it was important to address this source of coal fouling. We undertook a program to fix damaged bottom-dump car doors on BNSF's fleet, and we implemented expanded maintenance and inspection of bottom-dump cars. I understand that Union Pacific Railroad Company ("UP") also took measures to repair damaged bottom-dump cars. I believe that coal losses from bottom-dump cars have been controlled through these measures. But even if additional measures need to be taken to deal with bottom-dump cars, there would be no excuse for ignoring the coal losses from the top of coal cars. An effective coal dust curtailment program must deal with both sources of coal dust.

Indeed, as other studies have found, the volume of coal lost off of the top of moving coal cars can be very large. Dr. Emmitt explains in his reply verified statement that it is difficult to measure with any precision the amount of coal lost from the top of moving coal cars, but BNSF has attempted to make rough estimates using tests that measured the volume of coal in a loaded coal car at the beginning and end of a trip. Dr. Emmitt describes the tests which indicated that between 250 and 750 pounds of coal per car are lost in transit. These estimates are not precise, but they make it clear that large volumes of coal are lost in transit.

A simple reality check confirms that large volumes of coal can be lost from the top of moving coal cars. Assume that a coal car contains 120 tons of coal and that the loaded coal is on average 10 feet deep in a coal car. Each inch of coal in the car would account for approximately one ton of coal. That would suggest that if the wind were to blow an inch worth of coal off of the top of a car during a rail movement to a destination, one ton of coal would be lost. The photographs that BNSF included in its opening evidence of coal dust being blown off of moving coal cars make it easy to understand how an inch of coal could be blown off of a car along a several hundred mile movement, particularly on a windy day. Indeed, photographs of loaded coal cars after long movements show substantial erosion of coal. Large sections of the coal within the rail car have clearly been blown off of the car by the wind. *See* Exhibit 2. These visual observations cannot be used to make precise estimates of coal losses from the top of moving coal cars, but they confirm that the problem of fugitive coal from the top of loaded coal cars is a real one and not a figment of our imagination.

II. Small Amounts of Coal In the Ballast Can Destabilize the Track Structure.

In their opening evidence, WCTL/CCCS and AECC claim that BNSF has overstated the severity of the coal dust problem because, they claim, the percentage of coal dust in the rail ballast that supports the track structure is relatively low in some areas. *See* Crowley Op. V.S. at 9; AECC Op. at 8 {{(

}}[1] Their selective use of BNSF's documents is misleading and creates the false appearance that coal dust fouling is insignificant. The shippers also ignore the physical properties of coal dust that make it a serious fouling agent even in small quantities. The shippers' dismissive attitude toward coal dust in the ballast is extremely short sighted, since all coal shippers would be adversely affected by an interruption in service due to track failures.

There are several reasons why the shippers' claims regarding low coal dust levels in the ballast should be given no weight. First, the documents supporting the shippers' claims are taken out of context. For example, WCTL/CCCS' witness Thomas Crowley relies heavily on a BNSF document {{

}} But when BNSF presented these data to the National Coal Transportation Association ("NCTA"), BNSF explained that the {{

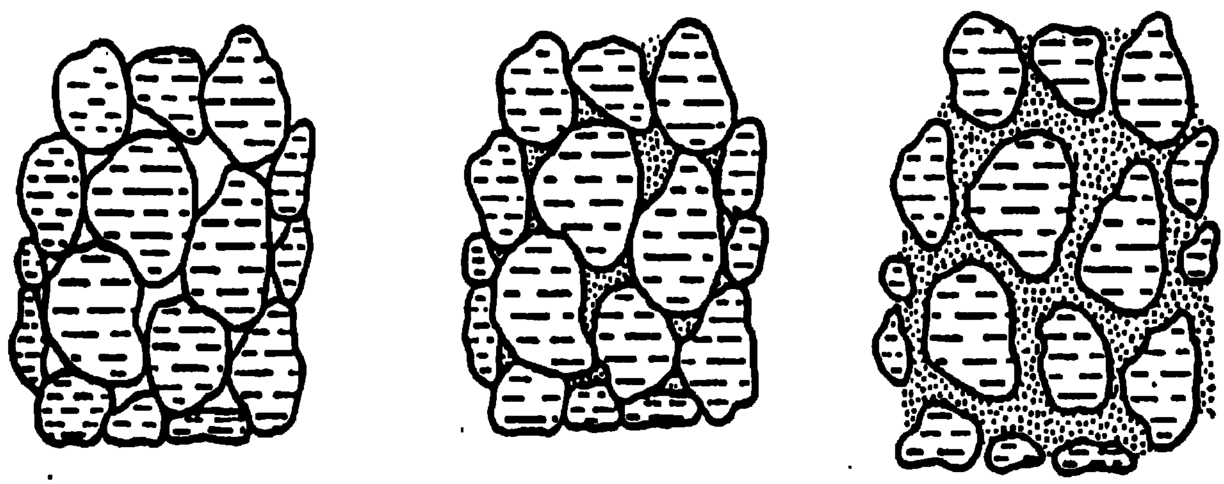
}}[2] Mr. Crowley fails to point out that the lower fouling percentages in these samples corresponded to areas that had recently been cleaned.

[1] Confidential materials are designated by a single bracket – "{" – and Highly Confidential materials are designated with double brackets – "{{".

[2] All documents referred to herein that contain a document reference number were produced in discovery and copies are contained on the CD that is included in Appendix B to the Counsel's Reply Argument.

Mr. Crowley cites another BNSF analysis of coal that had been removed from the ballast that {{

}} In assessing the impact of a ballast fouling agent, the more important figure is the percentage of fouling agent by volume. This is because ballast is weakened when particles fill in the voids between the granite rocks that form the ballast. BNSF presented a diagram in its opening evidence and argument that illustrates how ballast can become fouled, and that figure is reproduced below. *See* Tutumluer Op. V.S. Exhibit 4 at 94.



(a) Clean ballast (b) Partially fouled ballast (c) Heavily fouled ballast

As the diagram illustrates, when ballast becomes fouled, the spaces between the rocks become filled and the rocks lose the contact with other rocks that allows the ballast to carry heavy loads without settlement. A fouling agent that has a large volume will fill up those voids even if its weight is relatively low. Coal dust is relatively light, but its volume per unit of weight is up to two times greater than other ballast fouling agents. Moreover, coal dust absorbs water like a sponge, creating even greater problems for the ballast.

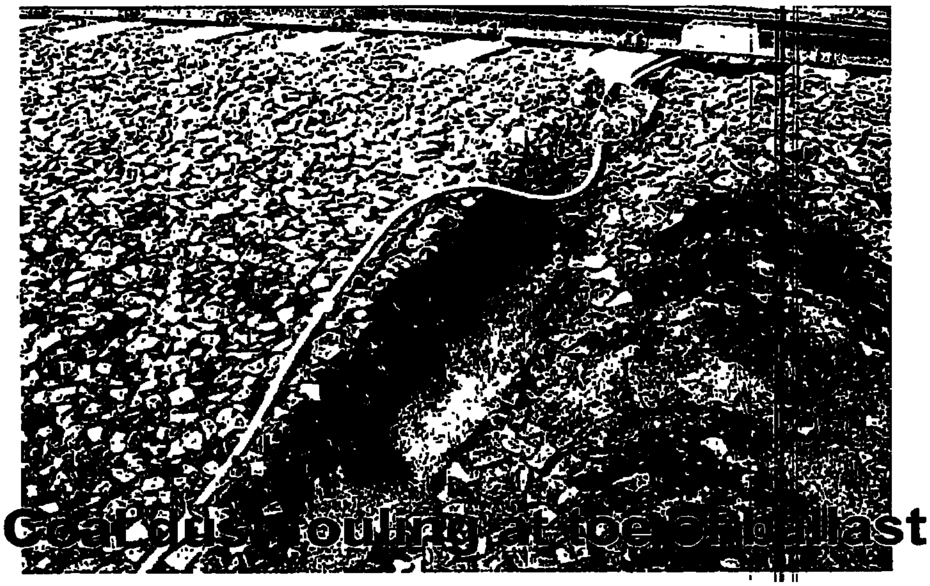
The shippers failed to draw the Board's attention to numerous other BNSF documents showing that coal dust as a percentage of volume was very high in many areas. {

} {{

}} Of course, when the ballast contains high percentages of coal dust by weight, there is substantial cause for concern given its physical properties, but the shippers also ignored many documents showing high concentrations of coal dust in the ballast by weight. {

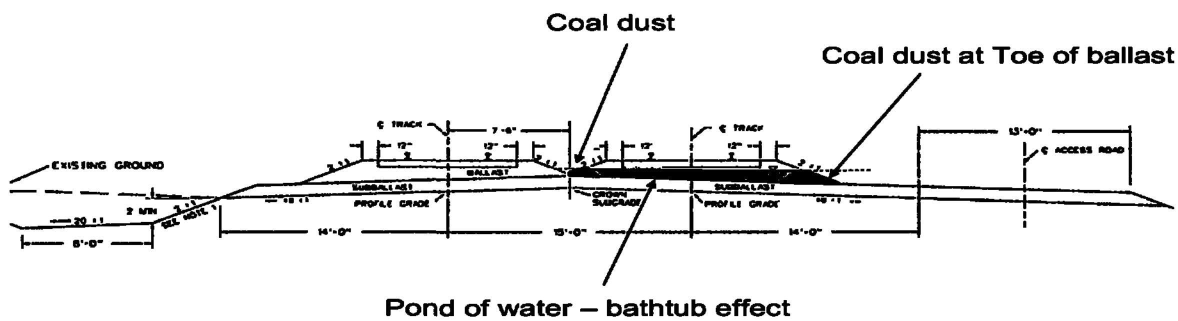
} *See* Exhibit 3, showing obvious accumulation of coal dust in substantial quantities.

The shippers' argument that many areas have only low percentages of coal dust in the ballast also ignores the fact that even small amounts of coal dust can have serious impact on the strength of the track structure under certain conditions. For example, the impact of coal dust on ballast strength depends upon where the coal dust has accumulated in the ballast. Even small amounts of coal dust in the ballast can be a serious problem if that coal dust is concentrated on the edges or "toe" of the ballast where it can create a "bathtub" effect. The photograph below shows coal dust fouling at the toe of the ballast.



This photograph was taken shortly after the track went into service near Milepost 50 on the Orin Subdivision. In this photograph, coal dust has accumulated on the shoulder of the ballast, but there is no visible coal dust close to the track (by the metal box). When coal dust accumulates either at the edges of the ballast or within the shoulders but not under the track itself, the coal dust accumulation can prevent water from draining out of the ballast under the tracks. As illustrated in the diagram below, the coal along the edges of the ballast can well up and prevent water under the track from draining.

COAL DUST WITHIN OUTER EDGES OF BALLAST

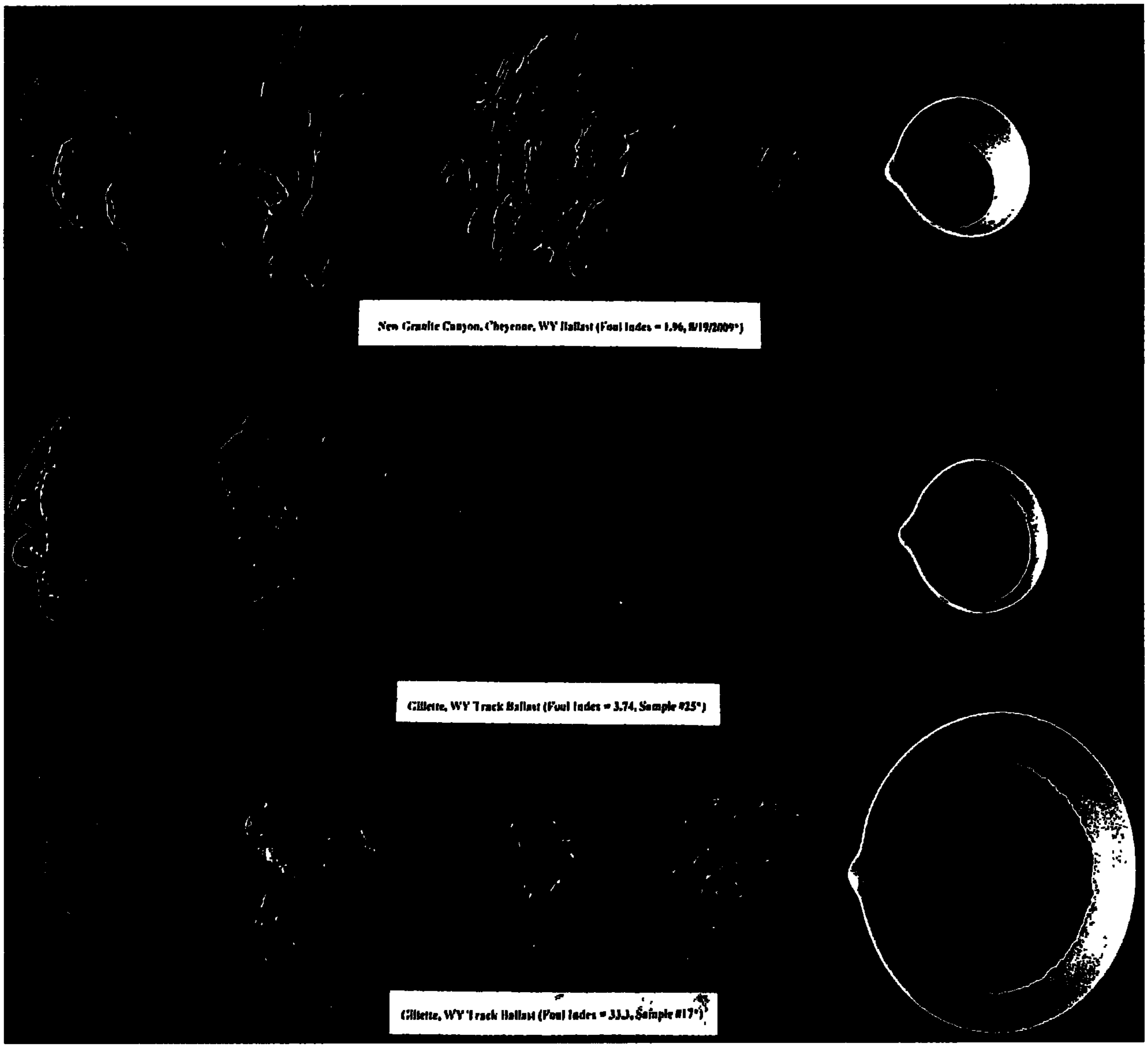


During wet periods, this pooling of water weakens the track structure by allowing the ballast under the track to fill up with water. Even when it is not raining, the coal can impede drainage and leave the ballast wet for extended periods which will cause the ballast to degrade more rapidly than under normal conditions and adversely affect concrete tie life and performance.

Low percentages of coal dust in fouled ballast can also be a serious problem if the ballast is relatively old. The photograph below contrasts new ballast with old ballast. The top level shows the materials contained in a sample of new ballast, and the bottom level shows the materials contained in a same-size sample of older ballast. The size of the pile depicts the relative percentages of each type of material in new and old ballast.

Gradation Ballast Comparison

2 ½" - 1 ½" 1 ½" - ¾" ¾" - ½" ½" - ¼" < ¼"



As depicted in the photograph, almost all new ballast is crushed rock that is larger than 0.5 inches. New ballast has rough or irregular surfaces, sharp or angular edges, and large voids between the rocks. Because these physical characteristics give the ballast load bearing strength and promote drainage, a small percentage of contaminants in new ballast might not pose a serious problem. By contrast, where ballast has been in service for several years, it has few rocks larger than 1.5 inches, and many particles that are less than 0.5 inches. Old ballast has smoother surfaces, fewer sharp edges, and smaller spaces between the rocks. In older ballast, a smaller percentage of coal dust could create serious track instability by filling the smaller voids and eliminating contact between the rocks.

To assess the impact of coal dust in ballast, it is also important to know what other contaminants are present and the amount of other contaminants. If ballast is already somewhat contaminated by typical fouling agents, a small percentage of coal dust could have a serious impact on the strength of the ballast. Given the physical properties of coal dust – its tendency to absorb water and act with lubricating qualities – even a small amount of coal dust added to ballast that already has a degree of fouling can cause the ballast to lose stability.

Finally, as BNSF explained in its opening evidence, academic research shows that coal dust can foul ballast at much smaller amounts than other typical ballast fouling agents. *See* Tutumluer Op. V.S. at 9-11. The shippers' focus on a few documents identifying relatively low percentages of coal dust fouling, taken out of context, says nothing about the serious nature of coal dust fouling on the heavy haul rail lines in and around the PRB.

III. Coal Dust Contributed To the 2005 Derailments.

In this section of my reply verified statement, I respond to arguments made by AECC and WCTL/CCCS regarding the cause of two derailments that occurred on the Joint Line in May 2005. Both parties dismiss the role of coal dust as a factor contributing to the derailments and claim that the derailments were caused by other factors and by maintenance and inspection failures by BNSF. I strongly disagree with their argument. It is undeniable that there were substantial coal dust accumulations in and around the ballast in areas where the derailments occurred. After studying the circumstances of the derailments, BNSF concluded that the presence of coal dust in the ballast combined with severe weather conditions in Wyoming in May of 2005 contributed to the two derailments that occurred on the Joint Line.

Many of the arguments made by AECC and WCTL/CCCS are based on five-year old photographs and/or observations of current track conditions at the derailment sites – neither of which can be used to form reliable conclusions about the causes of the derailments. In addition, most of these arguments miss the point. This proceeding is not about determining the cause of the 2005 derailments. BNSF does not claim that coal dust was the sole cause of the derailments. Instead, BNSF has determined that coal dust needs to be kept out of the ballast because it weakens track strength and can cause instability in track structure which can lead to serious service interruptions, as evidenced by the 2005 derailments. The possibility that other factors may have contributed to the derailments is not relevant here. What is important, and is ignored completely by AECC and WCTL/CCCS, is that coal dust contributed to the derailments. It is also irrelevant that BNSF might have done things differently before 2005 if it had known how dangerous coal dust was. Based on what BNSF knew at the time about coal dust, BNSF's maintenance practices were reasonable and cannot be faulted.

While most of the discussion of the 2005 derailments is therefore not germane to this proceeding, I address some of the engineering and maintenance claims made by AECC and WCTL/CCCS below.

A. AECC's Theory That the Derailment Sites Share Four Common Factors.

Both AECC witnesses De Berg and Nelson argue that the two sites where the 2005 derailments occurred share four common factors that they believe implicate causes other than coal dust: {{

}}

If AECC was really trying to understand the causes of the derailments and the common factors at the two locations, it would not have ignored the most obvious common factor that the two derailment sites share – that both locations had significant accumulation of coal dust fouled ballast and the presence of coal dust and moisture on the track at the time of the derailments. Any credible discussion of the 2005 derailments cannot ignore the role of coal dust.

B. AECC's Probability Analysis.

AECC witness Nelson also claims that "it is highly improbable that two derailments would have occurred by chance at these two locations . . . if they were caused by fugitive coal dust, which is found throughout the Joint Line." *See* Nelson Op. V.S. at 20. His probability calculation is convoluted, but he seems to be trying to demonstrate that the derailments must have occurred as a result of structural factors rather than coal dust. As I explained above, many of these structural factors that Mr. Nelson claims were responsible for the derailments are not inconsistent with the fact that coal dust in the ballast could have contributed substantially to the derailments by adversely impacting the structural integrity of the ballast section. In any event, his probability analysis rests on assumptions which clearly have no basis in fact and should be dismissed out of hand. Mr. Nelson assumes that coal dust accumulation, drainage problems, and track modulus problems are uniformly distributed across the Joint Line. There is no basis for these assumptions and Mr. Nelson's reliance on them renders his probability analysis meaningless.

C. AECC's Track Memory Observations.

In discovery in this proceeding, AECC requested permission for its consultants to inspect the locations of the Joint Line derailments. BNSF authorized the inspection, and I accompanied AECC's consultants on their site visit on March 3, 2010. During the inspection, I understand that AECC witness De Berg commented that he thought he saw irregular surface conditions at the current site of the BNSF derailment near Milepost 75.3. I inspected the track profile at this area personally and also consulted with BNSF Division Engineer Casey Turnbull, and neither of us agreed with Mr. De Berg's observation. Following the inspection, I reviewed the last track geometry car report from this location, dated February 4, 2010, which confirmed that the track surface at that time was well within normal limits. *See* Exhibit 4.

In his opening verified statement, Mr. De Berg suggests that the current main track 1 near Milepost 75.3 has evidence of "track memory," *i.e.*, that the track, although new, is responding to "sub grade shortcomings" that existed five years ago at the time of the derailments. De Berg Op. V.S. at 9. Mr. De Berg's "track memory" theory is completely without merit. After the 2005 derailment, BNSF added a new main track 1 with track centers of 35 feet from former main track

1, on which the derailment occurred.[3] Thus, former main track 1 on which the derailment occurred is now main track 2 and the current main track 1 did not exist in 2005. In constructing the new track, BNSF completely rebuilt the subgrade 35 feet away from the location where the derailment occurred using the latest construction techniques and geotechnical information available. In other words, the track observed by Mr. De Berg in March of this year is a completely different track, with new subgrade, located approximately 35 feet away from the track on which the 2005 derailment occurred. Furthermore, it is not credible that anyone could see an imperceptible surface deviation in newly constructed track and conclude, solely on the basis of this observation, that there is an obvious problem with the subgrade.

D. AECC's Reliance on Photographs.

Mr. Nelson relies on a number of isolated photographs to reach broad conclusions about the causes of the derailments and the adequacy of BNSF's maintenance practices. {{

}}

[3] The original two main lines at this location were constructed with only 15-foot track centers. A 35-foot track center allowed BNSF to shift the location of new main track 2 ten feet towards new main track 1, creating 25-foot track centers between all three main tracks at this location.

Other photographs identified by Mr. Nelson were not taken at the derailment locations and are irrelevant for that reason. For example, Mr. Nelson opines that {{

}}

In another example, Mr. Nelson uses {{

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E. BNSF's Maintenance and Inspections Practices Prior to the Derailments.

Both AECC and WCTL/CCCS allege that inadequate maintenance and inspection practices were the primary cause of the derailments. I was not responsible for maintenance on the Joint Line during that time period. Greg Fox, who was BNSF's Vice President of Engineering and principally responsible for maintenance and inspection at the time of the derailments, addressed this issue in his opening verified statement. Nevertheless, there are three issues raised by AECC and WCTL/CCCS on this topic that I will address. The first is WCTL/CCCS' use and interpretation of FRA documents.

I regularly interact with the FRA and am familiar with the various types of FRA records that WCTL/CCCS reference in their opening evidence. As part of their opening evidence, WCTL/CCCS reviewed FRA inspection reports from the two-year period preceding the derailments. *See* WCTL/CCCS Op. Appendix B at 8-13. WCTL/CCCS suggest that the fact that FRA track inspectors noted certain track conditions requiring maintenance during their inspections indicates that the Joint Line was not well maintained. To the contrary, it is not unusual that each time a railroad or FRA inspector inspects railroad track, the inspector will find track defects. Changes in track conditions are a natural result of the dynamic nature of the track structure, which changes over time from the forces that act upon the track in the form of train movements, tonnage of the freight on the track, weather, ongoing maintenance efforts, and other factors. It is because of the dynamic nature of the track structure that regular inspections are performed so that necessary repairs can be made as needed. The fact that some defects are found in FRA inspections does not mean that a railroad is negligently inspecting or maintaining the railroad. Indeed, if an FRA inspector had believed that the defects it noted were indicative of a systemic problem with BNSF's maintenance and inspection program, that inspector could have exercised the authority to take more aggressive action, such as taking track out of service until it was brought into compliance or issuing a Special Notice of Repairs. No such action was taken with respect to the Joint Line.

Rather than looking at isolated examples of track defects identified by inspectors, a better measure of the overall condition of a line segment is to compare the number of track defects identified by inspectors or track geometry car testing with railroad averages. During its investigation of the derailments, BNSF looked at key performance indicators, such as track geometry car test results, to determine whether there were indications that the Joint Line was not adequately maintained. *See* Exhibit 5. As shown in the table below, the BNSF track geometry car defects recorded in 2003 and 2004 on the Joint Line were well below the BNSF system average, the FRA average for Class 1 railroads, and the FRA average for all railroads for those years.

Exceptions Per Mile Tested[4]

Year	Milepost 0.0-72.5	Milepost 72.5-127.3	BNSF System Average	FRA Class 1 Average	FRA Railroad Average
2003	{{ }}	{{ }}	{{ }}	0.22	0.34
2004	{{ }}	{{ }}	{{ }}	0.30	0.38

These results indicate to me that the Joint Line was well maintained in 2003 and 2004 and that track defects were minimal and/or were found and corrected by BNSF track inspectors and maintenance crews as they developed. Attached at Exhibit 6 is a chart showing that BNSF has continued to be far better than the industry average in the incidence of track defects found by FRA inspections.[5]

WCTL/CCCS also reference FRA track geometry car inspection reports from May 2 and 4, 2005, which identified instances of cross level, warp and other track conditions requiring attention, as evidence that BNSF did not adequately maintain the Joint Line. *See* WCTL/CCCS Appendix B at 13-14. A significant number of the defects identified by the track geometry car

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[4] I obtained the 2003 and 2004 Joint Line averages and BNSF system averages shown in the table from page 3 of Exhibit 5. I obtained the 2003 and 2004 FRA Class 1 and Railroad averages through a conversation with an FRA representative.

[5] The chart identifies the average number of exceptions found per 100 miles of track geometry car testing through the FRA's Automated Track Inspection Program ("ATIP").

related to the cross level of the rails. However, this is consistent with the unusual weather conditions and excessive moisture on the Joint Line in late April and early May 2005, which, when combined with high levels of coal dust in the ballast, led to the derailments.

Following the UP derailment on May 15, 2005, the FRA prepared a Railroad Accident Report, which is discussed in WCTL/CCCS' opening evidence. *See* WCTL/CCCS Appendix B at 7. WCTL/CCCS argue that the second derailment was caused by a defective field weld and subsequent inspection failure, not coal dust. But the document does not support this conclusion. The FRA identified the "probable cause" of the accident as a "broken rail: a bolt hole crack in the outermost bolt hole that ran 11 inches to the adjoining field weld, then broke upward through the ball of the rail." The report does not identify the cause of the bolt hole crack. A bolt hole crack could be caused by a defect in the rail itself, by stress on the rail due to unstable fouled ballast, or by some other factor. Evidence collected after the derailments shows that a train crew passed over this location shortly before the derailment and reported to the dispatcher that the track was rough and that there was a significant amount of mud on the track, likely indicating fouled ballast. Subsequent investigation of this site confirmed coal dust fouled ballast, suggesting that it was a contributing factor in causing the broken rail that led to the derailment.

Further, the selective document passages cited by WCTL/CCCA suggest that BNSF made only a temporary repair at this location and that BNSF failed to drill the outermost holes (i.e., the bolt holes closest to the end of the rail) when installing a replacement rail. It is standard practice not to drill the outermost holes when installing replacement rail so that the rail can be field welded. Moreover, a permanent repair was made at this location, as evidenced by the fact that the replacement rail ends had been field welded.

WCTL/CCCS also note that the FRA recommended action against BNSF for civil penalties for failure to note required information on the rail when it was field welded. *See* WCTL/CCCS Appendix B at 7. But the FRA inspector made this recommendation not because BNSF failed to make a repair or because of inadequate inspection, but because BNSF did not comply with an internal BNSF Continuous Welded Rail ("CWR") maintenance procedure to notate in grease marker on the rail certain required information after a rail is field welded. While this is not a specific FRA requirement identified in the FRA regulations, the FRA does require that railroads comply with their own internal standards. In other words, if the same event had occurred on another railroad that did not require its maintenance personnel to note such information on the rail as part of that railroad's CWR maintenance procedure, no recommendation for civil penalties would have been issued.

Regarding ballast replacement, AECC's witness De Berg commented that BNSF did not appear to have engineering elevation control points established to ensure that we had adequate ballast in place to return the track structure to its original position after undercutting the track. *See* De Berg Op. V.S. at 4. It is not possible to draw any conclusions regarding ballast replacement based on the absence of engineering elevation control points. BNSF does not use elevation control points for this purpose. The maintenance equipment that BNSF uses has the latest technology that ensures that the track is aligned and supported with the proper amount of ballast.

Finally, regarding shoulder ballast cleaning, AECC observed in its opening evidence that UP had criticized BNSF for performing shoulder ballast cleaning instead of undercutting the entire ballast section, suggesting that shoulder ballast cleaning could cause centerbound concrete ties. *See* De Berg Op. V.S. at 11. The term "centerbound" refers to a concrete tie with insufficient ballast support at the edges of the tie, which may allow the tie to bend or flex and possibly break thereby failing to maintain proper gage of the rails. It has been my experience that shoulder ballast cleaning does not cause centerbound ties as long as the ballast is properly tamped after being cleaned and replaced, which BNSF does. Moreover, it is noteworthy that this view was held by UP's then chief engineer in 2005, but that UP's current chief engineer has no objection to shoulder ballast cleaning on the Joint Line and, in fact, performs shoulder ballast cleaning on portions of the UP railroad as well.

F. WCTL's "Deferred Maintenance" Allegations.

WCTL/CCCS' witness Thomas Crowley asserts that BNSF deferred maintenance on the Joint Line that should have been completed in prior years. *See* Crowley Op. V.S. at 15-16. The "deferred maintenance" claim suggests that BNSF knew that we needed to perform certain maintenance activities in a given year, but that we decided to put off doing that work until a later date. That did not happen, and none of the evidence cited by WCTL/CCCS indicates otherwise.

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The fact that BNSF performed greater maintenance after the derailments is not at all surprising, and it is not indicative of deferred maintenance. As Mr. Fox indicated in his opening statement, the derailments prompted BNSF to look more closely at the problem of coal dust. Those efforts showed BNSF that coal dust was a larger problem than BNSF had previously thought, and they led BNSF to undertake additional maintenance and inspection to deal with the coal dust problem. The subsequent increase in maintenance activity is not evidence of deferred maintenance but of BNSF's realization that additional maintenance needed to be carried out to address the adverse effects coal dust has on the ballast and track structure as a whole. Indeed, BNSF has continued to study the problem of coal dust and has found that even greater levels of maintenance activity are required than those projected by BNSF soon after the derailments. The magnitude of the problem is much larger than BNSF initially believed, and it requires even more maintenance and inspection than BNSF forecast in the immediate aftermath of the derailments.

IV. Shippers' Analysis of Relative Maintenance and Surfactant Costs Is Highly Misleading.

In their opening evidence, WCTL/CCCS and AECC argue that BNSF's coal dust standards are unreasonable because the cost to curtail dust emissions in accordance with BNSF's standards is greater than the cost to the railroads to clean up the coal dust after it has spilled out of the cars. I do not believe that it is appropriate to consider the reasonableness of BNSF's coal dust standards based on the costs of incremental maintenance compared to the costs of applying surfactants. BNSF has adopted coal dust emissions standards to eliminate a serious risk to the coal supply chain from service failures due to coal dust fouling and to improve the efficiency of coal transportation. The value of achieving these critical objectives, which cannot easily be quantified, is not included in the shippers' simplistic cost analysis.

The shippers' argument ignores the important costs that can be imposed on the public as a consequence of coal dust accumulation. As BNSF explained in its opening evidence, coal dust can accumulate in the track ballast at unpredictable rates. Often, coal dust can foul ballast without any visible indication that the ballast contains coal. As BNSF explained, in some areas we have found coal dust fouling on ballast sections that have recently been cleaned and even on recently constructed line segments. Given the pernicious character of coal dust, its impact on track stability, and the difficulty in detecting coal dust in the ballast, coal dust emissions create unacceptable risks of service interruption. If any cost analysis were to be done in assessing the reasonableness of BNSF's coal dust standards, it would be critical to consider the value of assuring a reliable energy supply and the costs that would result from a service interruption, which are difficult to quantify. The relative costs of surfactant application or increased maintenance would be insignificant compared to the costs to the economy associated with a large scale interruption of the supply of coal from the PRB.

In addition, the Board must consider the impact of coal dust emissions on rail capacity. As described by Mr. Sloggett on opening, the maintenance necessary to clean up coal dust that has been blown out of moving coal cars takes away capacity that could otherwise be used to provide transportation service. Capacity constraints on the rail network have been acute at times over the past several years. The more recent economic downturn has made the issue of rail capacity less urgent at the present time, but the economy will turn around eventually, and increasing demand will continue to put strains on the rail network. The costs to the economy from constraints in the capacity of the rail network are difficult to quantify, but it is clear that they are very large.

The cost analyses put forward by WCTL/CCCS and AECC ignore these fundamental considerations altogether. The reasonableness of BNSF's coal dust emissions standards cannot be addressed based on simplistic cost analyses of the type presented by WCTL/CCCS and AECC. In any event, I explain below that those cost analyses are highly misleading and present a distorted view of the relative costs of surfactant application and expanded maintenance, even without considering the much larger policy issues and costs that are not amenable to the sort of comparative cost analysis the coal shippers have performed. As I explain below, if the basic assumptions used by WCTL/CCCS are used as a starting point for a more complete and realistic analysis of relative costs, it is clear that there are plausible scenarios where the costs of surfactant application are significantly *lower* than the costs imposed on the railroads from expanded maintenance.

A. Maintenance Costs.

WCTL/CCCS presented their cost analysis through Thomas Crowley. Crowley concluded that the railroads' cost of performing maintenance is less than the shippers' cost of spraying surfactant. {{

}} AECC presented its cost analysis through its witness Michael Nelson, who concluded that {{

}}

I focus my critique of the shippers' cost analyses on Crowley's evidence because

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{{

[6]}}

I revised Crowley's calculations in several ways, starting with his estimates for the incremental maintenance costs on the Joint Line in the Orin Subdivision.

1. Orin Subdivision.

My first adjustment to Mr. Crowley's analysis was to update the unit costs to use current cost assumptions and to update the miles to reflect track miles added in recent construction projects. My revised assumptions are contained in the spreadsheets at Exhibits 7 through 9. Column A in Exhibit 7 lists the maintenance activities affected by coal dust in lines 2 through 20. Column C, from the {{ }} provides the annual maintenance cycles under normal conditions absent coal dust fouling. Column E, also from the

[6] {{

}}

{{ }}, provides the higher frequency maintenance requirements resulting from the need to deal with coal dust. I generally adopted {{ }} coal dust maintenance requirements, even though our experience has shown that our coal dust maintenance cycles are more frequent than those assumed by {{ }} *See* the reply verified statement of Mr. Sloggett.

Column G shows the annual incremental amount of maintenance associated with coal dust based on the difference between Columns C and E. I performed the same calculation as {{ }} to produce these estimates using the updated track miles and turnouts, which are set out in Column J. For example, to calculate the annual amount of undercutting on the Orin Subdivision associated with coal dust fouling, I divided the 392 track miles on the Orin Subdivision by the 5.8-year cycle assumed by {{ }} to be applicable to coal dust fouling. I then divided the 392 track miles by the 10-year cycle for undercutting applicable to normal maintenance conditions. The difference between these two numbers is 28.4, which is the annual number of undercut track miles that are associated with coal dust maintenance. For maintenance activities that used turnouts or concrete ties instead of track miles as the basis for the cost estimate, I followed the same basic approach using the underlying unit of measurement (track miles, turnouts, or concrete ties) identified in Column J. Column H contains the updated unit costs.[7] I calculated the increased total costs in Column I by multiplying the annual number of incremental coal dust maintenance requirements by the updated unit cost. I performed these same calculations for the maintenance activities in lines 2 through 20. {{

[7] The updated unit costs are numbers that BNSF is using to budget these maintenance activities in 2010.

}}

My second adjustment was to add back into the analysis the costs associated with track availability for slow orders and track maintenance windows on the Orin Subdivision, {{

}} However they are classified, the costs associated with reduced cycle times and impeded operations from coal dust maintenance are costs that should be considered in this analysis. Contrary to Mr. Crowley's assertion, as Mr. Smith explains in his reply verified statement, slow orders and track maintenance windows are two different things. Mr. Smith states in his reply verified statement that he estimates eighty percent of current slow orders and track maintenance windows on PRB lines are attributable to coal dust. To be conservative, I adopted the amounts for slow orders and track maintenance windows from a study done by a former BNSF employee, Larry Parker, then General Director Maintenance Planning, that was used as the basis for the {{ }} BNSF_COALDUST_0022782.

My analysis shows that the annual incremental maintenance costs associated with coal dust is }} million on the Orin Subdivision.

2. Coal Loop.

I then expanded my analysis to include incremental maintenance costs from coal dust for the Orin, Black Hills, Butte, Valley, Canyon, and Campbell Subdivisions. These lines form BNSF's "coal loop," which includes the principal lines used by BNSF to move coal trains into and away from the PRB mines. These lines are depicted on the map in Exhibit 10. These subdivisions were included in both {{ }} 2007 study and {{

}} *See* BNSF_COALDUST_0019753; Crowley Op. V.S. at 12-13.

With respect to the subdivisions on the coal loop, I did not follow an assumption that {{ }} made that the incremental cost of coal dust maintenance decreases as a function of a subdivision's distance from the Orin Subdivision. *See* BNSF_COALDUST_0019752. {{ }} theory is not corroborated by our experience on PRB lines. We have found that the levels of coal dust maintenance on BNSF's subdivisions in the coal loop are not significantly different from those on the Orin Subdivision. This is not surprising since most of the subdivisions in the coal loop are within 100 miles of the mines, and the densities on the other subdivisions in the coal loop are equivalent to that on the Orin Subdivision. Therefore, I made the same assumptions about frequency of maintenance for all lines within BNSF's coal loop. *See* Exhibit 8. (As I noted before, I believe those frequency assumptions are already understated.) To estimate the costs associated with slow orders and maintenance windows, I used Larry Parker's calculation of the incremental costs of slow orders and track maintenance windows for the coal loop subdivisions. *See* Exhibit 8 (Lines 22 and 23); BNSF_COALDUST_0022782.[8] The results estimate BNSF's incremental maintenance costs associated with coal dust to be {{ }} million annually.

3. Coal Loop Plus Adjacent Subdivisions.

I then extended this analysis to include BNSF's four adjacent subdivisions that are directly affected by coal dust maintenance costs—the Angora, Big Horn, Ravenna, and Sandhills Subdivisions. *See* the map in Exhibit 11. {{

}} *See* BNSF_COALDUST_019753; Crowley Op. V.S. at 12-13. I added the Sandhills and Ravenna Subdivisions because they have

[8] While Larry Parker's estimate included a few additional track segments not included in BNSF's coal loop, I did not increase his estimate of coal loop slow order and maintenance window costs when I extended my analysis to adjacent lines, as discussed below.

required increased maintenance associated with coal dust. BNSF's witness Mr. Smith discusses some of the maintenance currently being carried out on the Sandhills and Ravenna Subdivisions to address coal dust fouling.

To calculate the maintenance costs associated with coal dust for the Sandhills Subdivision, I used the same methodology that I used with respect to the line segments in the coal loop. *See* Exhibit 8. The Sandhills Subdivision has required comparable amounts of coal dust maintenance as the lines within BNSF's coal loop, which is not surprising because the Sandhills Subdivision has a comparable or slightly higher traffic density than the lines in the Orin and Black Hills Subdivisions as a result of the fact that the Sandhills Subdivision handles coal trains that originate coal on both prongs of BNSF's coal loop.

For the three remaining adjacent subdivisions (Big Horn, Angora, and Ravenna), I assumed a reduced level of maintenance. We have found a substantial amount of coal dust fouling on these lines, but the level of increased maintenance has not reached the levels experienced on lines directly within the coal loop or on the Sandhills Subdivision. To account for the lower level of incremental maintenance on these lines, I used only fifty percent of the actual track miles, turnouts, and concrete ties for these adjacent subdivisions in my calculations. *See* Exhibit 9. This assumption has the effect of reducing the annual incremental number of maintenance units associated with coal dust for these three subdivisions. I did not change the incremental costs of slow orders or track maintenance windows from the assumption I included in the coal loop cost estimate.[9]

[9] Mr. Parker's cost estimate of slow orders and track maintenance windows, while it included UP's high density line from Shawnee to Northport, did not include BNSF's Sandhills and Ravenna Subdivisions.

My calculations show that BNSF's annual incremental maintenance costs associated with coal dust on the coal loop subdivisions and BNSF's four adjacent subdivisions are {{ }} million. *See* Exhibit 9. This cost estimate does not include UP's coal dust maintenance costs on its solely-owned line segments, including its high density line from Shawnee to Northport or its high-density lines from Northport east.

B. Surfactant Costs.

Mr. Crowley's analysis assumed that the costs to apply surfactants could be as much as {{ }} million per year. That estimate was based on an assumption that {{ }} million tons per year would have to be treated and that the treatment costs would be {{ }} per ton. Crowley Op. V.S. at 38.

First, our experience with the surfactant trial currently underway suggests that the costs of surfactants will actually be below {{ }} per ton. Based on my interactions with shippers and mines, I understand that charges to shippers for surfactant application are in the range of {{ }} per ton. Experience and common sense show that through competitive bidding and economies of scale this cost will go down over time, especially when mines or shippers purchase surfactant in large quantities by contract. {{

}} I assumed that the cost will come down fifteen percent when shippers begin to comply with BNSF's coal dust standards, to a cost of about }} per ton.

Second, Mr. Crowley's analysis assumed that surfactant would be applied to {{ }} million tons, which reflected the volume he assumed for Joint Line traffic only. Last year, Joint Line traffic volumes were around 345 million tons. However, my incremental maintenance calculations address the incremental costs for the coal loop and BNSF's adjacent lines, so the proper tonnage assumptions would be total Joint Line volumes (BNSF and UP) plus additional volumes originated by BNSF at mines off of the Joint Line from the Montana and Campbell subdivision mines. To reflect total PRB coal originations, I used {{ }} million tons per year, which was the tonnage from 2009. Applying an assumed cost of }} per ton to {{ }} million tons equals an annual surfactant cost of {{ }} million.

As described above, an estimate of incremental maintenance costs for BNSF's coal loop – without considering any costs associated with UP's solely owned PRB line segments outside of the Joint Line or any adjacent solely owned BNSF lines – is {{ }} million annually, an amount that is approaching the surfactant costs. When the incremental maintenance on BNSF's adjacent lines is included, the maintenance costs exceed {{ }} million. As noted previously, this cost comparison ignores the critical policy issues relating to service reliability and capacity utilization, and for that reason, should not be used to address the reasonableness of BNSF's coal dust standards. However, when Mr. Crowley's analysis is corrected and updated, its clear that incremental maintenance costs for all line segments affected by coal dust deposits substantially exceed the costs of surfactant. And if UP's costs were added, the difference would increase even more.

Finally, it is important to note that the cost to spray surfactant is very small when compared to the price of the delivered cost of coal. Assuming a transportation rate of $20 per ton and a coal cost of $10 per ton, the delivered cost of coal would be $30 per ton. If the cost to apply surfactant to the coal is {{ }} per ton, the surfactant cost would represent {{ }} of the delivered cost per ton of coal. Moreover, this slight increase in the delivered cost of coal would be offset by the value of the increased coal kept in the car, which I roughly estimate to be {{ }} million per year, based on an assumed 500 pounds of coal lost per car, the number of carloads in 2009, and a coal cost of $30 per ton. In any event, the incremental cost of surfactant application is very small and would have no impact on the relative attractiveness of coal in the market, which would remain the most economical fuel alternative.

I declare under penalty of perjury that the foregoing is true and correct. Further, I certify that I am qualified and authorized to file this Verified Statement.

Executed on April 28, 2010

William VanHook

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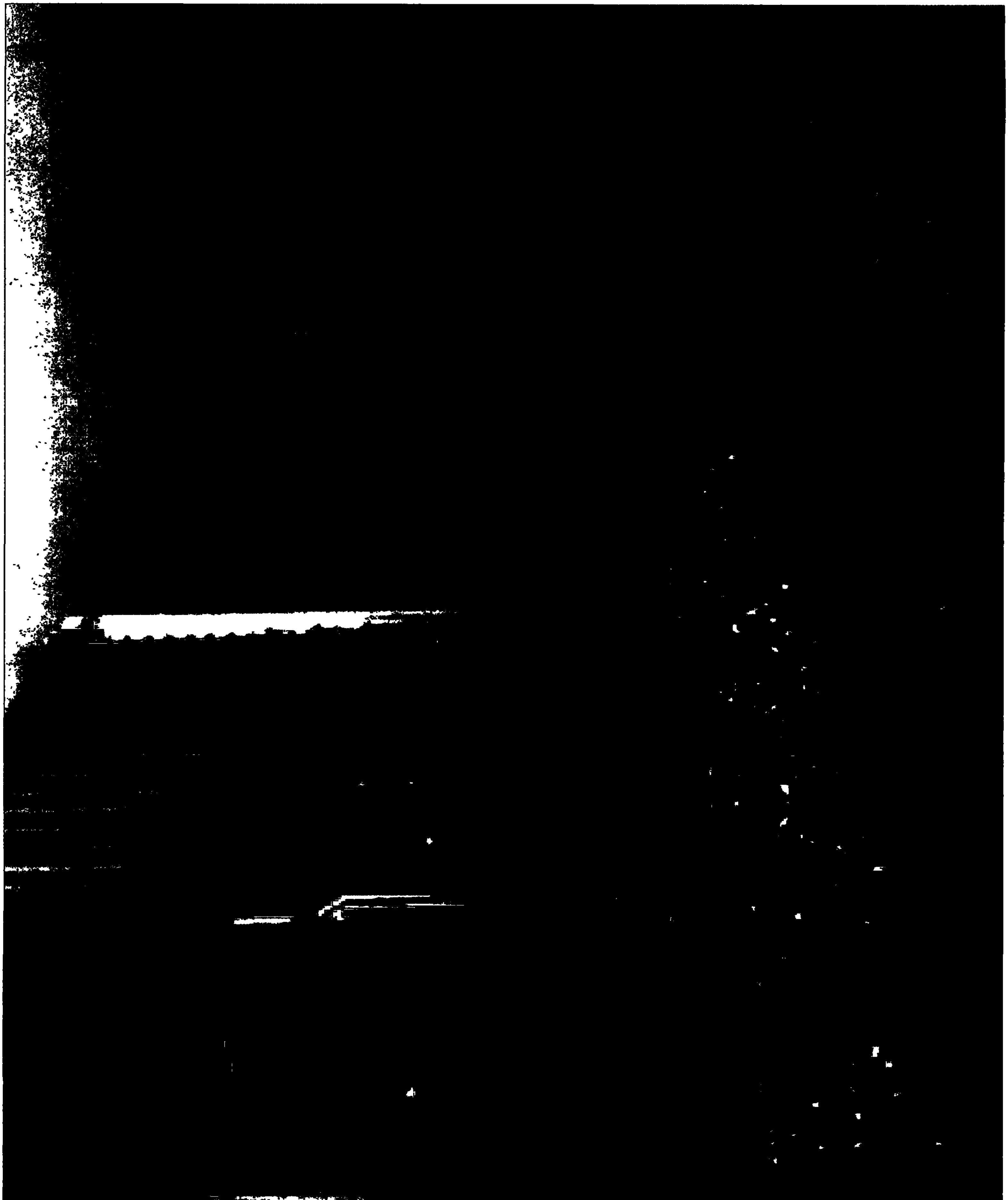

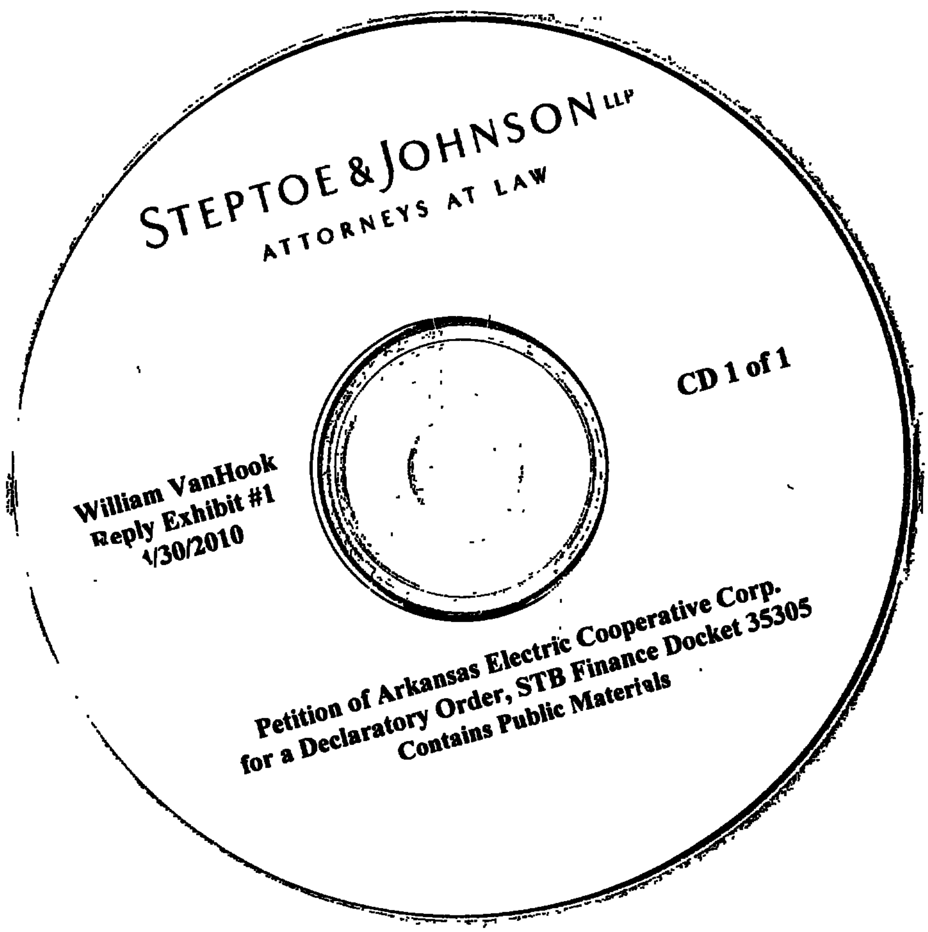
STEPTOE & JOHNSON LLP
ATTORNEYS AT LAW
CD 1 of 1
William VanHook
Reply Exhibit #1
1/30/2010
Petition of Arkansas Electric Cooperative Corp.
for a Declaratory Order, STB Finance Docket 35305
Contains Public Materials

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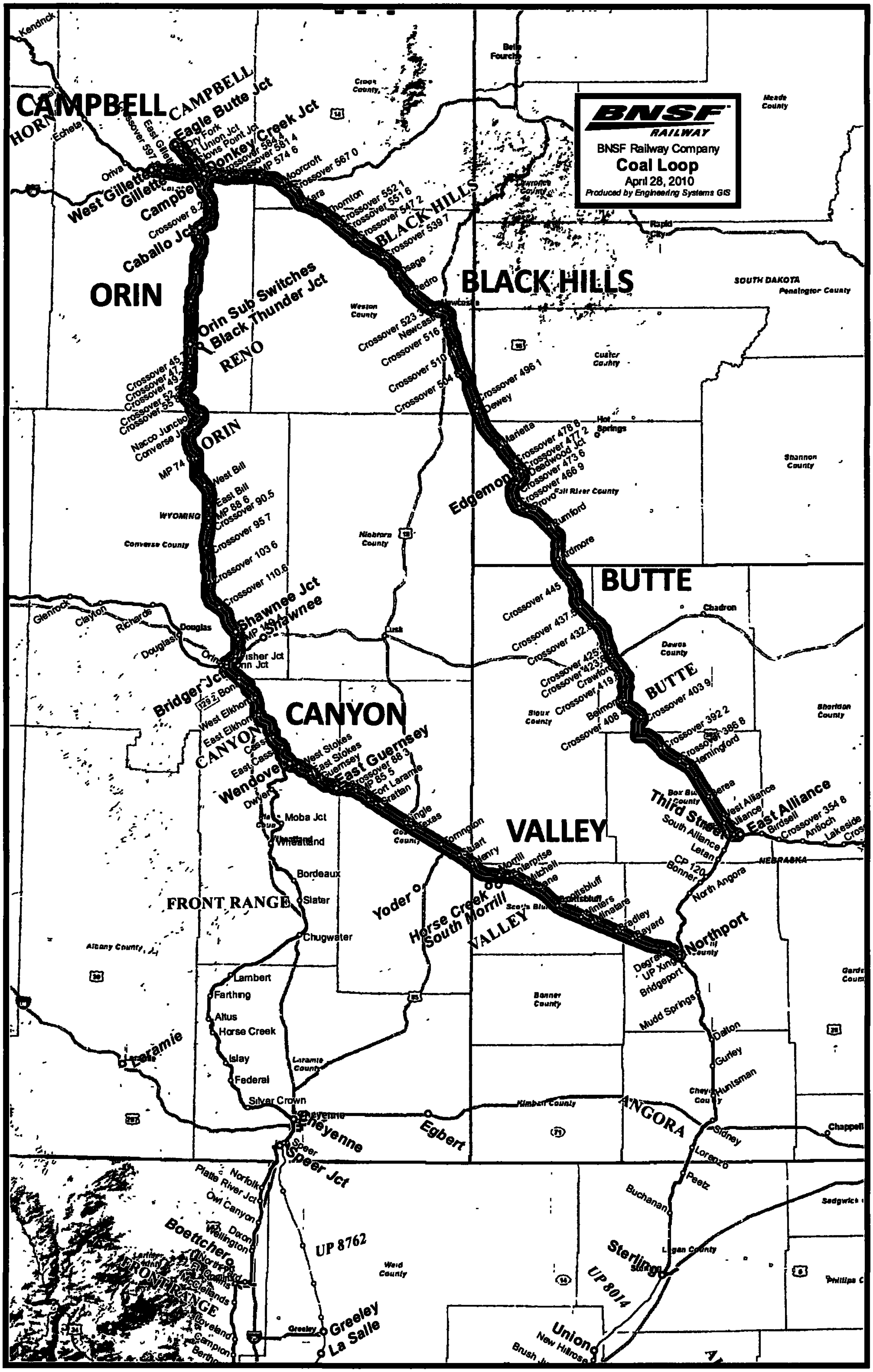
BNSF RAILWAY
BNSF Railway Company
Coal Loop
April 28, 2010
Produced by Engineering Systems GIS
CAMPBELL
ORIN
BLACK HILLS
BUTTE
CANYON
VALLEY
FRONT RANGE
ANGORA
RENO
Eagle Butte Jct
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West Gillette
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Campbell
Caballo Jct
Orin Sub Switches
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UP 8014
UP 8762
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Greeley
La Salle
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Crossover 445
Crossover 437.5
Crossover 432.8
Crossover 408
Crossover 403.9
Crossover 392.2
Crossover 354.8
Douglas
Glenrock
Clayton
Richards
Lusk
Chadron
Rapid City
SOUTH DAKOTA
NEBRASKA
WYOMING
Converse County
Niobrara County
Weston County
Albany County
Weld County
Logan County
Banner County

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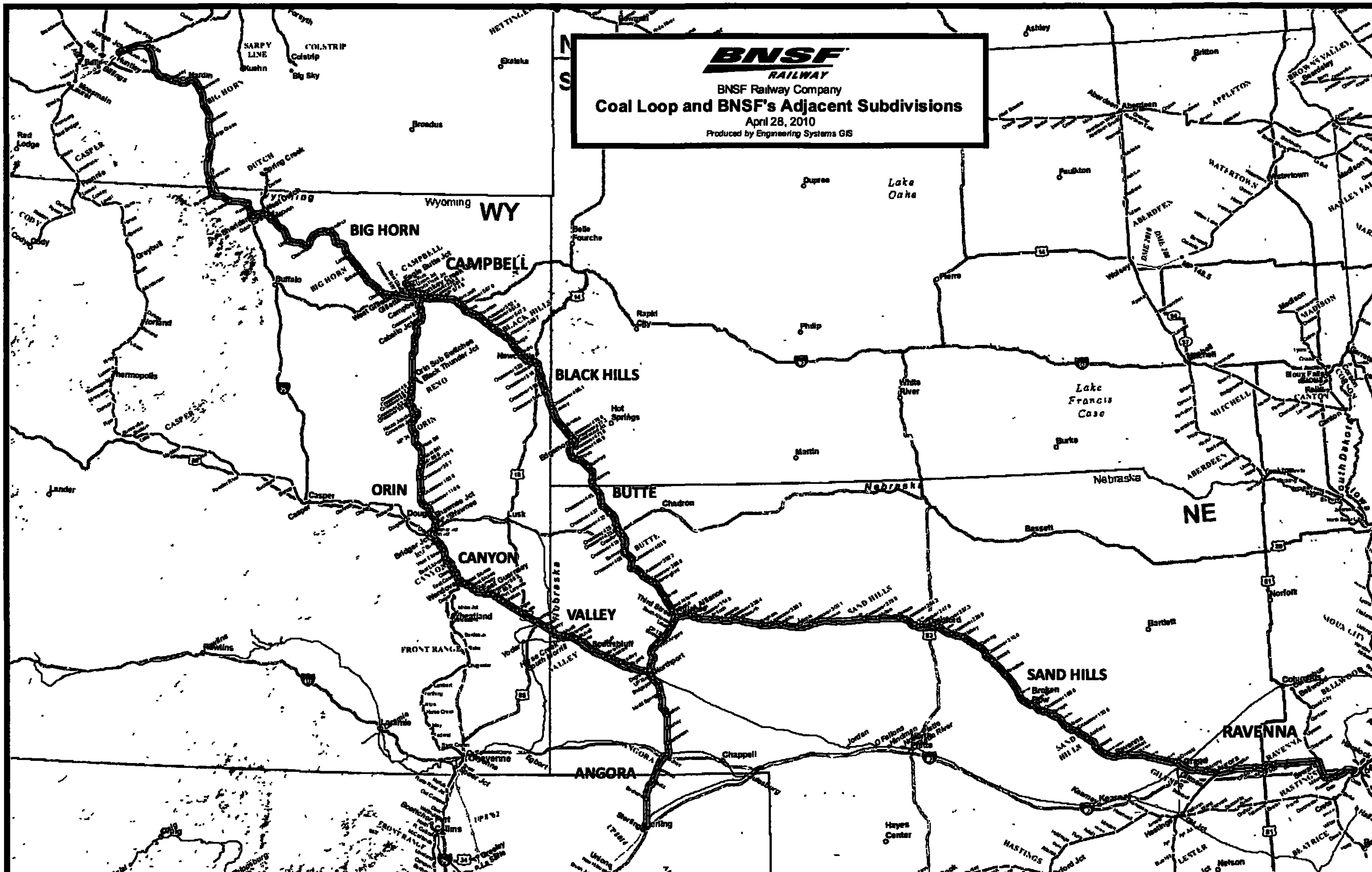
BNSF RAILWAY
BNSF Railway Company
Coal Loop and BNSF's Adjacent Subdivisions
April 28, 2010
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Wyoming
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FRONT RANGE
Lake Oahe
Lake Francis Case
Broadus
Ekalaka
Colstrip
Big Sky
Rapid City
Hot Springs
Belle Fourche
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Philip
Martin
Dupree
Burke
Faulkton
Britton
Ashley
Aberdeen
Watertown
Mitchell
White River
Chadron
Bassett
Bartlett
Norfolk
Columbus
Chappell
Hayes Center
Nelson
Lander
Casper
Buffalo
Hermopolis
Douglas
Lusk
Wheatland
Cheyenne
Laramie
Rawlins
Alliance
Northport
Scottsbluff
Sterling
Broken Bow
Kearney
Cody
Red Lodge

Sloggett

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Finance Docket No. 35305

PETITION OF ARKANSAS ELECTRIC COOPERATIVE
FOR A DECLARATORY ORDER

REPLY VERIFIED STATEMENT OF CRAIG SLOGGETT

I am Craig Sloggett, General Director Maintenance for BNSF Railway Company ("BNSF"). I am responsible for overall maintenance and maintenance planning on BNSF's Powder River Division. I previously submitted a verified statement in support of BNSF's opening evidence in this proceeding, which statement includes a description of my work experience.

Many of the coal shippers and shipper organizations that filed opening evidence in this proceeding suggest that coal dust suppression measures are unnecessary and that BNSF can and should continue to address the coal dust problem through expanded maintenance and inspections. *See, e.g.*, WCTL/CCCA Op., McDonald Op. V.S. at 4-8. I disagree. These overly simplistic arguments fail to acknowledge or account for the details and difficulties of actually performing such extensive maintenance while also operating an efficient and reliable railroad. In this reply verified statement, I will describe how maintenance work required to address coal dust is performed and detail the extensive commitment of time and resources required to perform these tasks on a more frequent basis. In a separate verified statement, my colleague, Mr. Smith, General Superintendent Transportation, Central Region, which includes the Powder River Division, discusses the impact that our coal dust-related maintenance efforts have on railroad operations.

I. Undercutting and Shoulder Ballast Cleaning

As I explained in my opening verified statement, we are currently performing undercutting on the line segments affected by coal dust at least every 5 to 6 years and as often as every 2 to 3 years in locations with high coal dust accumulation. As a result, we are undercutting track on these line segments 2 to 3 three times as frequently as would be required under normal operating conditions. Undercutting involves lifting the rail and ties off the ballast, removing and cleaning the ballast of coal dust and other fines, and replacing it with clean ballast. There are two different types of undercutting. One is referred to as out-of-face ("OOF") undercutting, which involves undercutting a continuous stretch of track for longer distances. The other is spot undercutting, which involves undercutting discrete problem areas, typically several hundred feet in length.

There are several different undercutting machines that we use. Our most efficient undercutter is the Plasser RM802, which is used exclusively for OOF undercutting. It is approximately 10 standard railcar lengths, is self-powered and sits on the track. BNSF has assigned a crew of approximately 25 BNSF personnel, along with 5-6 Plasser assigned employees, who exclusively work this undercutter. When a maintenance window is scheduled for this undercutter, another BNSF train crew operating a 50-car unit train collects ballast from the nearest ballast pit and dumps it where needed. The crew assigned to the Plasser RM802 then positions the undercutter and begins work. The undercutter lifts the rail and ties off of the ballast, removes the ballast and cleans it of coal dust and other fines, and then replaces it with clean ballast. The undercutter is followed by additional crews operating two surfacing machines that tamp the ballast and ties and ensure that the rail is returned to its proper elevation and alignment. When maintenance is completed for the day, the undercutter is moved to a nearby set-out track or siding so it does not interfere with traffic.

The Plasser RM802 uses the latest technology and can undercut approximately 1,000-1,200 feet per hour. In a typical 8-hour maintenance window, it undercuts approximately 2/3 of a mile of track, allowing time for set up, take down, tamping and other necessary activities. BNSF currently leases only one Plasser RM802. Because of the coal dust problem, BNSF has assigned this undercutter to run on the Powder River Division approximately 99% of the time.

We use two additional undercutter models, the Plasser RM80 and RM8800, for additional OOF undercutting work on the Powder River Division. These machines are not exclusively assigned to the Powder River Division and rotate among Divisions as needed. These machines are also self-powered and sit on the track, but are smaller, approximately 3-4 car lengths long. They require a similar size crew to operate, are followed by a single surfacing machine, and perform the same function as the RM802, although at a slower speed, approximately 700-800 feet per hour. In a typical maintenance window, each machine undercuts approximately 1/2 of a mile.

For spot undercutting, we utilize an off-track undercutting machine, which sits on the right of way. Exhibit 1 contains pictures of various coal dust-related issues, including pictures of the off-track undercutter at MP 15 on the Orin Subdivision. *See* Exhibit 1 at 2. The off-track undercutter lifts the ties and rail and has a bar that removes existing ballast. Another machine is used to replace the old ballast with new ballast. The off-track undercutter is used only in small problem areas. In a typical 8-hour maintenance window, it is capable of undercutting approximately 100 feet of track. We have four off-track undercutters assigned to the Powder River Division. During the current maintenance season, we will use the off-track undercutters to address problem areas related to coal dust in approximately 70 locations on the Joint Line and another 100 locations in other areas on the Division.

In addition to undercutting, we use a ballast maintenance technique called shoulder ballast cleaning ("SBC"), which involves removal and cleaning of the ballast at the shoulders of the track, i.e., the ballast not directly under the ties and rail. Shoulder ballast cleaning improves drainage along the track by making sure that the ballast shoulders are free of contaminants that can restrict the drainage of water that collects under the tracks. We use a Loram shoulder ballast cleaner. The SBC machine sits on the track and has large wheel-like attachments that dig down into the ballast on either side of the ties to remove old ballast and replace it with new or cleaned ballast. The SBC machine is also followed by a tamper. It moves at approximately 5,000 feet per hour, depending on the concentration of coal dust in the ballast, which causes the machine to run more slowly in areas with higher concentrations of coal dust. We currently perform shoulder ballast cleaning annually on the Joint Line and on all other Subdivisions in the Powder River Division. If we did not perform SBC annually, we would have to perform undercutting at even greater frequencies.

Exhibit 1 contains pictures of a Loram shoulder ballast cleaner in operation at MP 20 on the Orin Subdivision. *See* Exhibit 1 at 3. Although BNSF performs shoulder ballast cleaning annually, heavy amounts of coal dust have already accumulated in the ballast shoulders and can be seen in the spoils deposited by the machine.

II. Bridges and Turnouts

Many of BNSF's bridges and turnouts must be undercut with greater frequency than main line track because they are located in areas that are especially prone to coal dust fouling. In general, we must undercut bridges and turnouts affected by coal dust every 3 years. At some bridge locations, we are unable to use traditional undercutter machines, which further complicates the undercutting process. For example, at Nacco Bridge located at MP 62.4 on the Joint Line, we must cut out sections of the track and complete remove the ties and rails in order to remove old ballast and replace it with new. We use a front end loader to remove fouled ballast down to the bridge track, place new ballast, and then replace the ties and rails. We completely replaced all of the ballast supporting main track 1 across this bridge just 1.5 years ago and it is already fouled with coal dust.

III. Surfacing

Surfacing machines play several roles related to coal dust maintenance. They tamp the ballast and ensure that rail is properly aligned. As discussed above, surfacing (or tamping) is performed immediately following undercutting or shoulder ballast cleaning. Because we are performing undercutting and shoulder ballast cleaning more frequently to combat the coal dust problem, we are also surfacing more frequently. In addition to the surfacing that follows the undercutter, we also surface the track periodically as part of our preventive maintenance program and as needed in response to reports of irregular surface conditions. In response to the coal dust problem, we currently surface the track on the Powder River Division on an annual basis, which is approximately 2 to 3 times as frequently as we would under normal conditions.

BNSF has only a few high speed surfacing gangs, which it refers to as a supersurfacing gang. They consist of a 15-person crew and operate high speed surfacing equipment that can work at a rate of approximately one mile per hour. Because of the increased maintenance required to address coal dust, one of the supersurfacing gangs is dedicated to the Powder River Division, while the other gangs travel among multiple Divisions. BNSF also has regular surfacing gangs, consisting of approximately 4 crew members, that operate surfacing equipment at a rate of approximately 1/3 of a mile per hour.

IV. Coal Dust Removal

As coal dust escapes from loaded coal cars traveling on the railroad, it accumulates in the ballast, on the track, in between tracks, and on the railroad right of way. In addition to performing normal maintenance and enhanced ballast and surfacing maintenance to combat coal dust that has been embedded in the ballast, we must plan additional maintenance windows to remove coal dust from the tracks, in between the tracks and on the right of way. These dust removal maintenance efforts are required solely because of coal dust and are not performed on other BNSF Divisions.

We use vacuum trucks to remove coal dust that has accumulated on the track and in switches, and, to a lesser extent, from between tracks and on the right of way. A vacuum truck is essentially a huge vacuum on a tractor-trailer. I have two gangs consisting of four people each that work constantly during the 8 to 9 month maintenance season to vacuum coal dust. These gangs are dispatched to railroad locations as needed, in order of priority, and return to the same locations repeatedly that are known to have high levels of coal dust accumulation. We vacuum each switch location at least 2 to 3 times per year in an effort to prevent coal dust accumulation in the ballast and to prevent coal dust fires caused by switch heaters. We vacuum other track segments at least once every 2 to 3 years, with many locations with high coal dust accumulation receiving more frequent vacuuming. Whenever the vacuum truck is working on or near the track, the gang requires a maintenance window during which time no traffic can use the track. Each switch area generally requires two days of track time to clean, depending on the extent of the accumulation and the size of the area to be vacuumed.

Even with regular vacuuming, we cannot stop the rapid accumulation of coal dust in many switches on the lines impacted by coal dust. For example, in February of this year, we removed the switches at MP 90.5 on the Joint Line and installed new switches at MP 91.1. We are already seeing one inch of coal dust accumulation on the ballast shoulder and between the tracks in this newly installed switch in just two months.

Approximately two years ago, we began using a Loram badger/ditcher to remove coal dust from between the railroad tracks, which previously could only be reached and removed by vacuum truck or manually. Exhibit 1 contains pictures of the badger/ditcher in operation at Milepost 103 on the Orin Subdivision. *See* Exhibit 1 at 4. The badger/ditcher sits on the track, is approximately 3-4 car lengths long, and is operated by a 4-person crew. It has an arm that digs up coal dust from between the tracks and places it on a conveyor that discharges the coal dust either into a rail car or off to the side of the track onto the right of way. It is currently used as needed to pick up accumulated coal dust. We project that we will need to perform this maintenance work at least every year in some locations and every 2 to 3 years on the remainder of the territory that has two or more tracks. Several weeks ago, the badger/ditcher was in operation on the Joint Line, covering territory that it had previously cleaned approximately one year ago. The coal dust was already 3-4 inches deep in multiple locations.

Finally, we use front end loaders and motor graters to remove and/or spread coal dust for use as roadbase on the right of way. These machines are capable of covering approximately 0.25 miles per day during the maintenance season. They are used for other maintenance projects as well, but spend a considerable amount of time addressing coal dust accumulation. When I was a Division Engineer on BNSF's Southwest Division, which is similar in size to the Powder River Division, we had 1 to 2 loader/graters. On the Powder River Division, we have 8, with the difference attributable to increased maintenance from coal dust.

V. Inspections

In addition to increased maintenance, we have increased the frequency of inspections, particularly during spring and summer rains, to identify coal dust fouled ballast and related drainage problems as quickly as possible. Under normal conditions, each location on the Division would be inspected approximately 4 times per week. With coal dust, we inspect every location daily, 7 days per week. During rainy periods, track inspectors are working approximately 40% overtime hours and examining potentially troublesome areas 2 to 3 times per day. During rainy periods, we also augment our normal track inspection efforts by bringing railroad officers and other engineering department employees from all over the system to ride trains 24 hours a day. The track inspectors spend approximately 90% of their time in hi-rail vehicles, riding on the track and assessing track conditions. In addition, we have yard inspectors who generally walk the yard limits and identify any irregular conditions requiring attention. This level of inspection inevitably interferes with trains, which must either stop or travel at reduced speed to accommodate track inspectors. Track inspectors also respond to reports of rough track and issue slow orders as needed to reduce the maximum allowable speed on the track until any necessary repairs can be made.

To deal with coal dust issues, we have also increased the frequency with which our track geometry cars and TrackSTAR cars traverse the Powder River Division. As discussed in my opening verified statement, track geometry cars and TrackSTAR cars make detailed measurements of the track and rail condition and report irregularities outside of acceptable criteria. The TrackSTAR car also applies thousands of pounds of horizontal force on the rails and measures the movement of the rails outward. Track geometry cars are generally on a two-month cycle, which is increased as needed in response to weather conditions. The STAR car used to be run once per year and is now used a minimum of twice per year to assist in identifying exceptions.

VI. Rapid Accumulation of Coal Dust

Despite BNSF's extensive maintenance efforts, coal dust continues to accumulate on the Joint Line and on all of BNSF's primary coal lines both rapidly and in significant quantities. Exhibit 1 contains a series of recent pictures from the Orin Subdivision demonstrating the continuous problem that BNSF faces and how difficult it is to keep up with coal dust through expanded maintenance efforts:

- Pictures at Milepost 42.1 show significant coal dust accumulation on crossovers that were newly constructed in 2006 and from which BNSF has previously removed coal dust in the intervening years. The track will be undercut this year to remove excessive accumulation of coal dust in the ballast. Coal dust emissions are evident from a loaded coal train passing this location. *See* Exhibit 1 at 5.

- At Milepost 45.7, large quantities of coal dust have accumulated between all three main line tracks in a span of 2 years. BNSF used the Loram badger/ditcher at this location 2 years ago and completely removed all coal dust from between the tracks. Coal dust is also evident in the shoulders of the ballast on main track 2 (the middle track shown in the picture). *See* Exhibit 1 at 6.

- Similar levels of coal dust accumulation have occurred at Milepost 51.7. This location was also completely cleaned 2 to 2.5 years ago. *See* Exhibit 1 at 7.

- At Nacco Junction, coal dust has accumulated at depths measuring 11-12 inches between main lines 1 and 2 in the 1 to 1.5 years since this area was cleaned. *See* Exhibit 1 at 8.

- In late 2008/early 2009, BNSF constructed a signal bridge at Milepost 74. In just over 1 year's time, coal dust accumulation measures several inches deep and is beginning to cover the lowest step of the bridge. *See* Exhibit 1 at 9.

- Pictures taken between Mileposts 74 and 75, near the site of the BNSF derailment in May 2005, show rapid coal dust accumulation in the 1 year since this area was cleaned of coal dust. *See* Exhibit 1 at 10-11.

- Pictures taken at East Bill also show rapid accumulation of coal dust since this area was cleaned 1 year ago. A footprint several inches deep in the coal dust shows how the coal dust holds moisture. *See* Exhibit 1 at 12.

- At Milepost 91, a loaded coal train emits visible dust as it passes. *See* Exhibit 1 at 13.

- Pictures taken between Mileposts 95 and 98 illustrate coal dust accumulation in the ballast, in switch components and between the main line tracks. Switch components are vacuumed regularly to remove excess coal dust that can lead to switch failure, fouled ballast, and coal dust fires. *See* Exhibit 14-16.

VII. Conclusion

In my experience, coal dust poses an inherent risk to track stability if allowed to accumulate in railroad ballast, even in small quantities. Because only the top portion of ballast is visible by inspection, it is difficult for us to detect fouled ballast until we see evidence that the ballast is not draining properly or that track stability has been adversely affected. As part of our efforts to detect and resolve coal dust-related problems before they arise, we have adopted an aggressive inspection and maintenance schedule that is more expansive than for any other Division on the railroad. However, as discussed in this statement, these efforts consume limited resources and track capacity and are not a practical solution over the long term. Moreover, unless coal dust emissions from loaded coal cars are significantly reduced, there will always be a risk that ballast fouling and resultant track instability could go undetected, leading to events that have a significant adverse effect on coal deliveries as occurred in May 2005.

I declare under penalty of perjury that the foregoing is true and correct. Further, I certify that I am qualified and authorized to file this Verified Statement.

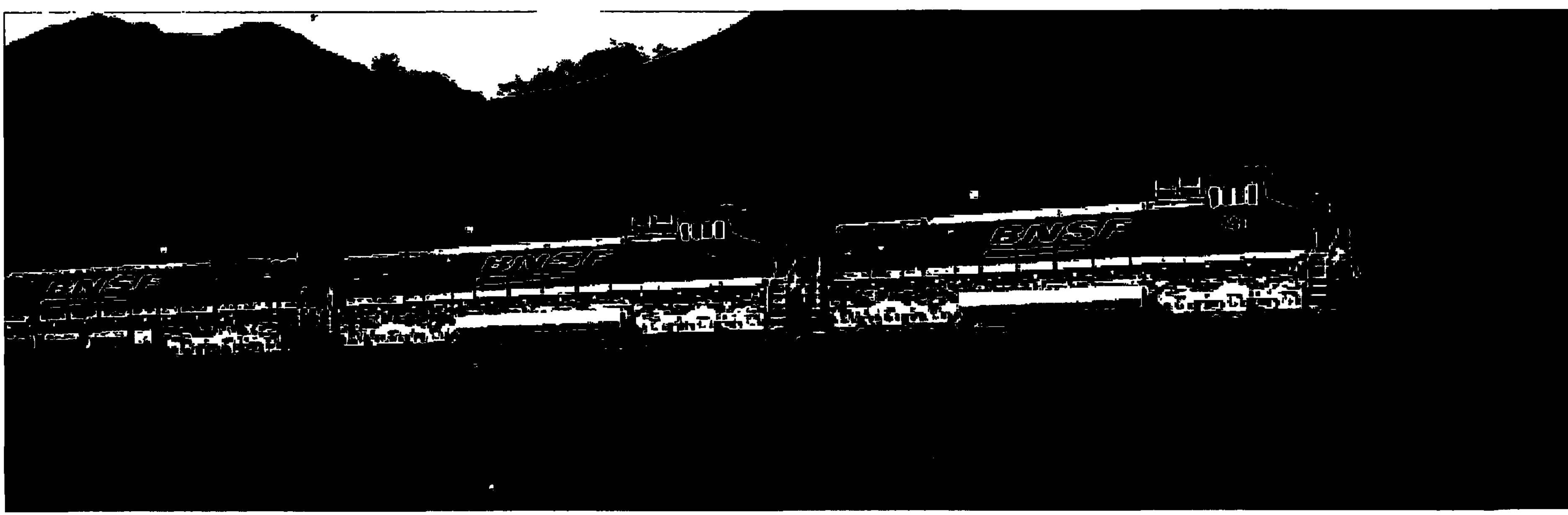
Executed on April 29, 2010

Craig Sloggett

1

BNSF Railway

BNSF® RAILWAY



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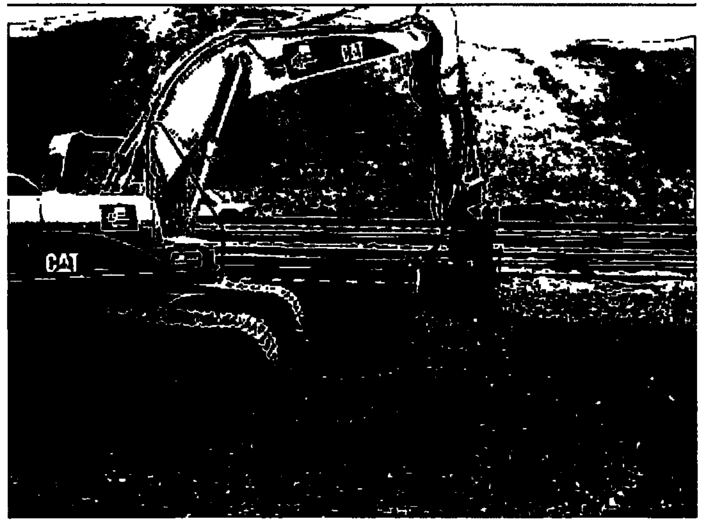
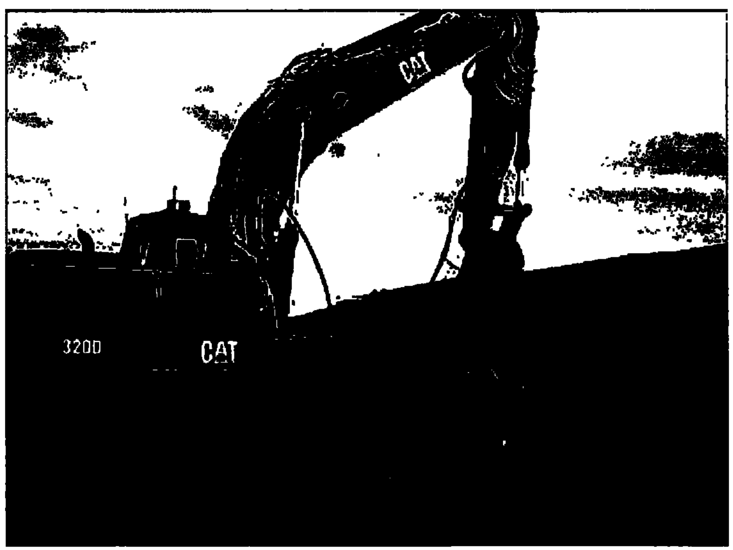




BNSF RAILWAY

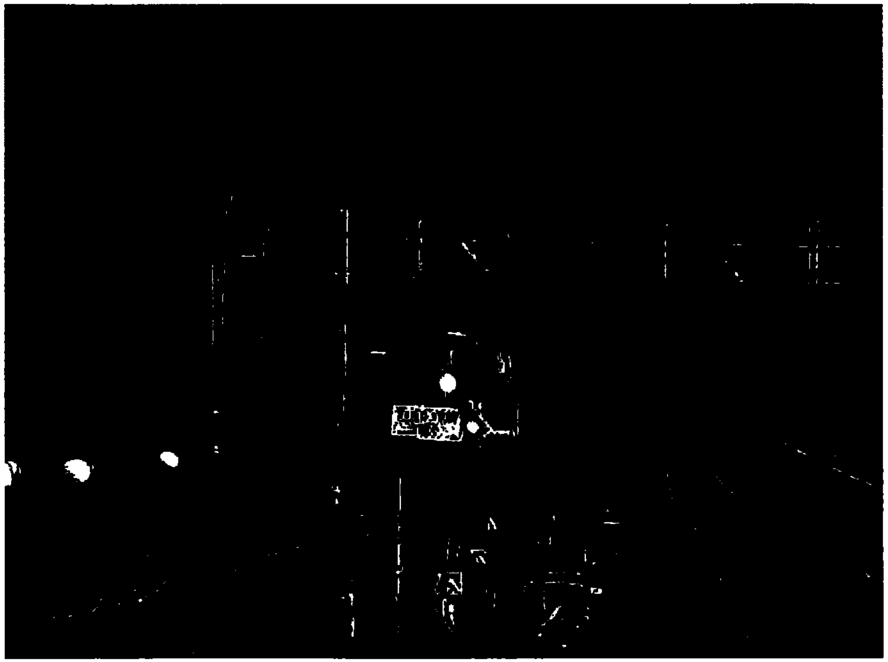
SHOULDER BALLAST CLEANER

BNSF RAILWAY

LORAM DITCHER

BNSF RAILWAY

CROSSOVERS 42.1

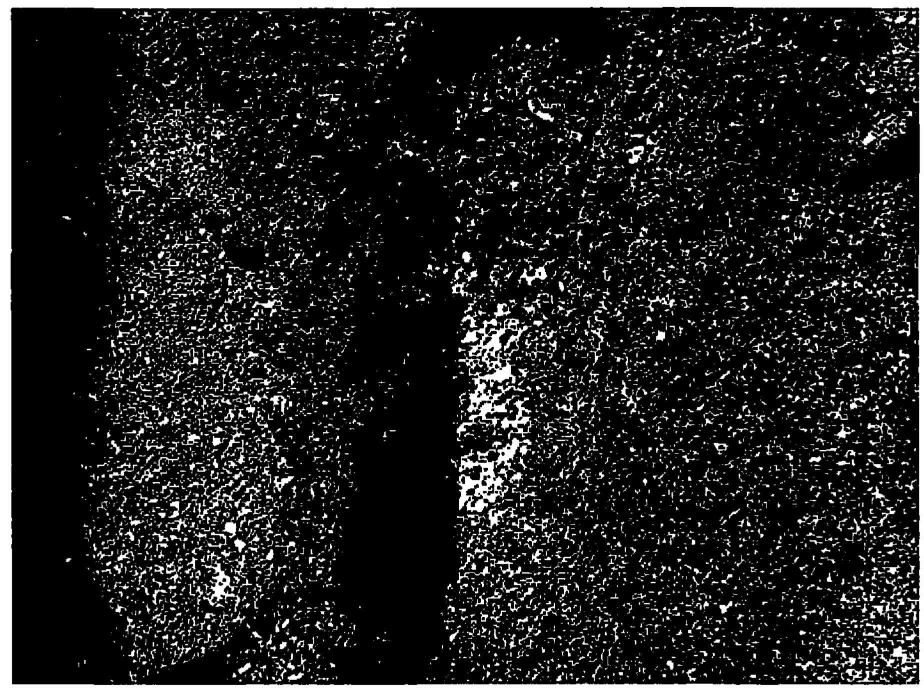


BNSF RAILWAY

CROSSOVERS 45.7

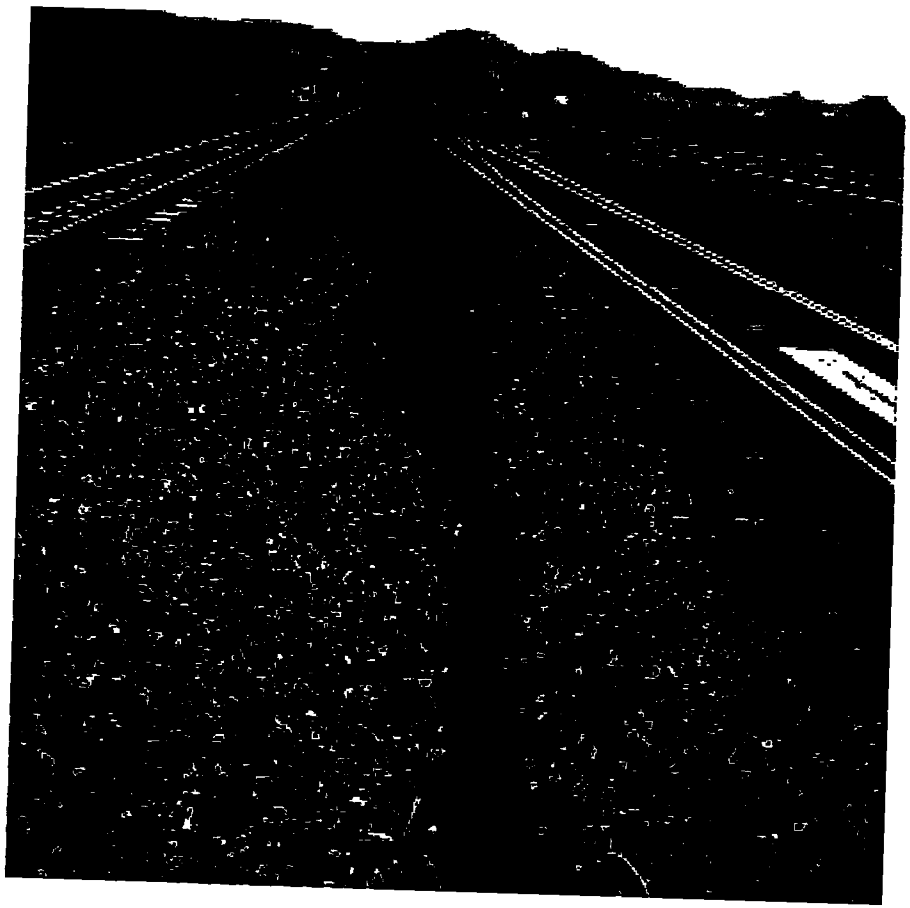
BNSF RAILWAY

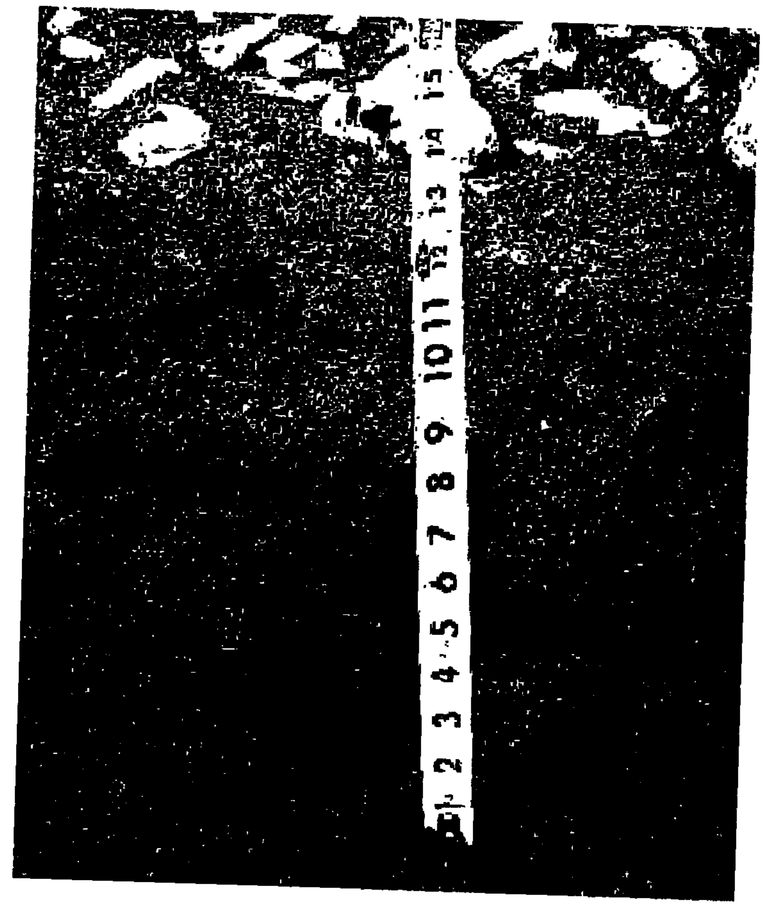
MP51.7



BNSF RAILWAY

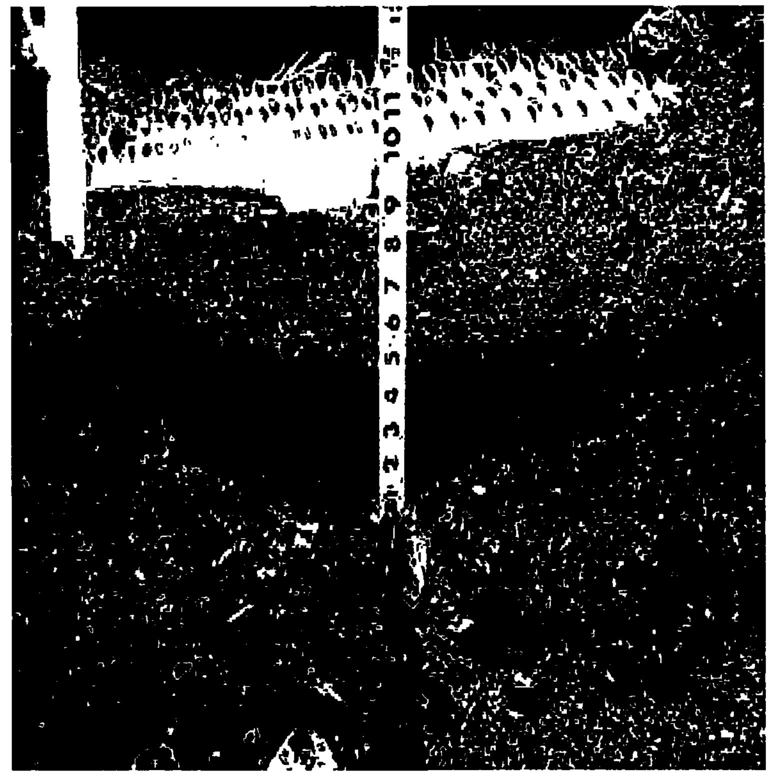
NACCO Between Mains 1 & 2





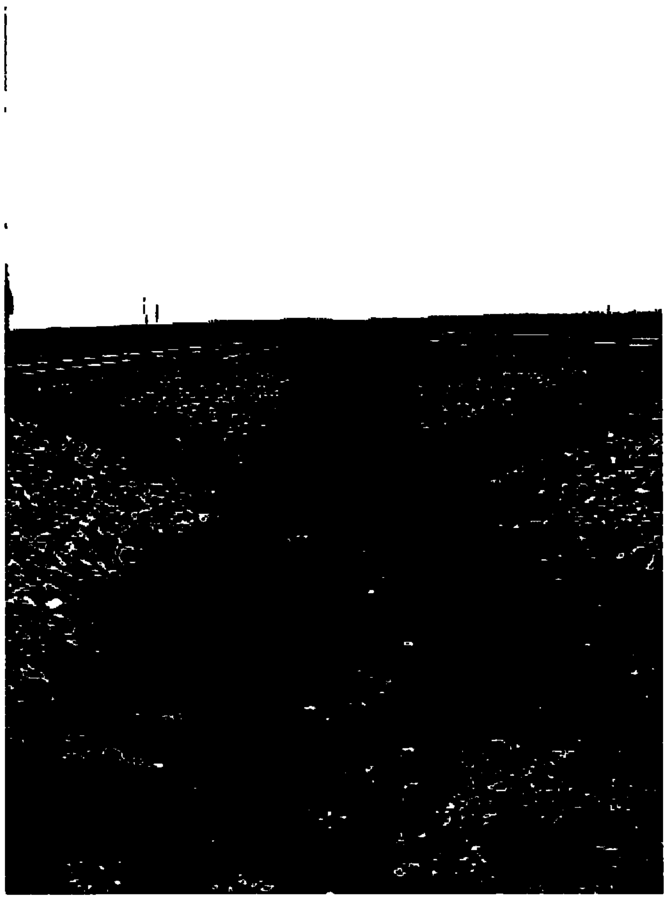
BNSF RAILWAY

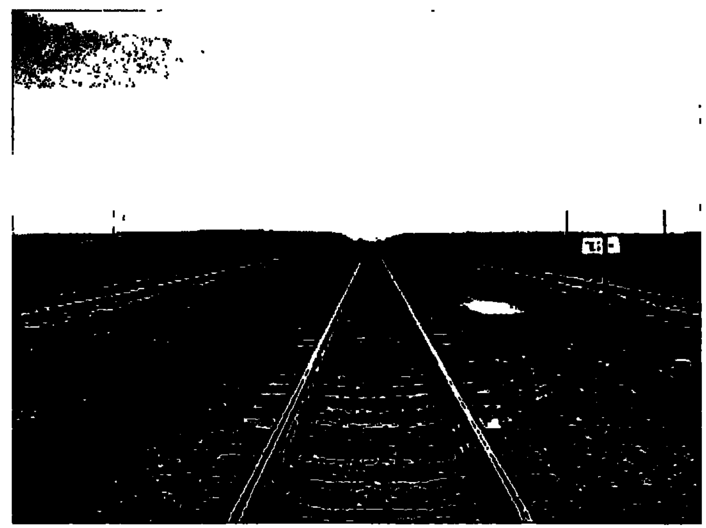
Signal Bridge MP 74



BNSF RAILWAY

Between MP 74 & 75

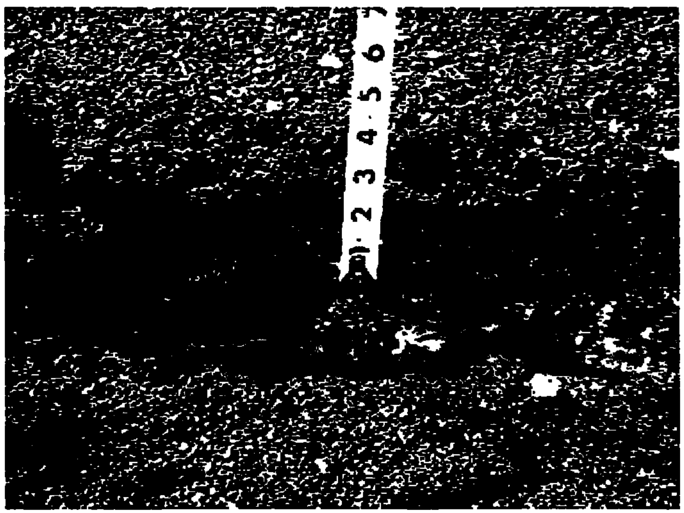




Between MP 74 & 75

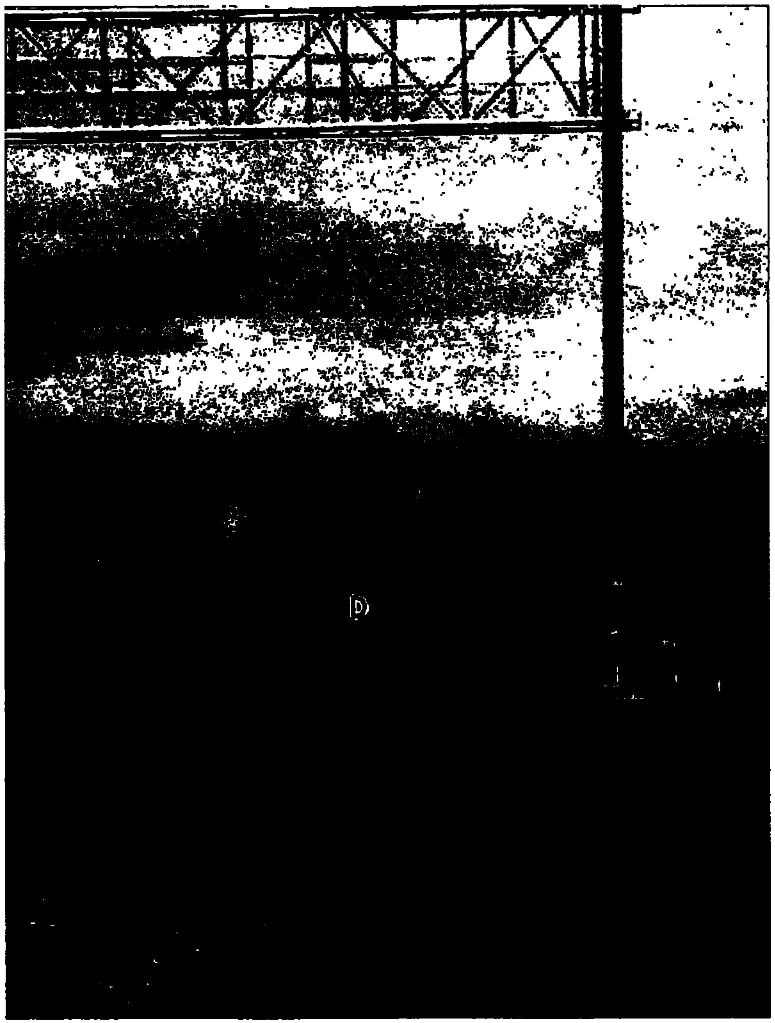
BNSF RAILWAY

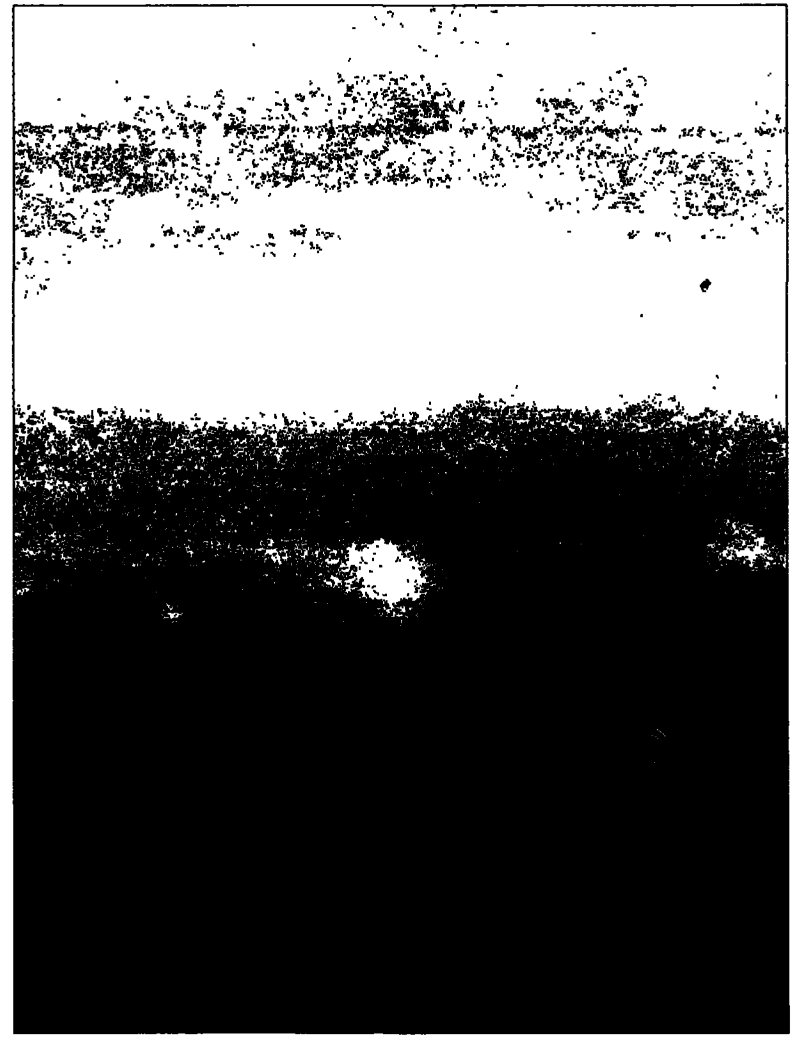
East Bill



BNSF RAILWAY

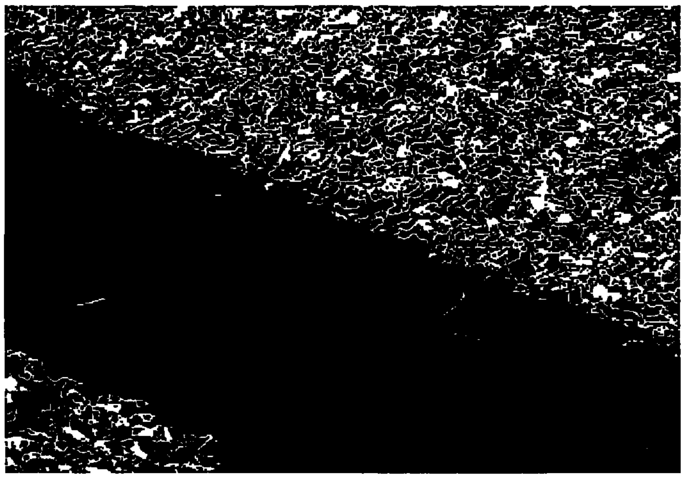
Blowing Coal MP 91





BNSF RAILWAY

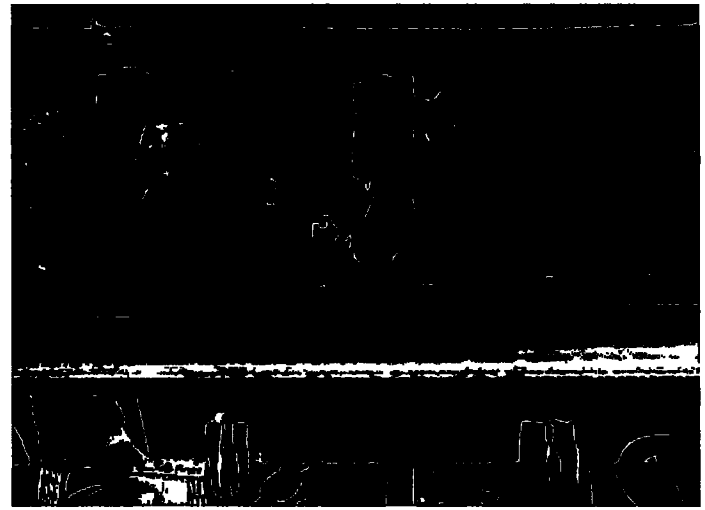
MP 95 to 98

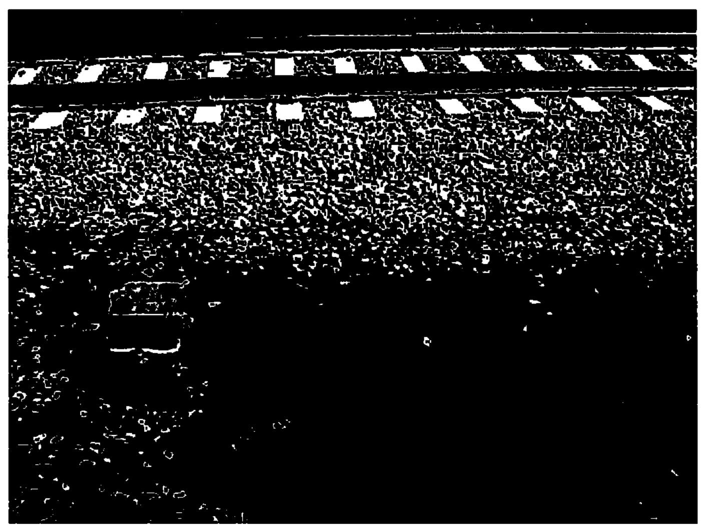


MP 95 to 98 Cont.

BNSF RAILWAY

MP 95 to 98 Cont.





BNSF RAILWAY

Smith

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Finance Docket No. 35305

PETITION OF ARKANSAS ELECTRIC COOPERATIVE FOR A DECLARATORY ORDER

REPLY VERIFIED STATEMENT OF TERRY D. SMITH

I am Terry D. Smith, General Superintendent Transportation, Central Region for BNSF Railway Company ("BNSF"). I have responsibility for railroad operations on BNSF's Central Region, which includes the Colorado, Powder River, Nebraska, and Springfield Divisions, including all of the BNSF coal routes into and out of the Powder River Basin ("PRB"). In that capacity, I am responsible for all over-the-road operations and dispatching functions in the Central Region. I have four Corridor Superintendents who report directly to me and who each supervise operations in one of the four Divisions in my Region. I have approximately 300 exempt and scheduled employees who report directly or indirectly to me.

I am submitting this verified statement in support of BNSF's reply evidence in this proceeding. I understand that many of the coal shippers who filed opening evidence in this proceeding have advocated that coal dust suppression measures are unnecessary and that BNSF should continue to perform enhanced maintenance to address fugitive coal dust. In a separate verified statement, my colleague, Mr. Sloggett, General Director Maintenance for BNSF's Powder River Division, describes how maintenance work required to address coal dust is performed and details the extensive commitment of time and resources required to perform these tasks on a more frequent basis. The purpose of my verified statement is to explain the impact that such enhanced maintenance efforts have on railroad operations. Based on my experience, performing expanded maintenance to address coal dust emissions has a significant impact on railroad operations and is not an efficient or responsible long-term solution to the coal dust problem.

I began my railroad career in 1978 as a switchman in Alliance, Nebraska for the former Burlington Northern Railroad ("BN"). I then became a railroad engineer, working various crew districts on the Powder River Division for the next 14 years. Between 1992 and 1998, I held various operating positions on the Division including trainmaster, roadforeman, and superintendent of operations. In 1998, I moved to Fort Worth, Texas to work in the BNSF Network Operations Center, holding additional supervisory operations positions with responsibility for train operations and maintenance planning. In 2003, I became General Superintendent Transportation, South Region. In 2005, I became General Superintendent Transportation, Central Region, which is the position I hold today.

I. Expanded Maintenance Due To Coal Dust Reduces BNSF's Effective Capacity

I have principal responsibility for coordinating train operations on the Powder River Division. These responsibilities include scheduling maintenance windows. A maintenance window refers to the period of time during which a section of track is taken out of service for maintenance and is unavailable to be used for train traffic. Maintenance windows are typically scheduled to perform planned maintenance tasks, such as periodic tie replacement, surfacing, ballast removal, and switch replacement, which occur at regularly scheduled intervals. We also schedule maintenance windows to perform unplanned maintenance, such as performing necessary repairs as track conditions require. For example, when track conditions become unstable, we generally require that trains moving on the track slow down substantially until the track conditions can be returned to normal. These "slow orders" remain in effect until a maintenance window can be scheduled.

In scheduling maintenance on PRB lines, our goal is to minimize the impact that maintenance has on railroad operations and keep the railroad running as efficiently as possible. This is a challenging task, since removing sections of track from service temporarily reduces the effective capacity of the railroad and impacts the normal flow of train traffic. The PRB is a high density area of railroad operations and any reduction of available capacity can lead to congestion. The challenges have become much greater as a result of increased maintenance on PRB lines that is required to deal with coal dust. As maintenance efforts have increased to address the impact that coal dust is having on our track structure, the effective capacity of the railroad in the PRB has been reduced further and we have experienced greater disruption in train operations.

Coal dust has caused us to perform a number of maintenance activities more frequently than would otherwise be required in the absence of significant coal dust accumulations. For example, excessive accumulation of coal dust has required that we increase the frequency with which we perform undercutting and rail surfacing and replace switches, ties and rail. As discussed by Mr. Sloggett, BNSF's General Director Maintenance for the Powder River Division in his reply verified statement, we perform many of these maintenance activities 2 to 3 times as frequently as we would under normal conditions. We also perform maintenance activities associated exclusively with coal dust that we would not otherwise perform, such as vacuum removal of coal dust from the track bed and switches and use of heavy equipment to remove coal dust from between tracks and on the railroad right of way. All of these activities require that we schedule additional maintenance windows beyond the windows necessary to perform normal maintenance. Approximately 80% of our currently scheduled maintenance windows are for the purpose of performing coal dust-related maintenance work. During these maintenance windows, one or more tracks must be taken out of service and are not available to move coal.

Most loaded PRB coal trains originate on the Joint Line, which is part of BNSF's Orin Subdivision, and coal dust is found in the ballast along the entire length of the Joint Line in varying quantities. But coal dust is also found in large quantities along rail lines other than the Joint Line, including lines that are quite distant from the PRB. BNSF has had to increase maintenance efforts on all line segments that comprise BNSF's major coal routes. This includes approximately 1,200 route miles (or 2,000 track miles accounting for line segments with multiple main line tracks) on the Orin, Canyon, Black Hills, Butte, Big Horn, Sand Hills, Valley, Angora, and Ravenna Subdivisions, which include portions of Colorado, Nebraska, Montana, South Dakota and Wyoming. *See* Exhibit 1. Conducting expanded maintenance to address coal dust on these lines impacts not only our coal customers, but all other customers whose freight travels over these line segments, including primarily grain and merchandise customers.

There is a limited time period each year in which to perform maintenance activities on the rail lines in and around the PRB. Maintenance activities typically begin in March or April and end in October, November or December, depending on the length and severity of the winter season. Because we have had to perform more maintenance each calendar year to address the effects of excessive coal dust, we have been forced to schedule more and more maintenance windows within a finite time period. The practical result is that we have less track time available to run trains and more interference with train operations.

An example will illustrate the impact of increased maintenance on BNSF's operations. The Sand Hills Subdivision includes rail lines leading east from Alliance, NE and handles a high volume of coal traffic. *See* Exhibit 1. We have found substantial coal dust fouling of ballast, switches and bridges along these lines and have been required to perform more extensive undercutting to address the coal dust. Approximately 4.5 months of our maintenance season on the Sand Hills Subdivision this year is devoted exclusively to undercutting. In addition to the extensive undercutting required to address coal dust fouled ballast, we must perform other required maintenance. We currently have the equivalent of 14 months of maintenance planned for this year, which obviously cannot fit into a calendar year, let alone the reduced maintenance season in which we must operate. In an effort to accommodate the necessary maintenance, we have maintenance planned on this Subdivision every day until December 25 of this year. That assumes that we will be able to work every day from now until late December. Each day that we are unable to work due to heavy rains, early winter storms, or other conditions, is a day that we will not be able to recover and make up that work.

In addition, to accommodate the high level of maintenance planned for the Sand Hills Subdivision this year and to avoid severe congestion on this line, we have taken the unusual step of re-routing trains hundreds of miles out of their normal route. The Sand Hills Subdivision handles approximately two-thirds of the coal trains operated by BNSF. We have been forced to re-route trains 300-500 miles out of route in order to meet customer demand and perform required maintenance. Trains that would normally travel from Alliance, NE, to Lincoln, NE, to Kansas City, MO, to Memphis, TN (referenced as the "primary route" in Exhibit 2) are being re-routed from Alliance, NE, to Sterling, CO, to Denver, CO, to Amarillo, TX, to Tulsa, OK, to Springfield, MO, to Memphis, TN (referenced as the "secondary route" in Exhibit 2). *See* Exhibit 2. These costly and inefficient measures are the result of the increased levels of maintenance that are needed to remedy the impact of coal dust on our track.

Even at current traffic levels, which are down due to the downturn in the economy, we are therefore seeing significant operating impacts associated with increased maintenance related to coal dust. As the economy recovers over the next few years and traffic levels return to normal and presumably grow, those operating impacts will become even more severe. As maintenance occupies increasing amounts of track time, we will simply not have enough capacity to accommodate both enhanced maintenance associated with coal dust and traffic growth, which will ultimately require that we either add capacity sooner than would otherwise be necessary or re-route additional trains over longer routes.

II. Impact of Maintenance Windows on Operations

Maintenance windows are typically scheduled in 8-hour increments, during daylight hours. While a maintenance window is in effect, no trains are allowed to travel over the portion of track on which maintenance is being performed or over any adjacent track with less than a 25-foot distance between the track centers. If maintenance is being performed on a single-track segment, train traffic will need to be stopped entirely during the maintenance window, or as discussed previously, re-routed over alternative lines. If maintenance is performed on multiple track segments, where the distance between tracks is less than 25 feet, train traffic also needs to be stopped completely over the track segment. On other multiple track segments, the trains will have to share the remaining track or tracks with oncoming traffic. With the exception of BNSF's Orin Subdivision, which includes the Joint Line and is made up entirely of quadruple and triple-track segments, all of the other Subdivisions impacted by coal dust are made up of double and single-track segments, including double-track segments with less than 25-foot track centers. As a result, every day that we have a maintenance window on these line segments we must stop traffic entirely for 8 hours or operate as if on a single-track segment, which creates a substantial bottleneck for train operations.

The impact of expanded maintenance efforts on our operations goes beyond train delays and re-routing trains. It has a significant impact on our crew and equipment costs, as illustrated by the following example of just one maintenance window on one of our Subdivisions. We are currently performing spot undercutting on an 11-mile section of track located between Alliance, NE and Lincoln, NE on the Ravenna Subdivision. In mid-March of this year, track inspectors imposed a 25-mph slow order on the line segment between McDonald and Phillips, NE, which includes single track, because of bad surface conditions related to coal dust fouled ballast. To remedy the problem, we are performing spot undercutting and surfacing on portions of this 11-mile segment. Because this was unscheduled maintenance, all production undercutters, which operate on the track, were being used elsewhere on the railroad and were unavailable. This undercutter work is being performed with an off-track undercutter, which is less efficient than a production undercutter and requires significantly more track time to accomplish the same work.

Because this maintenance is occurring over a single-track segment, the entire line segment is effectively shut down each maintenance day for eight hours. We do not have terminal capacity at either Alliance, to the west, or Lincoln, to the east, to stage trains while waiting for the track to open. Accordingly, we advance loaded coal trains from Alliance and tie them down on the mainline just short of the maintenance window. We send a bus to collect the crews from each of these trains and transport them on to their destination, Ravenna, which they cannot reach within their hours-of-service limits due to the maintenance window. We similarly advance empty coal trains from Lincoln to the maintenance window, tie them down on the mainline and shuttle their crews on to destination as well. Before the window re-opens, we shuttle fresh crews to all of these trains. As a result of re-crewing all of these trains, we end up with too many crews at away from home terminals and then have to shuttle the crews back to their home terminals to have sufficient crews for additional traffic. On any given day that such maintenance is being performed, we have approximately 10-15 trains staged on the main line, with locomotives sitting idle, waiting for the track to re-open.

During the maintenance season (approximately 8-9 months of the year), it has now become common to have one or more maintenance windows on each of the affected Subdivisions every day. This increased level of maintenance is a direct result of having to address coal dust. It is also common to have 10-15 trains per day stopped on the main line track at the edges of the maintenance window waiting to proceed. This amounts to a significant number of re-crews and idle equipment time, thus increasing our overall costs of providing service. The increased maintenance is highly inefficient and it increases train cycle times and reduces capacity.

III. Impact of Slow Orders on Operations

Slow orders associated with coal dust fouled ballast or unstable track conditions also impact our operations. Based on my experience, I estimate that coal dust accumulation contributes to approximately 80 percent of the slow orders imposed on the Powder River Division. When track conditions warrant, we impose slow orders reducing maximum train speed to 25 mph or even 10 mph until necessary repairs can be made to allow trains to operate at normal track speed, which typically is 50 mph for a loaded coal train and 60 mph for an empty. While we try to make necessary repairs and lift slow orders as quickly as possible, slow orders may need to remain in place for days or weeks until we are able to schedule a maintenance window to remedy the affected area. If maintenance is already planned or in progress at nearby locations, we may not be able to perform the necessary maintenance on the slow order areas at the same time without causing severe congestion, or we may not have an available maintenance crew and equipment to perform the necessary maintenance on the slow order areas because they are already engaged in other work. As a result, slow orders in areas where significant planned maintenance is being carried out must be kept in place longer than we would like. Slow orders are frequently in place for a month or even several months as a result of the extensive maintenance being done to address coal dust. In contrast, under normal operating conditions, we generally would have the ability to send a crew to a location to perform spot undercutting and lift a slow order within a week or two.

Because slow orders cause trains to travel more slowly over affected track sections, they impact train velocity, which in turn impacts BNSF crews and equipment. When we have numerous slow orders on a line segment awaiting repairs, our crews cannot make their normal runs within hours-of-service limits. Under these circumstances, we identify yards or sidings short of the normal crew change point where expiring crews can park their trains and we provide a shuttle to carry relief crews to the trains and expiring crews to their destination. Similarly, when trains take longer to complete a cycle because of slow orders, more train sets and locomotives are required to deliver the same amount of coal in a given time period.

The spot undercutting work currently being performed on the Ravenna Subdivision illustrates the extended period of time during which many slow orders remain in effect. Because this maintenance work is occurring over a single-track segment and in order to allow time for train operations to recover from the track shutdown, we cannot schedule back-to-back maintenance days on this single-track segment. Accordingly, we have scheduled approximately 15 days of maintenance windows over the course of approximately 6 weeks. With just one to two maintenance windows per week, train operations have sufficient time to recover from the shutdown, and we are able to schedule other necessary maintenance windows on other parts of the Subdivision. However, because of the length of time required to complete maintenance work on this single-track section, the 25-mph slow order for this line segment will remain in place for a total of approximately 2.5 to 3 months.

I declare under penalty of perjury that the foregoing is true and correct. Further, I certify that I am qualified and authorized to file this Verified Statement.

Executed on April 29 2010

Terry D Smith

Terry D. Smith

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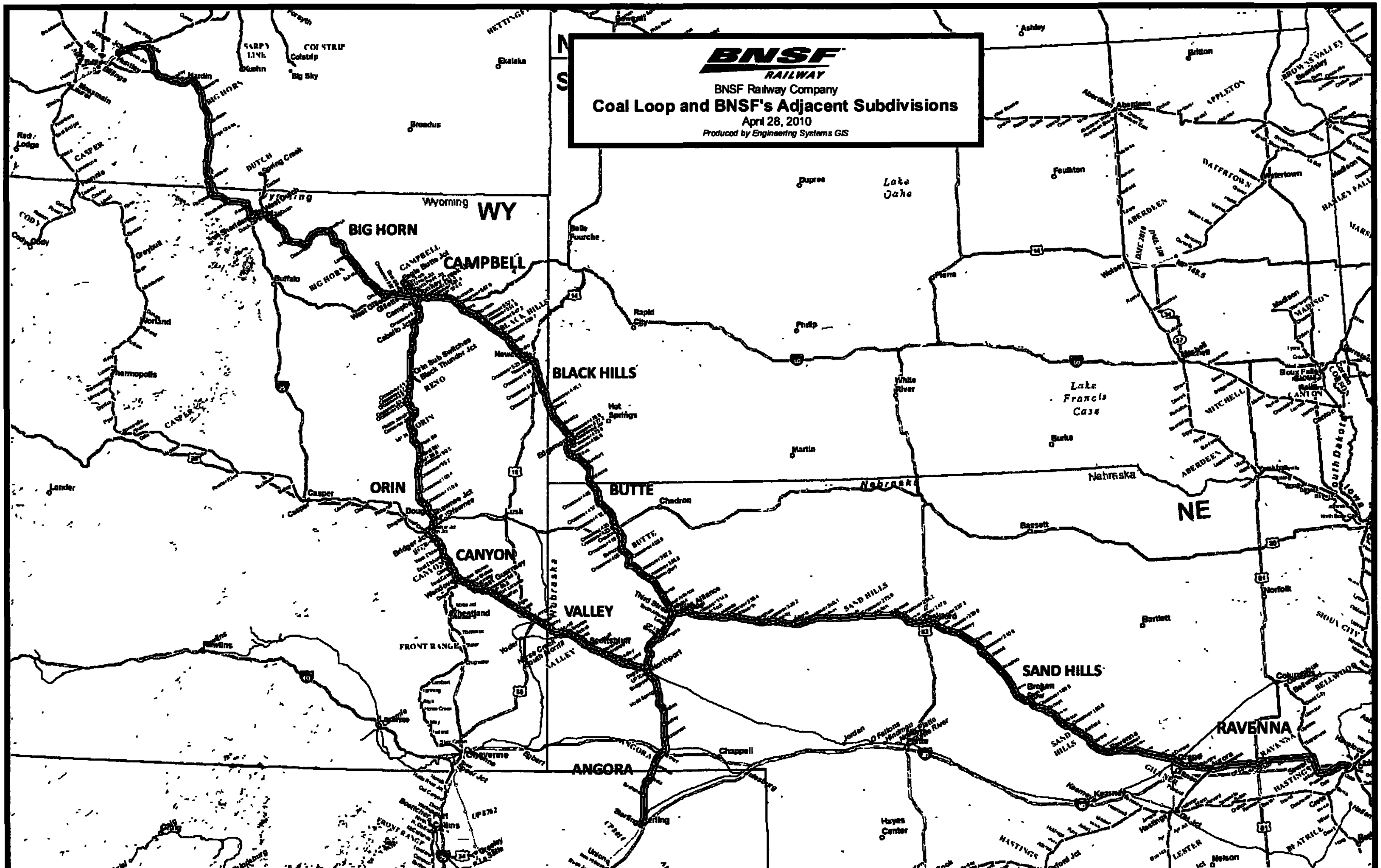
BNSF RAILWAY
BNSF Railway Company
Coal Loop and BNSF's Adjacent Subdivisions
April 28, 2010
Produced by Engineering Systems GIS
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NE
BIG HORN
CAMPBELL
BLACK HILLS
ORIN
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CANYON
VALLEY
SAND HILLS
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FRONT RANGE
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Nebraska
Broadus
Ekalaka
Buffalo
Casper
Lander
Rawlins
Thermopolis
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Rapid City
Hot Springs
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Aberdeen
Watertown
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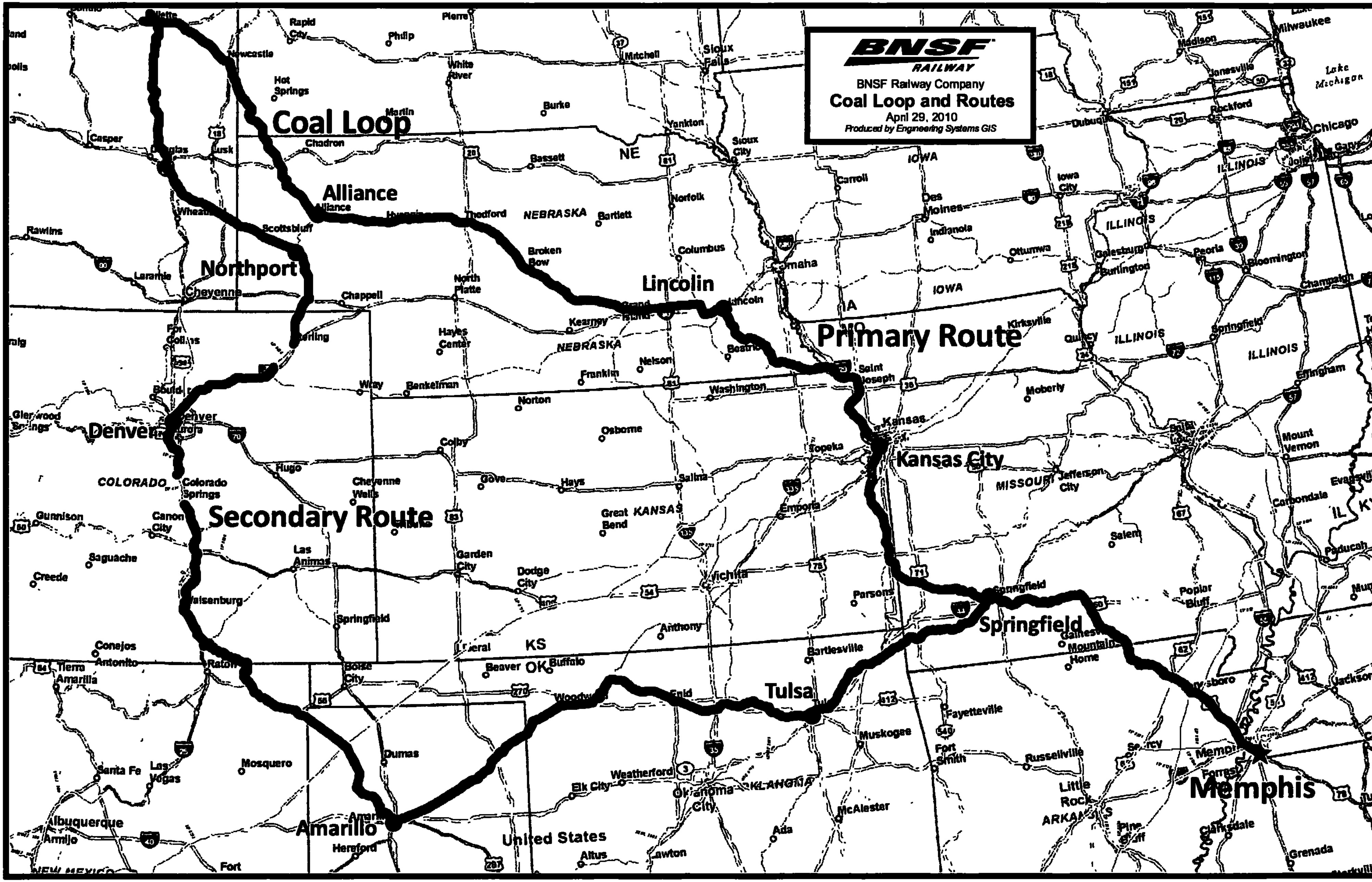

BNSF RAILWAY
BNSF Railway Company
Coal Loop and Routes
April 29, 2010
Produced by Engineering Systems GIS
Coal Loop
Alliance
Northport
Lincoln
Primary Route
Kansas City
Springfield
Tulsa
Memphis
Denver
Secondary Route
Amarillo

Sultana

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Finance Docket No. 35305

PETITION OF ARKANSAS ELECTRIC COOPERATIVE
FOR A DECLARATORY ORDER

REPLY VERIFIED STATEMENT OF CHARLES SULTANA

My name is Charles Sultana. I submitted a verified statement in support of BNSF Railway Company's ("BNSF") Opening Evidence in this proceeding. As I explained in my opening verified statement, I am a Six Sigma Specialist in the Mechanical Department of BNSF Railway Company ("BNSF"), and I had primary responsibility for developing the specific coal dust emissions standards that are at issue in this proceeding. In their opening evidence, Western Coal Traffic League and Concerned Captive Coal Shippers ("WCTL/CCCS") criticized the methodology I used to develop BNSF's coal dust emissions standards. In particular, a WCTL/CCCS witness, Mark Viz, criticized my use of an "Integrated Dust Value" ("IDV") benchmark for measuring coal dust emissions and my use of data from the Met One E-Samplers to develop the IDV benchmark. A second WCTL/CCCS witness, Gary Andrew, criticized the methodology that I used to develop the specific IDV values that are set out in BNSF's coal dust emissions standards. I respond to those criticisms in this reply verified statement.

I. Use of an IDV Benchmark

As explained in my opening statement, in order to measure the amount of coal dust coming off of locomotives as they travel past trackside monitors, BNSF and its consultant Simpson Weather Associates ("SWA") use an electronic monitoring device called an E-Sampler, manufactured by Met One Instruments. The E-Samplers, which are mounted on trackside monitors ("TSM"), take readings of airborne dust at five-second intervals. The E-Sampler measures dust by directing a laser beam into a sample of air particles, scattering the light from the laser beam. The light scattered by the dust is picked up by diodes that produce an electronic signal, the strength of which is directly proportional to the amount of dust in the air. The strength of the electronic signal is measured in "dust units," which is simply a relative measurement of the electronic signal produced by the E-Sampler. SWA adds up the dust units measured by the E-Sampler in each five-second reading (i.e., "integrates" the dust units) over the period of time that a train is passing the TSM. The resulting measurement is called the IDV.2 referred to in BNSF Rules Publication 6041-B. IDV.2 refers to an updated version of the IDV that includes adjustments made by SWA to remove background dust and the dust from diesel locomotives. These adjustments are straightforward, and are described by Dr. Emmitt in his opening verified statement. *See* Emmitt Op. V.S. at 9.

Dr. Viz expresses concern that "neither I nor any of my colleagues who have assisted me in this work have been able to find any citations in the open technical literature that refer to the concept of IDV (integrated dust value) or DUs (dust units)." Vis Op. V.S. at 16. This is not a valid criticism of BNSF's approach. BNSF is not engaged in academic research of coal dust monitoring approaches. BNSF developed the IDV benchmark as a practical application of coal dust monitoring technology. Our goal is to address an important commercial problem using available data and technology.

Dr. Viz's supposed concern about the lack of support for our approach in the technical or academic literature appears to be just an excuse to take no action. Dr. Viz's claim that there is no technical literature on the IDV approach to monitoring coal dust from moving coal trains would apply to any monitoring approach adopted by BNSF or any other party. As far as I know, there is no academic or technical literature on monitoring benchmarks or approaches for measuring coal dust from moving coal trains because the issue has never been studied by the academic community. Dr. Viz appears to be suggesting that nothing should be done about coal dust until the academic community involved in environmental monitoring weighs in on the issue. That suggestion is irresponsible. The coal dust problem needs to be addressed now because of the adverse impact of coal dust on rail ballast and track stability and the potential for service interruptions on rail lines that are of critical importance to the nation's energy supply chain. The question here should not be whether there are technical papers examining the use of an IDV standard to monitor coal dust emissions but whether use of an IDV standard is a reasonable element in a program to monitor the relative dust levels from passing coal trains.

The IDV benchmark is simple in concept and in application. It provides a straightforward way of determining the relative quantity of dust emissions from specific trains, and it allows BNSF to identify trains that are emitting large quantities of coal dust as they pass a trackside monitor. There is no doubt that other dust measurements could be made, other benchmarks could be developed, or other monitoring equipment could be used. But the IDV standard that BNSF and SWA have developed is a reasonable and practical approach to measuring the relative dustiness of moving trains.

II. The Variability In E-Sampler Output

Dr. Viz also raises questions about the accuracy or reliability of the E-Sampler output. His comments are focused on the fact that BNSF and SWA use the E-Samplers without a filter (or corresponding K-factor) to correlate the electronic output signal with a measurement of the total particulate mass, or weight of the dust being measured. Viz Op. V.S. at 9-11. Dr. Emmitt addresses this issue in detail in his reply verified statement. The short answer to Dr. Viz's concern is that the gravimetric filter is used only to correlate the electric signal produced by the E-Sampler laser light scatter to a specific measurement of mass, generally milligrams per cubic meter. The E-Sampler can be used, as BNSF uses it, to determine a relative measurement of dust in a sample without attempting to translate the relative dust measurement into a physical measurement of mass. For example, the E-Sampler can be used to determine that a particular sample of dust has five times as much dust as another sample. Since BNSF's objective is to reduce coal dust by a *relative* amount – 85% to 95% – the use of the E-Sampler to produce a *relative* measurement of dust is appropriate. When the E-Sampler is used to measure the relative dustiness of a particular sample, there is no need to use the filter to translate the electronic signal into a unit of mass.

Dr. Andrew's purported concerns about the E-Sampler are focused on the fact that the E-Samplers may produce different dust readings from a single dust sample. *See* Andrew Op. V.S. at 4-6. While Dr. Andrew's argument is confused by all the jargon he uses, his basic assertion is that BNSF has not established that the data produced by the E-Samplers is accurate. Dr. Andrew is confusing two basic issues: (1) the accuracy of the equipment itself, and (2) the variability of readings by accurate equipment due to environmental factors that cannot be controlled in measuring coal dust.

As to the first question, BNSF has adopted aggressive measures to ensure that the E-Samplers are operating accurately. Like any sophisticated equipment, particularly equipment used in the field, the measurement system can go out of calibration over time. To compensate for potential miscalibration, the E-Sampler self-calibrates twice per day to ensure accurate data. It performs a "self-zeroing" process where it resets the baseline value for clean air to adjust for signal drift and any possible contamination of the optical sensors. In addition, the E-Samplers are returned to Met One, the device manufacturer, every two months for calibration, cleaning, and manual maintenance. I understand that during this check-up, Met One technicians perform thorough testing and cleaning of the equipment. *See* Exhibit 1. This factory calibration is performed twelve times more often than the two-year time period recommended by the manufacturer. As a result of the aggressive calibration program that BNSF uses, there is no reason to use a "reference monitor" as Dr. Andrew suggests since there is no reason to question the accuracy of the equipment BNSF is using or the accuracy of the electronic readings made by the E-Samplers.

While Dr. Andrew frames his discussion about the E-Samplers in terms of accuracy, what he is really talking about is the fact that even accurate equipment may produce different dust level readings from a single sample of dust. In other words, a dust reading by the E-Sampler, strictly speaking, is not "repeatable." If it were possible to measure the same dust sample twice by the same E-Sampler, there is a chance that the E-Sampler (even if it were perfectly calibrated) would produce two different readings. This is a common problem in dust monitoring. Different particles of dust have different shapes and therefore scatter laser light in different ways. Since dust particles are not distributed evenly in a sample of air, two different dust readings from a calibrated monitor of the same air sample may produce two different dust level readings.

The variability of dust readings due to these uncontrollable environmental factors does not invalidate BNSF's use of E-Samplers. It simply means that the variability of dust level readings driven by uncontrollable environmental factors must be taken into account. Thus, when I began developing the IDV benchmark at issue here, one of the first things I did was to determine the degree of variability in dust level readings due to these environmental factors. As

I explained in my opening statement, I collected data on over 400 side-by-side tests of the E-Samplers, where two side-by-side E-Samplers produced dusts level readings from the same sample. I was able to use these test data to determine with a high degree of confidence the range of variability of dust readings from a single coal dust sample. The IDV benchmark I developed expressly accounts for this variability.

Variability in a measurement system does not invalidate its use in monitoring compliance with a standard. The degree of variability simply needs to be accounted for in the standard that is set. It is possible that the E-Samplers used by BNSF could not reliably distinguish between a moving train that emits 80 IDV and another train that emits 85 IDV. The environmental factors producing variability in the E-Sampler readings are too large to make such precise measurements of passing trains. But the E-Samplers are not being used for such purposes. The E-Samplers can be used to establish a maximum limit on coal dust emissions notwithstanding some variability in the readings by the equipment used to measure dust.

An example illustrates the importance of understanding the purpose for which a particular monitoring system is being used. At certain amusement park rides, children shorter than a specified height (i.e., five feet) are not allowed on the ride. The park places a measuring stick or horizontal bar at the five foot level. So long as the measuring stick is calibrated to ensure it is in fact five feet high, it is a highly effective and accurate means of keeping out anyone shorter than five feet. Clearly, the five foot measuring stick could not be used to make precise measurements of small children. For example, the measuring stick could not be used to measure the height of a child that is 3 feet tall or to determine the difference in height between a child that is 3 feet tall and a child that is 4 feet tall. But it is not being used for that purpose. It does not matter whether the child is three feet tall or four feet tall; as long as the stick is properly calibrated for five feet, it will keep children off the ride that are shorter than the measurement stick.

BNSF's objective was to identify an IDV.2 limit that would reduce coal dust emissions at Milepost 90.7 by 95%. I determined that an IDV.2 limit of 134 would reduce coal dust by that amount. To compensate for known variation in the monitoring equipment, BNSF established a more conservative standard by setting the limit at 300 IDV.2. When the variability in E-Sampler readings is taken into account, there is a high degree of certainty that a train emitting over 300 IDV.2 units is in fact exceeding an IDV.2 of 134. While the use of a 300 IDV.2 standard thus will treat more trains as compliant with emissions limits than BNSF originally wanted, it is a reasonable limit on coal dust emissions that fully accounts for the variability in the E-Samplers used to monitor moving coal trains.

III. SWA's Proposed Field Validation Procedure

A large part of Dr. Andrew's verified statement is totally irrelevant to the BNSF standards at issue. Dr. Andrew spends much of his statement criticizing a supposed field validation procedure developed by SWA that Dr. Andrew claims is flawed. *See* Andrew Op. V.S. at 7-9. Dr. Andrew's entire discussion of this issue, along with his discussion of Exhibits GMA_2, 3 and 4, is irrelevant because BNSF never implemented the field validation methods proposed by SWA.

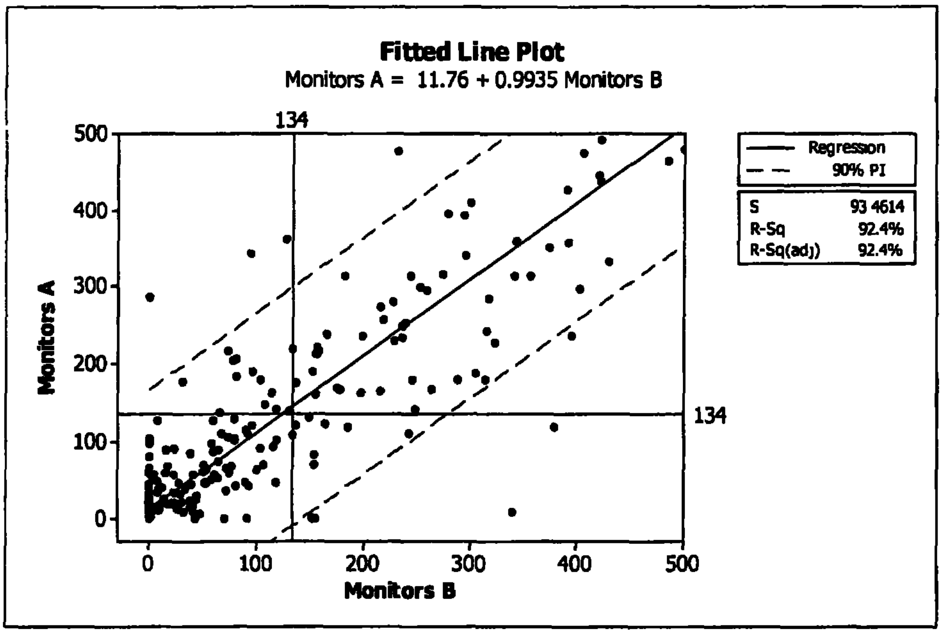
The field validation study referred to by Dr. Andrew at footnote 2 of his statement was a proposal by SWA for a program in which the E-Samplers used in the field could be monitored and maintained to ensure that they remained properly calibrated. The proposed approach would have involved a high level of field activity by BNSF personnel. Instead, BNSF decided that it made more sense to have the manufacturer recalibrate the E-Samplers on an accelerated schedule. As noted above, BNSF relies on frequent returns of the field equipment to Met One to ensure that the equipment remains properly calibrated. The fact that Dr. Andrew finds fault in the proposed validation technique is immaterial, as BNSF never adopted that approach.

The data and analysis set out in Dr. Andrew's Exhibits GMA_2, 3 and 4 do not merit a detailed response because they are based on the proposed field validation test that BNSF never adopted. Moreover, it is obvious from the data used in Dr. Andrew's exhibits that the data do not correspond to the coal dust data BNSF is using in monitoring coal trains. Not a single data point on GMA_2 is anywhere near the 300 IDV.2 threshold that BNSF has set. The extraordinarily high values in GMA_2 obviously correspond to something other than coal dust from moving coal trains. The data used by Dr. Andrew in GMA_3 are hypothetical, so they add nothing to the analysis of BNSF's coal dust standards. Further, GMA_3 supports the unremarkable, but irrelevant, claim that averages should not be averaged. Dr. Andrew's discussion of GMA_4 is largely unintelligible, but it also appears to be intended to support Dr. Andrew's irrelevant claim that "averages do not average." *See* Andrew Op. V.S. at 9.

The "average percent difference" methodology that Dr. Andrew spends three pages critiquing was not used in formulating BNSF's IDV.2 standard in any way, and it was not considered in my Six Sigma analysis. Instead, BNSF ensures the accuracy of the E-Samplers through frequent calibration of the E-Samplers by the manufacturer, and BNSF determined the range of variability of E-Samplers through extensive field and laboratory tests using side-by-side monitors. I described those tests in my opening statement.

IV. The Validity of My Regression Analysis

Dr. Andrew also criticizes my use of regression analysis to develop BNSF's IDV.2 standards. Dr. Andrew's criticisms are again misplaced. As I explained in my opening statement, I used regression analysis for the limited purpose of determining the range of variation in E-Sampler dust readings from a single source. As I noted previously, I had data from over 400 side-by-side tests of E-Samplers, where readings were made on each side-by-side monitor from a common source. I plotted the test results on a graph and used a regression analysis to create "best-fit" prediction intervals. My objective was to determine how high a reading could be expected on one monitor when the other monitor read a dust level of 134.



Each point on the graph represents IDV.2 values recorded on two E-Samplers placed next to each other in the tests that were conducted in the field and the laboratory. I used regression equations to draw the two outer red-dotted lines, which represent the area in which 90% of the data is expected to fall. Because five percent of the values are above the upper dotted line, I will have 95% confidence that the upper limit represented by the upper line will determine the highest reading that can be expected on Monitor A at any particular reading on Monitor B. Thus, at a reading of 134 on Monitor B, the highest expected value on Monitor A would be about 300. (See the solid vertical line.) Similarly, at a reading of 134 on Monitor A, the highest expected value on Monitor B would be about 300. (See the solid horizontal line.)

Dr. Andrew makes two criticisms of my use of regression analysis, although he does not acknowledge the limited purpose to which I put regression analysis in my calculations. First, he makes the blanket statement that a regression analysis cannot be carried out if there are any "measurement errors" at all in the underlying data. Andrew Op. V.S. at 10. This is not true, as the error term built into the basic regression equation can include measurement error. Indeed, nearly all measurements have some error, either between devices or operators.[1]

Once again, Dr. Andrew is confusing the accuracy of the E-Sampler with the inherent variability in the E-Sampler readings of a dust sample due to environmental factors. If the E-Samplers were not properly calibrated by the manufacturer (e.g., if a light-reading diode was loose, producing erratic readings), then his concern about measurement error might have some validity. But as explained in detail above, BNSF ensures the accuracy of the E-Samplers through frequent calibration by the manufacturer. It is true that there is variability in E-Sampler dust readings, but regression analysis is used to determine the relationship between variables, so the fact that the relationship varies obviously does not prevent the use of a regression analysis.

Dr. Andrew's second criticism is that I supposedly failed to make sure that the range of variability is relatively constant over the entire data set. I note that Dr. Andrew's criticism here is inconsistent with his first point that any variation in the measurements would invalidate the use of a regression analysis. Dr. Andrew's second point acknowledges that variation is acceptable, but that variation must be relatively constant over the data set. Dr. Andrew's assertion that variability should be relatively constant across the data is correct, but he ignores the fact that there are methods to determine whether the variability is sufficiently constant. Instead of using accepted and commercially available programs to determine whether variability

[1] *See* William Mendenhall, et al., *Mathematical Statistics with Applications*, 442 (3d ed. 1986); Irwin Miller, et al., *Probability and Statistics for Engineers*, 290 (2d ed. 1977).

is sufficiently constant, he uses a statistically invalid "eyeball" approach, which is set out in his exhibit GMA_5.

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[2] The data for GMA-5 is found in a Microsoft Excel file "Threshold Performance Standard 071001gma.xls." This file was not included in WCTL/CCCS' opening workpapers, but it is included on the CD in Appendix B to BNSF's Counsel's Reply Argument and Summary of Evidence. The CD in Appendix B also contains a copy of all documents referred to herein that contain a document reference number.

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Apart from being extremely convoluted, there are several errors in Dr. Andrew's approach:

1. Calculating the standard deviation of the current and all prior values (i.e., the "cumulative" standard deviation) is misleading and inappropriate. Each sample (row) should be measured on its own, while the StdError column is measuring cumulative variance across the entire measured range.
2. Dr. Andrew's use of the term "Standard Error" is not correct. What Dr. Andrew calls "Standard Error" is actually a cumulative standard deviation. As I demonstrate below, standard error is calculated from the standard deviation divided by the square root of the number of values to measure a single sample. Dr. Andrew instead combines the values of unrelated samples. His reference on

the graph to the term "Standard Error" while actually calculating cumulative standard deviation with all prior terms is inappropriate and misleading.

3. The standard error should have been calculated and graphed for each sample (row). {{

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[3] Standard error = Standard Deviation between both values divided by square root of the number of values, or σ / SQRT(n).

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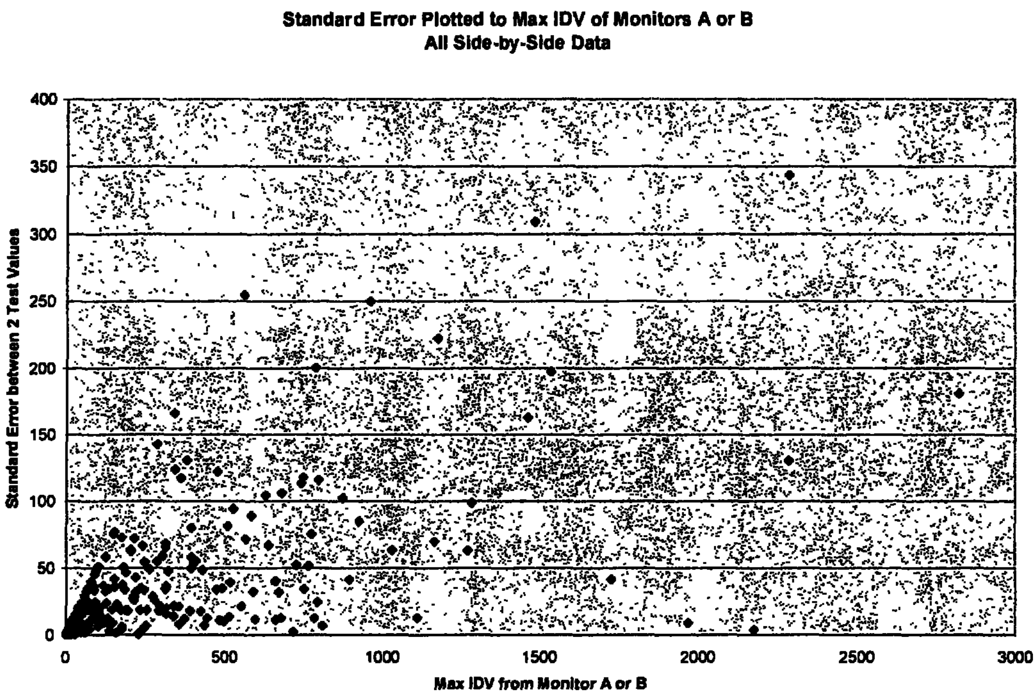
Additionally, GMA-5 appears to use only lab data and does not include the side-by-side monitor data developed in field tests. The following graph demonstrates the standard error, calculated correctly, for *all* data points in the side-by-side results:



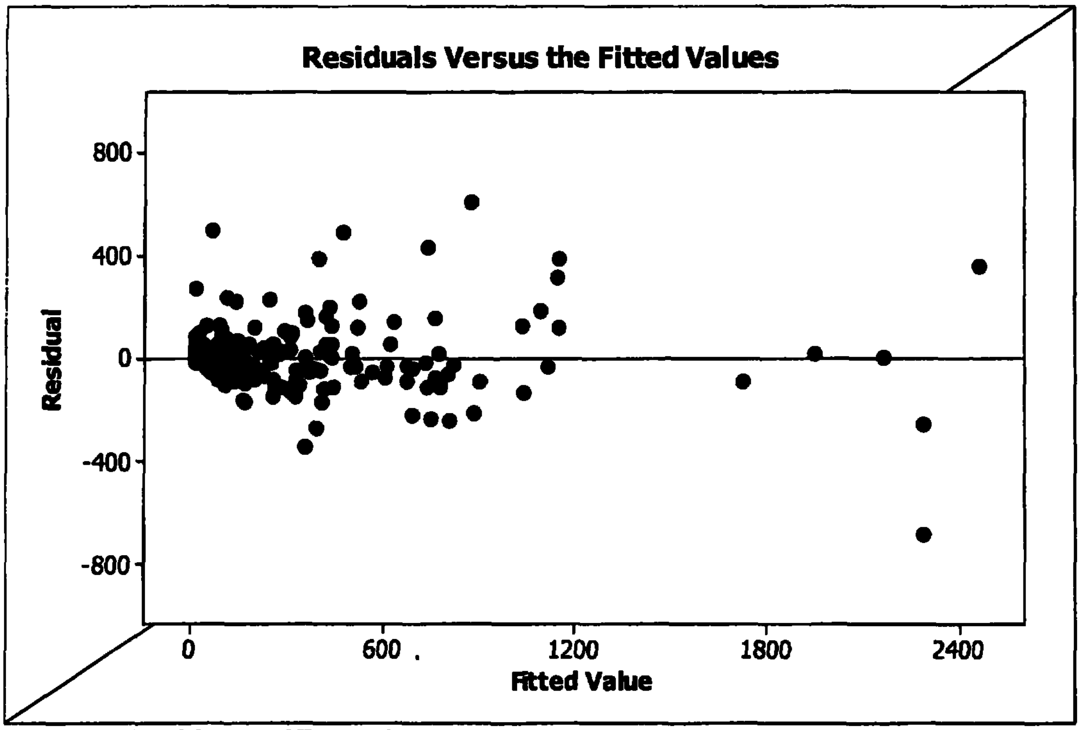
As can be seen, the linear relationship described by Dr. Andrew between maximum IDV.2 and increasing standard error is not observed when all data points are plotted and the standard error is correctly calculated. There are very high IDV.2 readings on this graph that correspond to relatively low standard errors.

When I originally performed my analysis of the side-by-side monitor data, I used a recognized Minitab method to make sure that the variability of the side-by-side readings was within an acceptable range. I checked for constant variation using Minitab statistical software with a Residuals versus Fits graph and found no unusual patterns. Minitab recommends checking for the following non-random behavior that may indicate non-constant variation: "a series of increasing or decreasing points, a predominance of positive . . . or negative residuals, [and] patterns, such as increasing residuals with increasing fits."[4] These indicators were not found with this data. The analysis I conducted is set out below:

1. Minitab documentation states that one indicator is "a series of increasing or decreasing points." Examining the data does not reveal the data moving in noticeable up and down patterns.
2. Minitab states that another indicator is "a predominance of positive residuals, or a predominance of negative residuals." This is resolved by examining the number of points above and below the line at the 0 y-axis. There appears to be a similar number above and below the line.
3. Minitab identifies as a third indicator, "patterns, such as increasing residuals with increasing fits." The values of the residuals do not show a pattern of clearly increasing values as the fitted values increase (i.e., there are high and low residual values at low and high fitted values). The 1 value at about -7.5 residual and 2,250 fitted value is only 1 sample and could be considered an outlier with unknown cause.

The following diagram reflects the Minitab analysis I conducted.

[4] Minitab Help Files, Residual Plot Choices and Checking Your Model. Release No. 14.1, Minitab, Inc, (2003).



Source: BNSF_COALDUST_0081615.

V. Outside Review of the IDV.2 Approach

Finally, Dr. Andrew raises questions about the outside review I obtained of the methodology used to develop the IDV.2 standards at issue in this proceeding. As I indicated in my opening statement, I sought an outside review from two companies, Six Sigma Qualtec, and Smarter Solutions. As I explained, Qualtec raised questions about the underlying data that reflected a lack of familiarity with the instruments used to monitor dust. Smarter Solutions, which had direct experience with the type of optical monitoring equipment BNSF uses to monitor dust levels, agreed with BNSF's approach and concluded that BNSF had taken an overly conservative view of the appropriate limit. As I explained in my opening verified statement, Smarter Solutions recommended that BNSF use an IDV.2 limit of 231.4 instead of 300. BNSF chose to keep the more conservative 300 level for use in its operating rules.

Dr. Andrew makes a number of misrepresentations regarding BNSF's efforts to ensure that the IDV.2 standards were reasonable. {{

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[5] *See*

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I declare under penalty of perjury that the foregoing is true and correct. Further, I certify that I am qualified and authorized to file this Verified Statement.

Executed on April 21, 2010

Charles Sultana

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THIS EXHIBIT IS A HIGHLY CONFIDENTIAL DOCUMENT

Emmitt

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Finance Docket No. 35305

PETITION OF ARKANSAS ELECTRIC COOPERATIVE
FOR A DECLARATORY ORDER

REPLY VERIFIED STATEMENT OF G. DAVID EMMITT

My name is G. David Emmitt. I am the President and Senior Scientist of Simpson Weather Associates ("SWA"). I submitted a verified statement on behalf of BNSF Railway Company ("BNSF") in BNSF's opening evidence in this proceeding. As I explained in that verified statement, SWA is a scientific consulting firm, focusing on applied solutions to complex environmental issues. Sincc 2005, SWA has worked closely with BNSF to create a monitoring system and performance standard for coal dust escaping from rail cars in the Powder River Basin ("PRB"). The purpose of this statement is to reply to questions raised by other parties in their opening evidence about the reliability of the methods that SWA and BNSF have adopted to measure coal dust emissions from moving coal trains and to monitor compliance with standards set by BNSF that limit coal dust emissions. I respond principally to the questions and comments of Western Coal Traffic League and Concerned Captive Coal Shippers ("WCTL/CCCS") and the verified statement of Mark J. Viz in support of WCTL/CCCS' evidence. Issues raised by other commenting shippers about BNSF's monitoring approach largely overlap with the issues raised by WCTL/CCCS.

My opening verified statement describes in detail the data collection and analysis that SWA has done for BNSF to develop a reliable coal dust monitoring approach for coal trains operating on the Joint Line and BNSF's Black Hills Subdivision. I do not repeat that discussion here. In short, BNSF's coal dust standards are based on extensive data that SWA has collected and analyzed over the five year period during which SWA has been retained by BNSF to assist in addressing the coal dust problem in the Powder River Basin ("PRB").

Among other projects, SWA helped BNSF establish a network of TrackSide Monitors ("TSM") along the railroad right-of-way to measure coal dust emissions from passing trains. *See* Exhibit 1. A TSM consists of a weather station and an electronic dust monitor mounted on a tower approximately 60 feet from the side of the track. The weather system provides meteorological data such as wind speed and direction, precipitation, temperature, and relative humidity. The dust monitor is a state-of-the-art device, called an E-Sampler, that takes readings of dust levels present during the passage of a train by the TSM. *See* Exhibit 2. The dust levels are recorded in relative units of dustiness, which SWA refers to as "dust units," and the dust units are integrated over the time period during which the train passes the TSM. Adjustments are made to the integrated dust units to eliminate background dust and dust from the diesel locomotives on each train, to produce a signature Integrated Dust Value, version two ("IDV.2") for each train, which indicates the relative dustiness of the train compared to other trains passing the TSM. *See* Exhibit 3.

The shippers try to make this approach appear to be complicated and uncertain, but the approach is quite straightforward, and the equipment used, while not perfect, is well suited to the task of monitoring the relative dustiness of particular coal trains. I address specific comments and questions raised by the shippers below.

I. The Coal Dust Measured By The TSMs Is A Strong Covariate Of The Coal Being Deposited in the Ballast.

WCTL/CCCS make the unremarkable observation that the dust actually measured by the E-Sampler mounted on the TSM is not the same dust that falls directly onto the ballast. The TSM towers are located 60 feet from the track and the E-Samplers are mounted at the approximate height of the sill of a moving coal car. It is clear that the dust measured by the E-Sampler is dust that has been blown a considerable distance from the track itself. But this obvious point is not a valid criticism of BNSF/SWA's monitoring program because the coal dust measured by the E-Samplers is a strong covariate with the coal dust falling directly onto the tracks. Use of a covariate is a common measurement technique when it is difficult for practical reasons to make direct measurements. Smoke detectors are used in fire alarms because smoke is a covariate of fire and it is easier to detect smoke than fire.

As a matter of common sense, when the wind blows small dust particles 60 feet away from the track, it also blows off larger particles. These larger particles do not remain airborne for long, but instead fall onto the right of way and get deposited directly into the ballast. Indeed, in a report prepared by Dr. Viz' firm, Exponent Engineering, for NCTA, it was recognized that {

[1]} Thus, by monitoring

[1] Exponent, Inc., Railcar Coal Loss and Suppressant Effectiveness Study: Final Report to the National Coal Transportation Association 219 (Aug. 3, 2009), AFS0007686 (Contained on CD in Appendix B to BNSF's Counsel's Reply Argument and Summary of Evidence).

All documents referred to herein that contain a document reference number were produced in discovery and copies are contained on the CD that is included in Appendix B to the Counsel's Reply Argument. In addition, confidential materials are designated by a single bracket -- "{" -- and Highly Confidential materials are designated with double brackets -- "{{".

coal dust at the TSMs, we observe a strong covariate of coal deposition in the ballast. It would be ideal to measure coal emissions from instruments embedded into the surface of the ballast itself, but such a system is simply not practical. The electronic equipment necessary to monitor train-specific coal dust emissions would not hold up under the stresses that would exist on or directly adjacent to the tracks, and would be subject to frequent damage by track maintenance. In addition, such an approach would also raise safety concerns for railroad workers by placing the equipment too close to moving trains and within the area in which maintenance workers perform their duties.

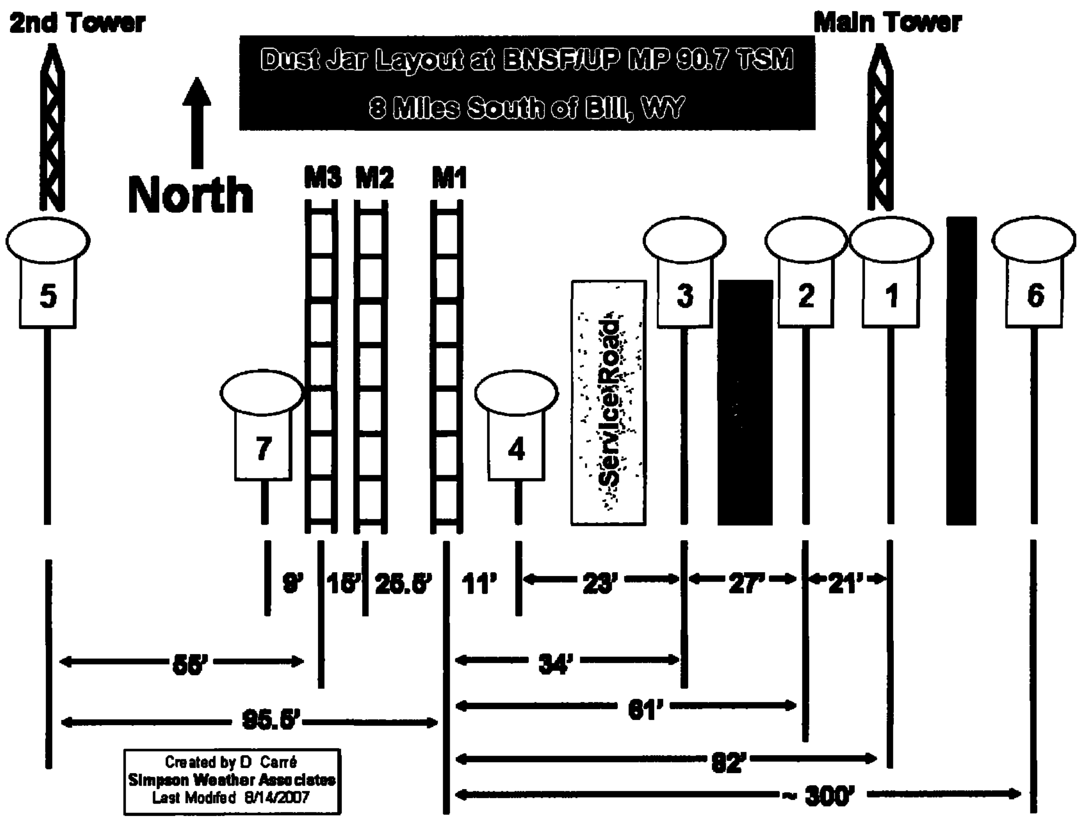
It would be an interesting academic exercise to correlate the specific amount of coal dust measured at a TSM with the specific amount of coal dust dropping directly onto the tracks or shoulders of the track structure. But such a study, which would be difficult for practical reasons to carry out, is not necessary to know that there is a direct relationship between the coal in the air measured by the TSM and the coal that finds its way directly into the ballast. Since the finest (smallest) particles of coal are the first to leave the surface of the coal, the monitoring of the fines by the E-Sampler serves as a low threshold detection of the processes that loft, advect and deposit larger particles directly into the right-of-way ("ROW"). If shippers take action to curtail coal dust emissions that can be read by the E-Samplers, those actions will have a direct effect on the amount of coal dust that drops directly onto the ballast. To insist on quantifying the relationship between the dust in the air measured by the E-Sampler and the dust falling directly onto the ballast, as WCTL/CCCS appear to believe is required, is a barely disguised excuse for putting off taking any action to remedy coal dust emissions.

II. The Evidence Shows That the Coal in the Ballast Comes Predominantly From Coal Blown Off the Tops of Loaded Cars.

WCTL/CCCS' claim that the E-Samplers are not measuring the coal that is dropping onto the ballast raises another obvious question: Where is that coal coming from if it is not being blown off of the top of the loaded coal car? Indeed, Dr. Viz explicitly questions "whether the coal that may be in the ballast uniquely or even primarily comes from loaded railcars in transit." Viz Op. V.S. at 6. The only possible source of coal in the ballast other than from the top of moving cars is that it falls directly out of the bottom of cars that are designed with bottom-dump doors that release coal at the destination directly out of the bottom of a car.

It is appropriate to raise this question, as coal released out of the bottom of a poorly maintained bottom-dump car could contribute to ballast fouling. But BNSF did ask this question at the very beginning of our work with BNSF and BNSF took direct efforts to measure the amount of coal lost from bottom-dump cars. SWA was involved in the tests carried out on bottom dump cars, although another consultant of BNSF, Conestoga-Rovers Associates, actually handled the tests. When BNSF determined from these tests that non-negligible amounts of coal dust came out of the bottom of some bottom-dump cars, BNSF undertook new maintenance procedures to ensure proper closure of the bottom-dump car doors on BNSF's car fleet. While some coal could still be coming out the bottom of these cars, which are only a minority of the car fleet, there is no reason to believe that these cars now contribute significantly to the coal dust in the ballast. This is confirmed by visual observations. Large volumes of coal clearly blow off of the top of moving cars while I do not recall ever seeing coal dust escaping from the bottom of moving cars.

The relative insignificance of coal escaping from bottom-dump cars is also confirmed by the dustfall collectors that BNSF and SWA have set up at numerous locations along the PRB lines. As I noted in my opening verified statement, dustfall collectors are set up at different distances from the track.



The dustfall collectors show large coal deposits in collectors near the tracks and decreasing, but significant, deposits as the distance from the tracks increase. These data support two conclusions. (1) When there is coal dust that has been blown far away from the track (and collected in the more distant dustfall collectors), there is also coal dust that has fallen much closer to the tracks (and collected in the closer dustfall collectors). This observation supports our use of E-Sampler data as a covariate for coal deposited more directly onto the ballast, as discussed above. Coal dust does not appear far away from the tracks without coal also appearing (in greater volumes) right next to the tracks. (2) The fact that coal is deposited in dustfall collectors extending several feet from the tracks also demonstrates that the coal is not coming from the bottom of bottom-dump cars. Coal escaping from the bottom-dump doors would be deposited directly between the tracks and would not be found in dustfall collectors as many as 80 to 100 feet away from the tracks. The coal found in the dustfall collectors must be attributable to coal being blown off of the top of loaded cars.

It might still be possible that a small fraction of the coal in the dustfall collectors originally escaped from bottom-dump cars but got kicked up by passing trains and subsequently was deposited in the dustfall collectors. BNSF monitors all trains passing Milepost 90.7, including empty trains heading back to the mines to be loaded. If coal dust was being generated in substantial quantities by trains kicking up dust that was deposited from bottom-dump cars, then coal dust readings would not be very different for empty and loaded trains. Both types of trains would kick up the dust. Indeed, the faster speeds of empty trains suggest that they might kick up even more dust than loaded trains. But the E-Sampler readings of the empty trains are an order of magnitude lower than the readings of loaded trains. The 90th percentile IDV.2 of loaded coal trains passing the MP 90.7 TSM during 2008 is 376 Integrated Dust Units (i.e., 90% are below 376 Integrated Dust Units), while the 90th percentile of empty trains during the same time period is 15 Integrated Dust Units. *See* Exhibit 4. It is clear that the coal being measured by the E-Sampler and the coal being deposited in the dustfall collectors is coal that is being blown off of the top of loaded coal cars.

The Australians have been concerned about coal dust for several years and they also have concluded that the vast preponderance of coal lost from moving coal cars comes from coal that is blown off of the top of loaded cars.[2] The engineering consulting firm Aurecon Hatch conducted

[2] In Colombia, coal dust losses from the top of moving cars was also determined to be a problem that needed to be addressed. The Colombians have used a roller/compressor to produce a flat coal surface that substantially reduces coal dust losses. Exhibit 5.

a study of coal losses for Queensland Rail in Australia and concluded that the vast majority of coal lost from moving coal cars comes from the tops of coal cars.[3]

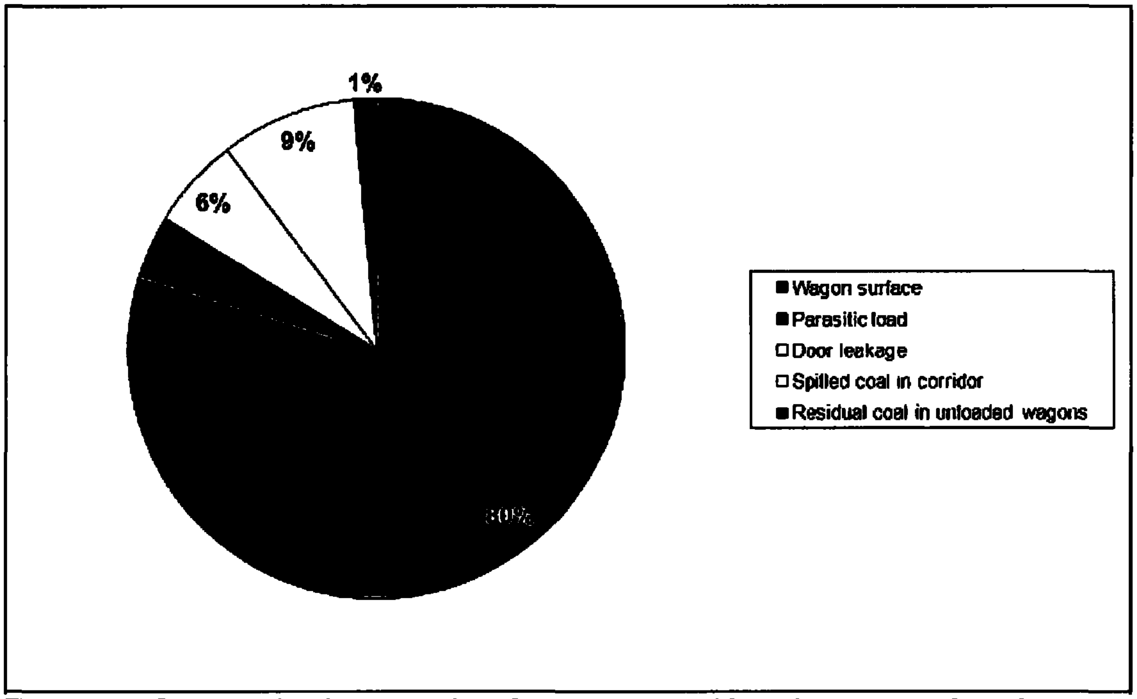


Figure 6.1 Pie chart showing proportion of coal dust emitted from the wagon surface, door leakage, spilled coal in the corridor, parasitic load and residual coal in unloaded wagons

Indeed, recognizing the extent of the problem, Queensland Rail, which manages Australia's largest coal rail network, has installed a series of track side monitoring and weather stations that are similar to the Trackside Monitors BNSF has installed in the PRB. *See* Exhibit 6. Much like the TSMs in use in the Powder River Basin, these dust monitors "measure the opacity of the air across the top of moving coal trains as they pass the monitoring stations."[4] The data will lead to "establishing an acceptable standard of particle levels with a targeted mitigation

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[3] Piechart from Connell Hatch, *Final Report: Environmental Evaluation of Fugitive Coal Dust Emissions from Coal Trains* (March 31, 2008), *available at* http://www.qrnetwork.com.au/Libraries/Coal_Loss_Management_Project/Coal_Loss_Management_Project_Environmental_Evaluation.sflb (last accessed April 21, 2010).

[4] QR Network, *Coal Dust Management Plan*, at 18 (Feb. 22, 2010), *available at* http://www.qrnetwork.com.au/Libraries/Coal_Loss_Management_Project/Coal_Dust_Management_Plan.sflb (last accessed April 26, 2010).

response to dusty coal."[5] Queensland Rail's engineering consultants conducted lab tests of surfactant products on ten different coal types. The results showed "a very high reduction in dust lift-off was achieved by the application of the surface veneer treatment for all ten coal types."[6]

SWA and BNSF also carried out several studies and concluded that while it is difficult to measure with precision the exact amount of coal lost from the surface of a moving coal car, it is clear that very large amounts of coal are lost from the top of loaded cars in transit. We used a scanning laser, Coal Car Load Profiling System ("CCLPS"), to estimate the amount of coal lost from the tops of railcars. *See* Exhibit 7. CCLPS uses a laser to scan the loaded coal in individual coal cars to determine the surface profile (height) of coal in the car. The scanning laser is suspended above the tracks, and completes 720 scans per second with an effective range resolution of 0.1 inch. At normal track speeds, more than 10,000 measurements are obtained from each car. Our methodology involved measuring the load profile of coal in individual cars at a location near the mine and somewhere farther down the track. Any decrease seen in the average height of the coal could be attributable primarily to either coal lost during the trip from the top of the car or coal settling that occurs during the movement of the train from the origin to destination. If coal settling and redistribution within the car can be taken into account, then the loss of coal from the top of the car can be estimated. We used an approach based on changes in volume (height change x surface area of car load) because direct weight measurements would be confounded by elements of the addition of moisture (rain) or loss of moisture (evaporation) and the fact that the "weigh in motion" scales commonly used are too inaccurate to confidently

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[5] *Id.*

[6] *Id.* at 21.

measure coal losses. The difference in weight between treated and untreated cars would be within the scale's margin of error

To take settling of coal into account, we measured cars that had been treated with surfactants and cars that had not been treated. The loss in the height of coal in cars that had been treated with surfactants is primarily attributable to the settling of coal during the trip. Therefore, the treated cars could be used as a control or benchmark with which to compare the height loss on untreated cars.

Estimated Losses (lbs)*

Trip Segment	Settling of treated loads (ft)	NT-T Heights (ft)	Material Lost (lbs)
Mine to Alliance	.09	.017	382 (± 250)
Alliance to [redacted]	.12	.006	135 (± 250)
Total	.21	.023	517 (± 250)

*Notes: 1. Assumed that treated cars experienced no loss and both treated and untreated loads settled same amount.
2. NT = not treated; T = Treated
3. Inside car dimension = 10 x 45 feet
4. Density of coal = 50lbs/cuft
5 RMSE = ~ 250 lbs

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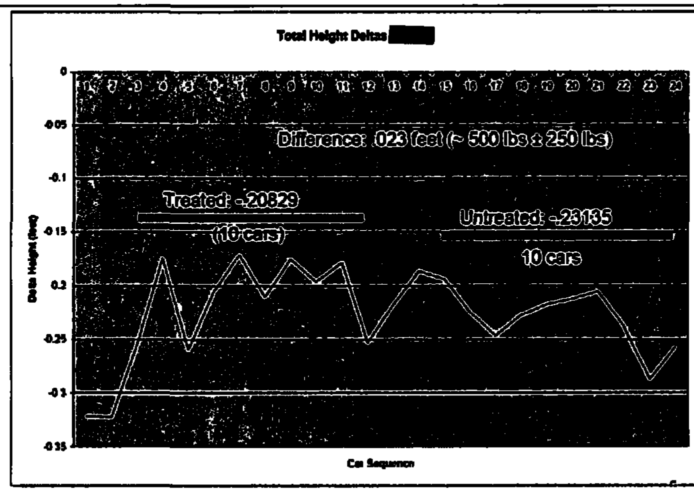


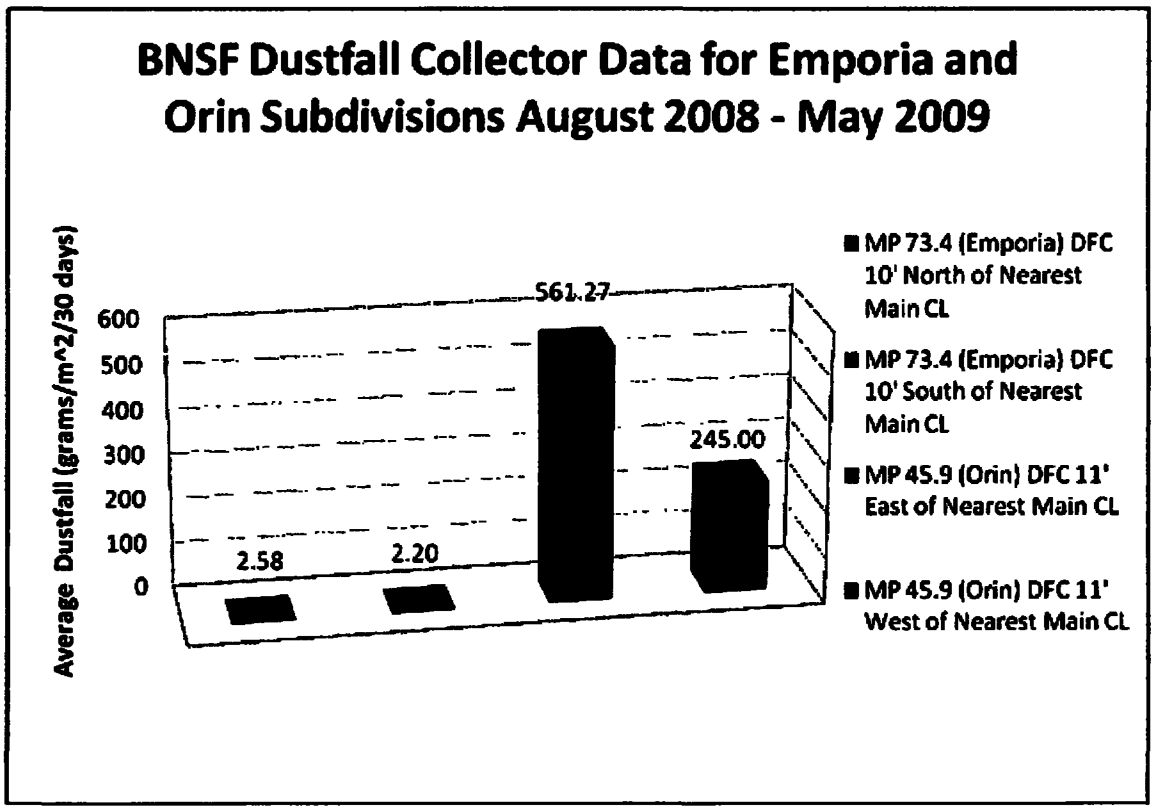
By averaging ten treated and ten untreated cars, we determined that the difference in height in untreated cars after accounting for the effect of settlement of coal was approximately 0.25 inches (0.25 inches corresponds to .023 feet). We assumed the density of coal to be 50 pounds per cubic feet. Using the change in height associated with material loss we could therefore convert the height change into a weight change of about 500 pounds. Based on the data variability, we estimate that there is uncertainty of approximately 250 pounds, plus or minus, for any one car's analysis.

The coal loss estimates produced by these tests are not precise. But they do make it clear that coal losses from the top of loaded coal cars are substantial. The laser imaging clearly reveals redistribution of coal within the cars and the reshaping (self grooming) of the load profiles, both form changes that serve as indicators of a stressed surface from which dust emissions are clearly likely. Indeed, from my personal observation of coal dust blowing off of loaded coal cars, including more than 20 trips in a caboose behind loaded coal trains, it is not difficult at all to believe that ¼ inch of coal could be lost, on average (or 500 pounds) from loaded cars over the course of an average train trip from a PRB mine to a utility power plant. A frequent observation on those caboose trips was the "waterfall" of particles over the rear sill of the coal car, injecting coal particles directly into the ballast. The high degree of erosion in the loaded coal over the course of a trip that is visually evident on some cars would suggest much larger coal losses than 500 pounds.

III. The E-Samplers Measure Coal Dust, Not Other Airborne Contaminants.

Dr. Viz also claims that there is no way of knowing whether the dust recorded by the E-Samplers is coal or some other material such as dirt, diesel soot, or even insects. Dr. Viz is wrong for several reasons. Once again, the question whether the materials recorded by the E-Sampler is coal is an obvious question that SWA set out to answer at the start of its work for BNSF. On several occasions, SWA used filters to collect the material being measured by the E-Samplers. The material on the filters was inspected by SWA, as it has done for other clients for more than 20 years, under a microscope and it was confirmed that the particles collected on the filter were over 99% coal particles.

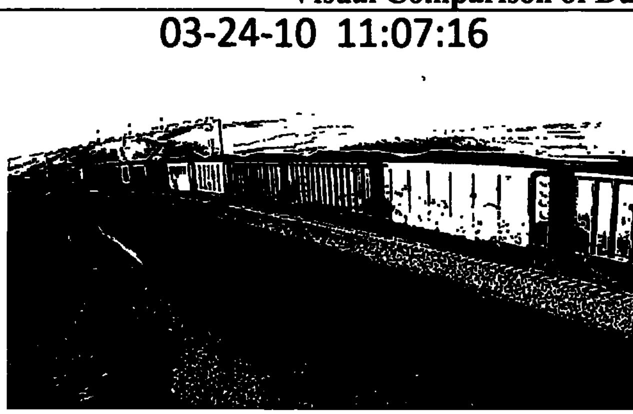
SWA also confirmed that the materials being collected in the dustfall collectors is coal. SWA analyzed the materials collected in the dustfall collectors with a microscope. Particles were identified (coal, pollen, soil, soot, etc.), counted and assigned to size bins. With the exception of a few combustion particles (possibly from the train diesels), over 90% of the material (by particle count) was identified as coal. BNSF also set up dustfall collectors on the Emporia Subdivision in Kansas, which has negligible amounts of coal traffic, to serve as a control or reference with which to compare data from the PRB. The dustfall collectors sites on the Emporia Subdivision are located at mileposts 73.4 and 73.6. The chart below shows that the volume of materials in the dustfall collectors at these control sites is very small compared to the coal route sites, further confirming that the E-Samplers on TSMs and the dustfall collectors located on the Joint Line are in fact measuring coal dust.[7]



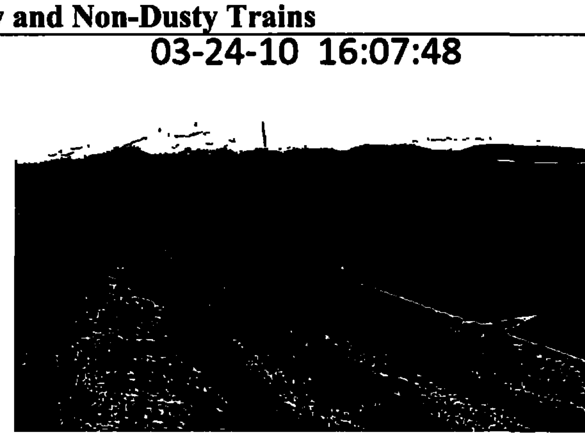
[7] Source: BNSF_COALDUST_0082798 (Contained on CD in Appendix B to BNSF's Counsel's Reply Argument).

In addition, visual evidence confirms that the E-Sampler coal dust readings correspond to coal being blown off of the top of moving coal cars. As early as 2005, BNSF collected visual evidence of highly dusting trains and showed that large dust emissions from the tops of coal cars are directly associated with high IDV readings at the TSMs. *See* Exhibit 8.[8] In response to Dr. Viz's comments in this proceeding, SWA compiled additional visual evidence that the monitors are detecting coal dust, and not some other contaminant, using a digital video camera that has been mounted on the TSM at milepost 90.7. Based on timestamps and data from the AEI readers, SWA correlated the camera footage with the IDV.2 data for passing trains. It is clear from the video images that high IDV.2 coal dust readings are associated with trains emitting large amounts of dust off the tops of cars. This chart compares a train with an IDV.2 reading of zero with one having an IDV.2 of 1017 Integrated Dust Units. A complete set of these images is contained in Exhibit 9.

Visual Comparison of Dusty and Non-Dusty Trains



IDV.2 = 0



IDV.2 = 1017

Other evidence confirms that the dust read by the E-Sampler is coal dust. As noted above, BNSF and SWA monitor both loaded and empty trains passing Milepost 90.7, and we

[8] Exhibit 8 contains a PowerPoint presentation. Double click on the still images to play the videos.

have found that very low dust levels are associated with passing empty trains. If the dust being read by the E-Sampler came from something other than coal being blown off the top of the loaded cars, then we would expect to see comparable dust readings from empty and loaded trains. For example, if the E-Samplers were reading ambient dust, the empty trains would kick up that dust in comparable quantities to loaded trains. The fact that high IDV.2 readings are associated only with loaded cars makes it clear that it is the coal from those loaded cars that is being monitored by the E-Samplers, not ambient dust.

In addition, as I explained in my opening verified statement, SWA accounts for ambient dust from the IDV.2 readings. When we produce an IDV.2 reading for a particular train, we use the 60 seconds of E-Sampler data from the TSM prior to the arrival of the train to establish the level of ambient or background dust that is not associated with a passing train. We include in the IDV.2 calculation only the dust units that exceed the average background reading plus 10 units. *See* Exhibit 3. We also do not assign any IDV.2 data to trains where there is an unusually high or erratic background dust reading.

Also as I explained in my opening verified statement, we exclude from the IDV.2 readings for individual trains the dust readings at the very beginning and end of the train's passage in order to eliminate any dust associated with the diesel locomotives on the train. We determined that spikes in the E-Sampler readings for a passing train at the very beginning and end of the train's passage indicate that dust from diesel locomotives is included in the first 30 seconds of the passing train and the last 15 seconds of the passing train. We therefore exclude all dust units from the first 30 seconds and the last 15 seconds of the passing trains from the IDV.2 calculations.

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IV. BNSF and SWA Properly Use the E-Samplers to Measure the Relative Dustiness of Individual Trains.

Dr. Viz is critical of the way BNSF and SWA use the E-Samplers. His criticism focuses on the use of the E-Samplers without the use of a filter to determine a "K factor." According to Dr. Viz, "[p]erhaps the most troubling aspect of how BNSF uses the E-Samplers at MP90.7 is that they have been used and continue to be used without the use of the 47-mm filter." Viz Op. V.S. at 9. While Dr. Viz appears to have studied the E-Sampler manual, he overlooked the reference in the manual to the fact that "[t]he E-Sampler does not need to be operated with a 47mm filter." Dr. Viz's concerns about the use of a filter stem from his failure to realize that BNSF is using the E-Sampler to make relative measurements of the dustiness of passing trains, and not to measure the specific mass of coal particles emitted from particular trains.

It is important to understand how the E-Sampler works. The E-Sampler uses a light scatter system to measure airborne particles. When a laser beam is directed into an air sample that contains dust particles, those particles scatter the light onto photo detector diodes surrounding the measurement chamber. The amount of light that is scattered off a particle depends on the particle's size, shape, and refractive index. The photo diodes convert the scattered light into an electric signal. The strength of the electric signal is proportional to the amount of dust in the air. SWA converts the strength of the electric signal into "dust units." Thus, a reading of 10 dust units simply means that the dust sample produced a voltage signal that is 10 times as large as the voltage signal for a dust sample producing 1 dust unit. When the E-Samplers' five-second readings are integrated over the time a coal train passes the E-Sampler location, the resulting IDV.2 values produce a measurement of the relative dustiness of a train.

If one wished to convert the electric voltage signal produced by the E-Sampler into a specific measurement of the mass of dust in the air sample (for example milligrams per cubic meter), one would have to use the gravimetric 47mm filter to collect dust from the air sample, weigh the dust and then translate the strength of the electric signal from the E-Sampler for the particular dust sample to the weight of the dust. The factor used to translate the strength of the electric signal to a measurement of mass is called the "K factor."

But BNSF is not trying to measure the specific amount of dust in specific units of mass concentration emitted by a passing train. BNSF is making measurements of the relative dustiness of trains, therefore BNSF is only interested in the strength of the electric signal produced by the E-Sampler, which can be measured in relative "dust units" without translating those dust units into specific measurements of mass. BNSF is able to base its monitoring program on such relative dust units, as opposed to specific units of mass concentration, because it is applying site-specific IDV.2 values. BNSF based its IDV.2 standard on data from thousands of trains passing Milepost 90.7 where the measurements were made using the same measurement protocol and measurement units. BNSF set a standard that would eliminate 85% to 95% of the dust recorded at that location based on that large database. It does not matter what units of measurement were used to set the standard so long as the units were consistent, which they were. {

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Finally, Dr. Viz expresses a concern about SWA using the {{

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V. SWA Ensures That The E-Samplers Are Properly Calibrated.

Dr. Viz also raises a number of questions about SWA's and BNSF's calibration of the E-Samplers. {{

}} For the reasons set out above, BNSF is using the E-Samplers to produce measurements of relative dustiness, not absolute amounts of dust in the air.

Dr. Viz also misunderstands the purpose for which side-by-side tests were done on the E-Samplers. BNSF conducted side-by-side tests to determine the range of variability between two E-Samplers. As noted above, the E-Samplers measure dustiness by reading the light scatter from a sample of dust. The light scatter from a particular sample of dust depends on the size, shape and distribution of dust particles in the sample. But any given sample will have varying particles and particle distribution, making it unlikely that two readings of the same air sample will produce exactly the same dust levels. This is not a problem with the design or operation of E-Samplers, but is a result of environmental factors within the air sample than cannot be controlled. BNSF used the side-by-side tests to determine the range of variability in measurements of dust from the same air sample so that BNSF could account for this variability in setting the maximum IDV.2 levels. {{

}} BNSF used the variability data to produce a valid and conservative IDV.2 standard.

Dr. Viz' technical concerns about the calibration of the E-Samplers are also misplaced. He claims that in referring to a "calibration unit," BNSF "may be confusing the calibration of the output particulate concentration signal with an internal calibration of the manual span function." Viz Op. V.S. at 15. Dr. Viz is wrong. To compensate for any potential signal drift, the E-Sampler self-calibrates twice a day to ensure accurate data. It performs a "self-zeroing" process where it resets the baseline value for clean air to adjust for signal drift and contamination of the optical sensors. SWA also monitors flows rates and alarm logs regularly to detect any signs that the E-Sampler internal calibration may be off.

In addition, the E-Samplers are returned to Met One, the device manufacturer, every two months for calibration, cleaning, and manual maintenance. This factory calibration is performed twelve times more often than the two-year time period recommended by the manufacturer. Indeed, SWA is Met One's only customer requesting such frequent factory calibration. Met One has confirmed that during their testing, they have found that there is very little change in settings necessary after the calibration, so the two-month period is more than adequate. *See* Exhibit 11. If their results had determined otherwise, we would have implemented an even more aggressive schedule.

Therefore, rather than carry out extensive calibration measures ourselves, BNSF and SWA rely more heavily on the manufacturer to conduct careful calibration of the instruments on an aggressive schedule. During their review of the returned E-Samplers, Met One technicians conduct a flow calibration and leak check, verify and calibrate the temperature, pressure, and flow meter sensors, change the filters, conduct pump maintenance, and clean the inlets. *See* Exhibit 12. Therefore, instead of performing field calibration of the E-Samplers, we send the E-Samplers back to the manufacturer on an aggressive 2-month schedule – far more frequently than suggested – to make sure that they remain properly calibrated. While Dr. Viz points out that the E-Sampler manual specifies that some maintenance procedures should be done once a month, this recommendation assumed that a factory calibration was only being conducted every two years. The fact that we receive essentially new instruments from the manufacturer every two months makes conforming to the manual's schedule unnecessary. As a result of this aggressive calibration program, there is no reason to question the accuracy of the E-Samplers.

VI. BNSF's Use of an Integrated Dust Value Standard is Valid.

Dr. Viz also expresses concern about BNSF's use of a benchmark for coal dust emissions based on an "Integrated Dust Value" assigned to individual trains. He claims that "neither I nor any of my colleagues who have assisted me in this work have been able to find any citations in the open technical literature that refer to the concept of IDV (integrated dust value) or DUs (dust units)." Vis Op. V.S. at 16. This criticism is without any merit. I am a research scientist but I am not studying coal dust as an academic exercise. Instead, I have been retained by BNSF to help BNSF solve a real world problem. The area of coal dust monitoring, particularly as it relates to moving coal trains, has not been extensively studied by others in the past, so SWA has helped BNSF come up with a customized approach that is based on the data we have gathered, the equipment we have available to us and the commercial objectives of BNSF.

BNSF developed the IDV benchmark for a specific purpose -- to establish an achievable and conservative limit on coal dust emissions that would allow us to determine whether coal shippers have adopted reasonable dust curtailment measures. Dr. Viz's criticism that SWA and BNSF have not based our approach on technical or academic literature appears to be an excuse for doing nothing. Indeed, there is no academic or technical literature on the benchmarks that can be used to measure coal dust from moving coal trains because the issue has never been studied by the academic community. That has not stopped others like Norfolk Southern, the Canadians, and the Australians from taking mitigation steps when they found it necessary.

I have described in detail the logic of the IDV.2 standard as well as the data and calculations used to produce the IDV.2 values. I have described the adjustments used to eliminate background dust and dust associated with diesel locomotives. I have also described the changes that were made to convert the original IDV values measured over a multi-year period to

IDV.2 values. The standard is not complicated and the calculations used to produce an IDV.2 for a passing train are straightforward.

WCTL/CCCS' claim that the IDV.2 process is a "black box" is also misleading. We have not produced the software that SWA created to make the IDV.2 calculations because that is a proprietary program. However, we have explained in detail the way the program is constructed and used. We have provided a detailed description of the computer logic. *See* Exhibit 13. If the shippers truly felt the need to recreate the software, they could easily hire a computer programmer to convert the logic into computer code. The shippers' only valid concern is knowing what the logic is, and how it operates, not having access to the technical computer code that implements that logic. We have produced detailed information on the underlying logic so there is no need for the shippers to have access to SWA's proprietary software.

I declare under penalty of perjury that the foregoing is true and correct. Further, I certify that I am qualified and authorized to file this Verified Statement.

Executed on April 28, 2010

G. David Emmitt

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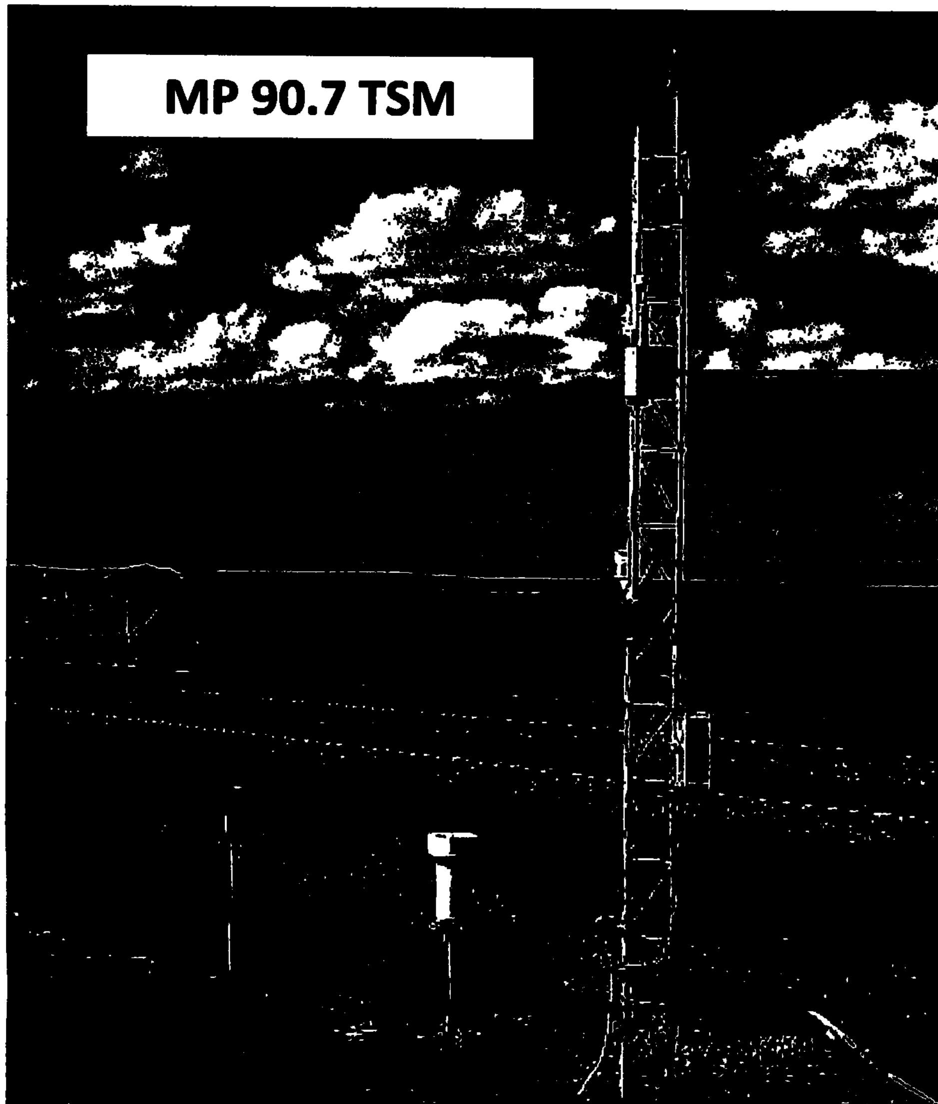
TrackSide Monitor (TSM)

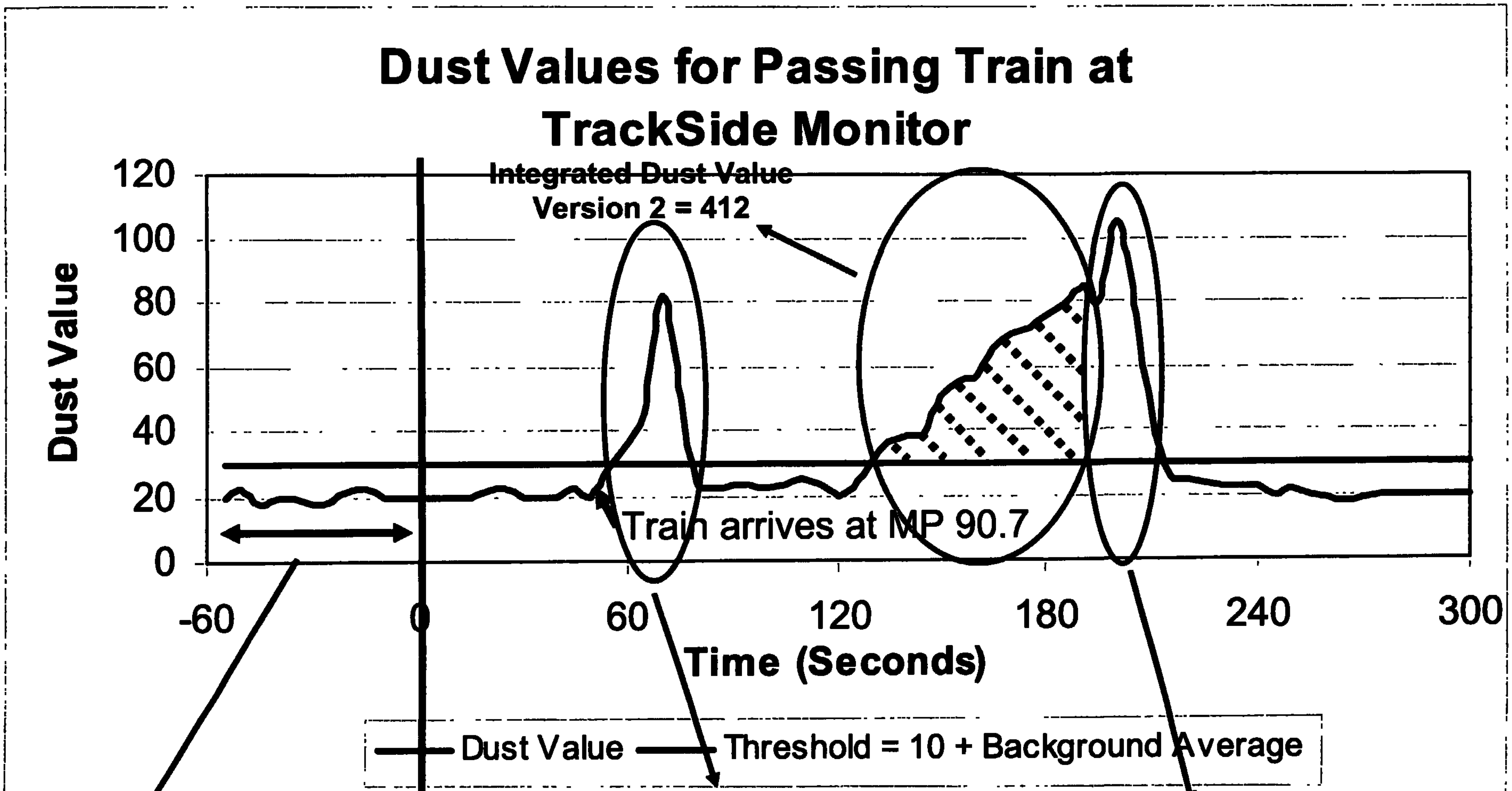


- Propeller Anemometer
- Dust Monitor
- Temperature/ Relative Humidity Sensor
- Data Logger
- Precipitation Gauge
- Dustfall Collector

2

3

Integrated Dust Value (IDV.2)



Environmental Background Dust

Train Passage at MP 90.5 According to BNSF Train Data

Front Diesel: Ignore first 30 seconds of values once dust signal exceeds thresh[redacted]

Rear Diesel: Ignore last 15 seconds of dust [redacted]hreshold

4

MP 90.7 (Orin) TrackSide Monitor (TSM) Integrated Dust Value Analysis of Loaded and Empty Coal Trains

April 28, 2010

E. D. Carré and G. D. Emmitt
Simpson Weather Associates
Charlottesville, Virginia

Methodology

- MP 90.7 TSM data for all trains during January 2008 – December 2008 were filtered to remove trains with high/erratic background dust, coincident train passage, or problems with equipment, such as train identification or data acquisition system malfunction
  - The remaining trains are considered "usable" for analysis
- Trains were separated into loaded coal trains and empty coal trains to compare the Integrated Dust Values of each subset of data

MP 90.7 TrackSide Monitor (TSM) Data for 2008
Loaded vs. Empty Coal Trains

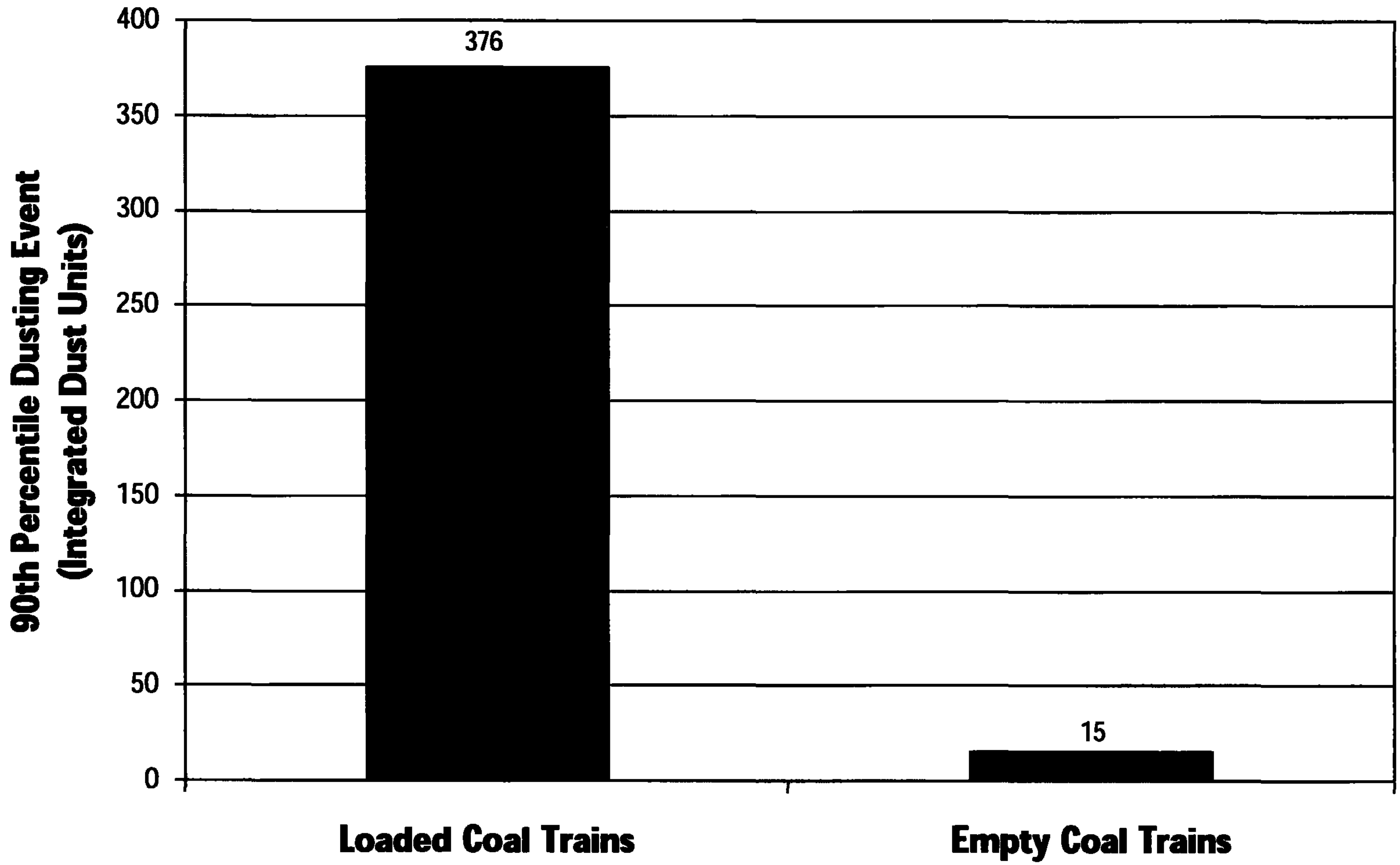
Integrated Dust Values of Usable Trains
(6 minute window for coincident train removal)

	Loaded Coal Trains	Empty Coal Trains
Number of Usable Trains	6064	7319
90th Percentile Dusting Event (Integrated Dust Units)[1]	376	15

[1] Represents the Integrated Dust Value Below Which 90 Percent of Usable Trains Are Observed

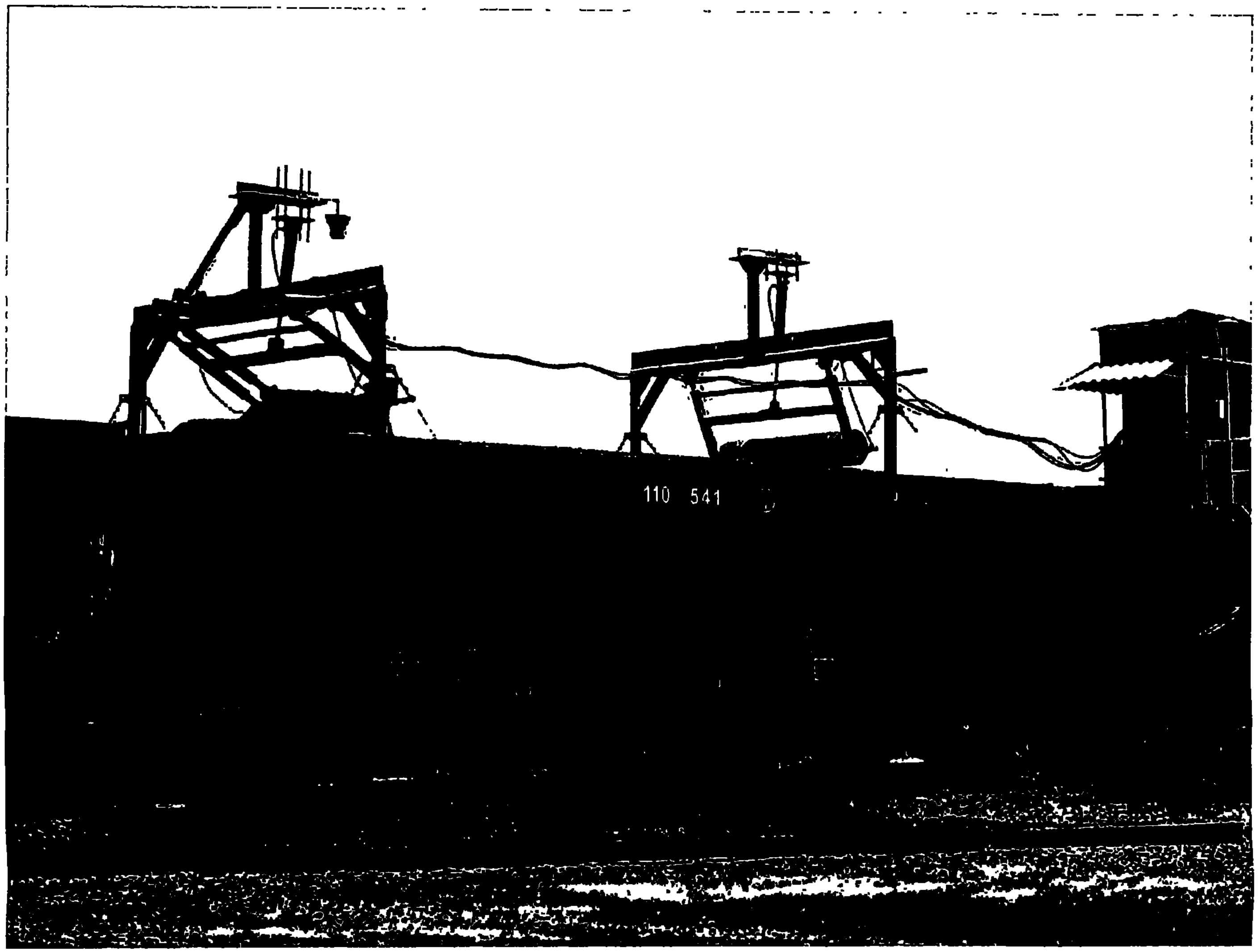
MP 90.7 TrackSide Monitor (TSM) Data – 2008

Usable Loaded and Empty Coal Trains' Integrated Dust Values

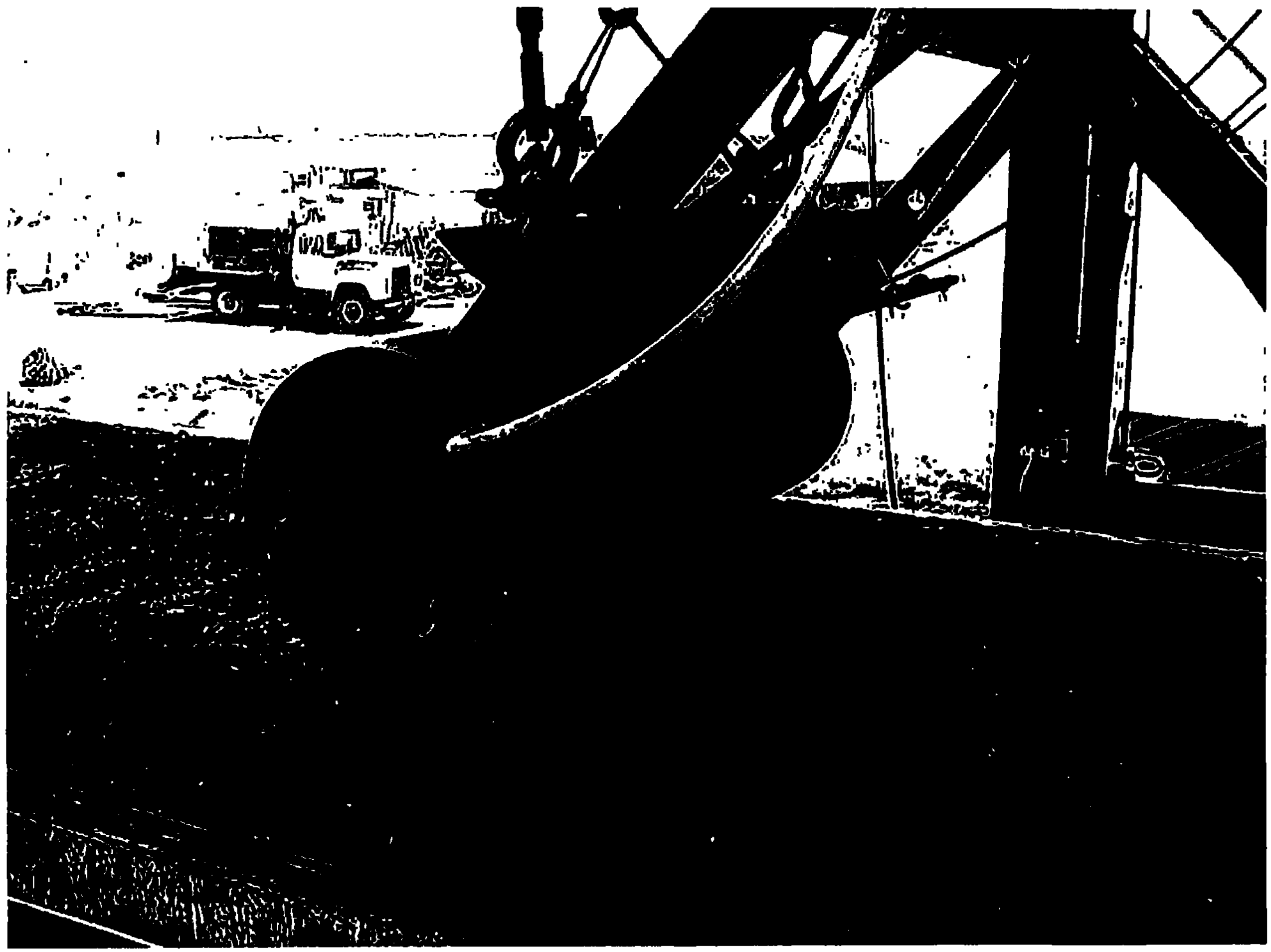


5

COAL COMPACTION



COAL COMPACTION



6

Queensland Rail trackside monitoring stations:

Marmor Monitoring Station Installation

Monitoring and Weather Station

Source: QR Network, Coal Dust Management Plan, at 18 (Feb. 22, 2010), available at http://www.qrnetwork.com.au/Libraries/Coal_Loss_Management_Project/Coal_Dust_Management_Plan.sflb (last accessed April 26, 2010).

7

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8

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9

MP 90.7 (Orin) TrackSide Monitor Camera/Integrated Dust Value Comparison - March 24, 2010

Simpson Weather Associates
Charlottesville, Virginia

April 19, 2010

Methodology

- Match MP 90.7 TrackSide Monitor (TSM) passing trains' dust/weather data to camera images
  - Camera records images every 5 seconds when train is present
- Pictures of non-dusty and dusty trains are shown for comparison

Train #1 – Non Dusty Train

Lead Engine UP 5964

March 24, 2010 11:05

Integrated Dust Value = 0 Integrated Dust Units

Wind Speed = 5.4 MPH

Average Train Speed = 35.4 MPH

03-24-10 11:05:46

03-24-10 11:07:16

Note the clear background downstream of the train

Train #2 – Dusty Train

Lead Engine UP 7002

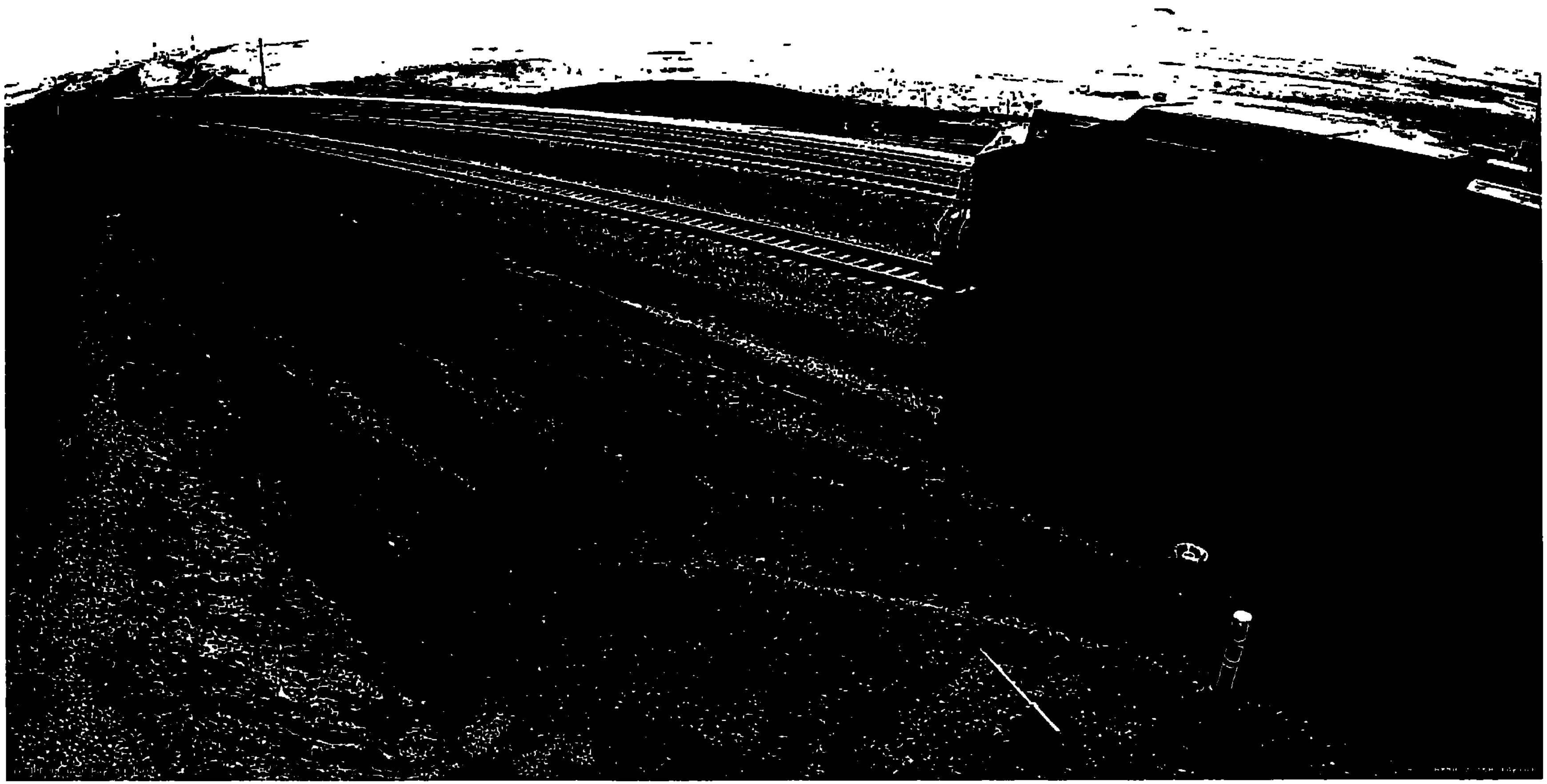
March 24, 2010 16:05

Integrated Dust Value = 1017 Integrated Dust Units

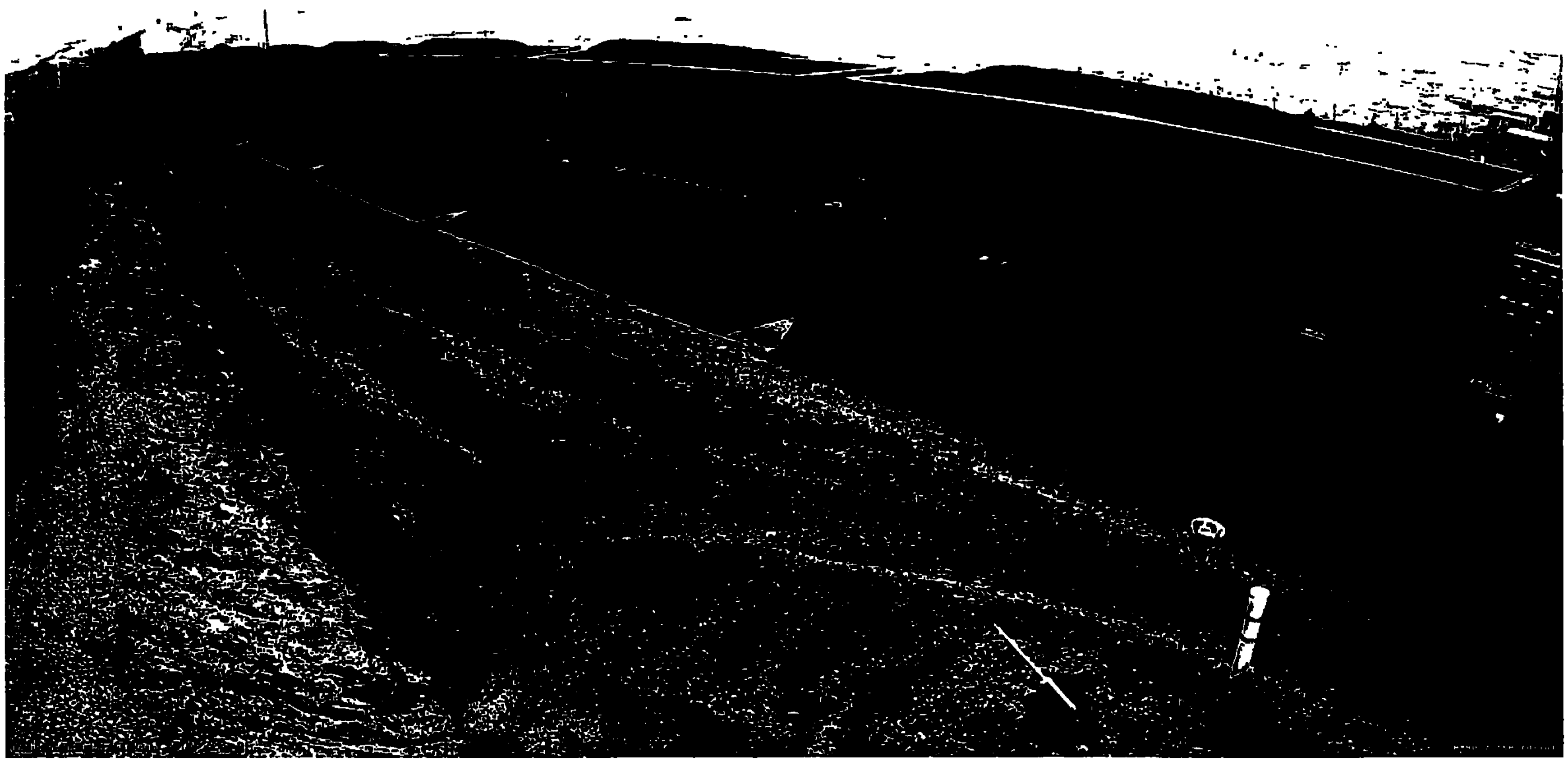
Wind Speed = 14.7 MPH

Average Train Speed = 29.7 MPH

03-24-10 16:05:04



03-24-10 16:05:58



03-24-10 16:07:43

Dust begins to be observed emitted from the tops of the coal cars

03-24-10 16:07:48

Camera visibility is impaired by the dust emissions

03-24-10 16:07:53

Background of image downstream of the train is impaired due to dust emissions

Train #3 – Dusty Train

Lead Engine UP 5984

March 24, 2010 14:03

Integrated Dust Value = 1290 Integrated Dust Units

Wind Speed = 10.5 MPH

Average Train Speed = 32.7 MPH

03-24-10 14:03:30

Note the clear background downstream of the train prior to train passage

03-24-10 14:03:35

03-24-10 14:03:51

03-24-10 14:05:11

Dust begins to be emitted during train passage

03-24-10 14:05:36

Camera visibility is impaired due to dust emissions

03-24-10 14:06:01

10

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11

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12

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13

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