AIR QUALITY EVALUATION REPORT
DUST FROM RAIL
TRANSPORTATION OF COAL

Prepared for:

TREASURE STATE
RESOURCE INDUSTRY ASSOCIATION

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1.0 INTRODUCTION

The Treasure State Resource Industry Association (TSRIA) has members across the state who are impacted by or work in the Powder River Basin (PRB) in Montana and Wyoming. To serve growing overseas markets for PRB coal, cargo terminal operators are planning to develop new West Coast ports. During the state and federal regulatory approval and environmental review process for new/expanded ports, a number of concerns with shipping coal over established rail lines have been raised by non-governmental organizations and concerned citizens. The specific concern addressed in this report is the potential for release of coal dust emissions from railcars during transport through communities between PRB mines and West Coast ports and the potential impacts of those releases on communities along the rail routes.

The TSRIA asked Bison Engineering, Inc. (Bison) to prepare a limited evaluation of the potential for coal dust emissions from railcars during transport of coal from mines to ports. This report reviews the results of a Missoula County, Montana, limited study related to coal dust and other air quality information from that community, and provides perspective on how these data may relate to the potential for coal dust emissions from railcar transport of coal.

2.0 COAL DUST AND PARTICULATE MATTER BACKGROUND

Coal dust that could be emitted during rail transport raises a couple of potential concerns regarding releases to the atmosphere – particle pollution (also called particulate matter or PM), and nuisance dust. The US Environmental Protection Agency (EPA) defines PM as a "mixture of extremely small particles and liquid droplets"[1] found in the air. PM includes "inhalable coarse particles," with diameters larger than 2.5 micrometers (µm) and smaller than 10 micrometers and "fine particles," with diameters that are 2.5 micrometers and smaller. For reference, a human hair is larger than 10 micrometers in diameter (a single human hair 50-70 µm). Nuisance dust would generally consist of the release of dust particles larger than 10 micrometers, which often settles out close to the source and may cause a nuisance by damaging or soiling nearby structures, automobiles, etc. It is important to understand the difference between PM and nuisance dust because the first impacts human health and the latter may create a nuisance or property damage, but is not considered injurious to public health. EPA has set National Ambient Air Quality Standards (NAAQS) for individual pollutants that are considered to be harmful to public health and the environment when they are in the atmosphere at a certain level. The NAAQS are set as primary standards, which provide public health protection, and secondary standards, which provide public welfare protection. Particulate matter NAAQS have been established for both inhalable coarse particles and fine particles as shown in Table 2-1 below.[2]

EPA now focuses much of its efforts and research on PM with an aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$) because the health impacts are most significant from particles of this size. The PM with an aerodynamic diameter of 10 µm or less (PM_{10}) standard has been retained as a 24-hr primary/secondary standard.

Table 2-1. Current $PM_{2.5}$ and PM_{10} NAAQS

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
$PM_{2.5}$	primary	Annual	12 µg/m^3	annual mean, averaged over three years
	secondary	Annual	15 µg/m^3	annual mean, averaged over three years
	primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over three years
PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over three years

[1] http://www.epa.gov/oar/particlepollution/
[2] http://www.epa.gov/air/criteria.html

The following paragraphs summarize results of a limited dust study in Missoula, and address other potentially relevant data available from several sources. The distinction between PM and nuisance dust is addressed within portions of the report to help put available information in context.

3.0 MISSOULA PARTICULATE MATTER – THEN AND NOW

3.1 Missoula Air Quality History

Missoula County is the most progressive county in the state of Montana in terms of environmental awareness and regulation development and implementation. The Montana Clean Air Act was authorized in 1967 and the Missoula City-County Health Department (MCCHD) instituted its first air quality program by 1969.[3] Following promulgation of an NAAQS for PM_{10} in 1987, a portion of the county was designated as a non-attainment area, which means at one time the area was shown to be out of compliance with the NAAQS for PM_{10}. As a result, MCCHD has undertaken a great deal of monitoring to collect actual PM_{10} data, and has studied, in-depth, the contributing factors to the particulate levels within the airshed in the Missoula valley. These studies were largely based on chemical mass balance (CMB) analyses and contain a great deal of detailed information about whom and what kinds of industry and public sector activities are generating the particulate pollution in the valley.

After development of PM_{10} control plans and their implementation by MCCHD, the ambient monitoring data has shown large reductions in particulate matter and Missoula has not shown a violation of the PM_{10} NAQQS since 1989.[2] The most recent data report published by MCCHD states that, "even with increased vehicle traffic and population in the Missoula Valley, PM_{10} concentrations over the last several years have been relatively stable."[4] PM_{10} has been the focus of Missoula's air pollution control program because of its importance in protecting public health.

3.2 MCCHD Chemical Mass Balance Analyses

To assist in identifying sources of air pollution in an area, a CMB/apportionment study is conducted to determine the sources causing or contributing to air pollution. CMB modeling is based on comparing chemical fingerprints of known or suspected sources of pollutants with actual chemical data collected on ambient air filters; the model allows a determination of the categories and amount of contribution from each of the sources with fingerprint data in the model.

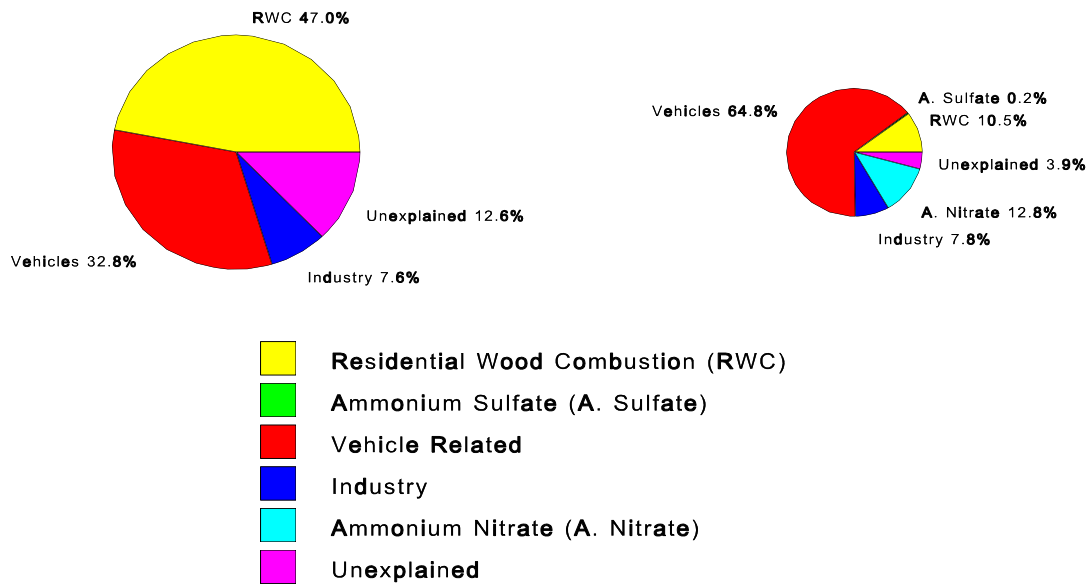
Since the inception of its air quality program, MCCHD has been involved with several CMB studies focused on PM_{10}. The first PM_{10} CMB study was done in the winter of 1986/1987 and was conducted to determine sources of the PM_{10} in the Missoula Valley. A follow-up MCCHD PM_{10} CMB study was conducted in the winter of 1995/1996. A summary of the results of both studies is included in Figure 3-1.[5]

[3] http://www.co.missoula.mt.us/airquality/MissoulasAir/aqhistory.htm
[4] http://www.co.missoula.mt.us/airquality/MissoulasAir/pdfs/2010AirTrendsReport.pdf
[5] http://www.co.missoula.mt.us/airquality/MissoulasAir/aqhistory.htm

Figure 3-1. Missoula Valley PM_{10} CMB Results

1986-1987 Rose Park
107 µg/m^3

1995-1996 Boyd Park
58.8 µg/m^3



The studies show that the largest contributors to particulate levels in the Missoula Valley are residential wood stoves and vehicles. As a result of the studies, MCCHD focused their air pollution control efforts on the significant sources as outlined in their regulations and control plans. These efforts have been successful; as noted in the most recently posted ambient air analysis by Missoula conducted earlier this year, the overall PM_{10} levels in Missoula are currently below the NAAQS.

While coal dust individually was not fingerprinted, or chosen for specific evaluation in the study, the results support minimal associations with these types of emissions. Since some coal dust may be less than or equal to 10 µm in size, it would be lumped into the unexplained category, along with all other particulate that was not categorized individually. The 1995-1996 CMB study showed this category to be only 3.9% of the total PM_{10} being emitted in the valley. The industry-related emissions are those emissions from the known industrial sources operating in the Missoula Valley.

Given MCCHD's focus on and commitment to the air quality in their county, they have a thorough understanding of the predominant sources of important air pollutants. Clearly, coal dust has not been a source of concern to MCCHD when determining contribution of PM_{10} impacts through the multiple CMB studies for PM_{10} in the Missoula Valley.

3.3 MCCHD Coal Dust Study Summary

Bison contacted MCCHD staff to review the results of a coal dust study conducted in the spring of 2012 in their community. MCCHD embarked on the study after fielding questions and hearing concerns from Missoula area citizens regarding potential coal dust emissions from coal trains traveling through the city. To help address the citizens' questions, MCCHD decided to sample some areas near the railroad in the city of Missoula. Their purpose in this sampling was to see if they would find any coal being deposited near the railroad tracks and sidings that might be coming from the trains.

MCCHD contracted with McCrone Associates, Inc. (McCrone) to conduct an analysis of dust samples from locations chosen by MCCHD. On June 14, 2012, MCCHD received an "Analysis of Dust Samples" from McCrone.[4] The coal dust study consisted of four samples: two tape samples and two cloth samples. The sample types and locations are summarized in Table 3-1.

Table 3-1. Sample Type and Location

Sample	Sample Type	Sample Location
A	Tape	200 Block, Rail Road Street, Missoula, MT
B	Cloth	314 N. 1st Street West, Missoula, MT
C	Tape	314 N. 1st Street West, Missoula, MT
D	Cloth	Bike/pedestrian bridge on north side of railroad track, Missoula, MT

Because Sample C contained very few particles, no analysis was possible on this sample and there are no results. Missoula requested that the samples be screened for coal dust particles, and McCrone used a combination of stereomicroscope and polarized light microscopy (PLM). These methods allowed for the determination of different particle types within the sample.[6] These are traditional methods of using a light microscope to determine particles in the sample. Their report provided the approximate percentage of material in the sample that was coal dust. The results for Samples A, B, and D all showed that, by volume, coal dust accounted for only 1-5% in each of the samples. Particle estimates had an approximate precision of ±10%.

Results of the samples showed an insignificant amount of coal dust along the railroad tracks. The level of coal dust was so minimal that Missoula found no basis for further studies and stated verbally that McCrone saw no reason for any further analysis because of the minute amounts of coal dust noted in the sampling results.

[6] http://www.co.missoula.mt.us/airquality/pdfs/Pre-Reportv1.MissoulaCity.061412_2.pdf

4.0 CONCLUSION

MCCHD responded to their community's request to take a closer look at potential coal dust in their community. The results of this simple testing revealed little coal dust along the railroad in this community. The Missoula Valley would be representative of other communities that are not located adjacent to a coal mine, but do have frequent rail traffic through the community.

There was a minimal amount of coal dust found within the MCCHD sampling and analysis and only a limited portion of this material would be of the particle size that would be viewed as a potential human health impact or of the size fraction of PM_{10} or smaller. Further, $PM_{2.5}$ would not be expected to be emitted from the railcars transporting coal, as this is a pollutant that is generally generated by the combustion process. The limited results of the study are made more noteworthy since the trains carrying coal have been traveling this route through Montana for decades.

MCCHD has been successful in their diligent endeavors to understand particulate in the Missoula Valley and to implement measures to reduce impacts over the past 25 years. Also, MCCHD has done a terrific job of identifying contributors to the valley's particulate issues and has established very successful programs and operations to control these emissions. Their programs focus on the particulate sources that are significant contributors to ambient air pollution in their valley, and the absence of coal dust as a source in their studies is also noteworthy.

Finally, coal dust from railcars will generally be of a size that would have the potential to create a public nuisance, but not create health impacts. In a recent informational brochure issued by the Spokane Regional Clean Air Agency, they stated that, "After reviewing how coal dust is treated once it is loaded, Spokane Clean Air is fairly confident that this will not be an issue for local quality impacts. The potential for coal dust emissions is greatest at the point of loading and unloading, which is not occurring in Spokane County".[7]

Based on our understanding of the measures taken by the coal mines to reduce the emission potential of coal dust from railcars, and the results of the limited study conducted by MCCHD in the Missoula Valley, we find it unlikely that coal dust emissions generated by the transportation of coal by railway will have health impacts on the public.

[7] Spokane Regional Clean Air Agency, (November 29, 2012). *Air quality & coal trains – Commonly asked questions.* 3104 E. Augusta Ave., Spokane, WA 99207.