March 14, 2016

Mr. Luke J. Danielson
Law Offices of Luke J. Danielson, P.C.
219 N. Iowa Street
Gunnison, CO 81230

RE: Response to Trinity Consultants' January 29, 2016 Review of MMA's December 15, 2015 Air Quality Modeling Analysis for La Plata County Road 120

Dear Mr. Danielson:

McVehil-Monnett Associates, Inc. (MMA) is pleased to provide this response to Trinity Consultants' review of our Air Quality Modeling Analysis for La Plata County Road 120. MMA appreciates Trinity Consultants' thorough review. A Summary of Responses to Trinity's comments is provided below, while Detailed Responses to their comments follow this summary.

Summary of Responses

Trinity agreed with our basic modeling approach, however they provided five significant comments during their review. Two of the comments provided by Trinity are reasonable (i.e., C Factor and Depletion Option). The C Factor represents that portion of PM_{10} emissions related to vehicle exhaust, brake wear and tire wear, and it is subtracted from the calculated emission factor. The C Factor is extremely small when compared to the total emissions from an unpaved road (in this case, it is approximately 0.04% of the total PM_{10} emissions), and its use would not alter the modeling results or conclusions. The Depletion Option accounts for particles settling to the ground as the dust plume travels downwind. This option reduces modeled concentrations at increasing distances from the road. However, at close ranges (as with residents very near the road) the reductions would be only 2-3% and, again, would not alter our conclusions. Inclusion of these two items in the modeling would provide negligible changes to the results.

We would not incorporate Trinity's comment on silt content, as more thoroughly discussed in our detailed response that follows below. In short, the emission factor equation uses silt content (the percentage of very fine road surface particles) to calculate the PM_{10} emissions from a road, higher silt content leads to higher emissions. The silt content we used is consistent with both published default values for unpaved roads and with the value GCC used in previous submissions to state agencies for their own access roads. Analysis of surface samples from the county road would provide a definitive value for this parameter.

Trinity's comment regarding emission reductions due to annual precipitation days is not appropriate when calculating maximum daily emissions, so we would reject the incorporation of this factor into our analysis.

Trinity also commented on the efficiency of the current dust control measures we assumed in the modeling. As one would expect, emissions from a road are reduced when dust control measures are implemented. The extent of these reductions depends on the specific dust control program in place. We are aware that water and magnesium chloride are applied periodically to this road, however we lack documentation as to the application frequency and rates. The control efficiency used in our modeling is consistent with dust reductions attributable to road watering, and may be adjusted (with the qualification described in our detailed response) if details of the dust suppressant program are available.

We agree on two "big picture" items raised in Trinity's review. First, we agree that dispersion models may overpredict impacts from ground-level dust sources such as unpaved roads. However, no other tool exists to predict future impacts from proposed operational changes (such as future, peak traffic levels). Dispersion modeling is used extensively by state and federal agencies, and air permits are not granted to industrial facilities if modeling demonstrates non-compliance with the National Ambient Air Quality Standards (NAAQS). Dispersion modeling is the basic tool used by regulators.

Efforts are made to use the most justifiable modeling inputs based on the information available, yet the most definitive way to characterize current impacts is through air monitoring. Thus, we are also in agreement with Trinity's recommendation that they advise GCC on performing air monitoring, especially at resident locations. PM_{10} monitoring over an extended period would conclusively show whether or not the road dust concentrations exceed the public health standard set by EPA.

<u>Detailed Responses</u>

<u>MMA responses to comments in Section 6 (Emission Sources) of Trinity's review:</u>

Trinity Comment: C Factor should be used.

MMA Response:
The C Factor presented in EPA's AP-42[1] accounts for PM_{10} emissions in vehicle exhaust, brake wear and tire wear. This factor equals 0.00047 lb/vehicle mile traveled for PM_{10} and is subtracted from the calculated emission factor. For unpaved roads, this factor is orders-of-magnitude below the calculated emission factor, and its inclusion in the equation results in no change in calculated emissions. Therefore, the C Factor was not included in our analyses, and its use does not affect the magnitude of emissions.

Trinity Comment: Silt content should be lowered.

MMA Response:
The silt content is a major input to the public unpaved road equation. Calculated emissions rise with increased silt content. The best source for this value comes from actual road surface sampling during dry, uncontrolled conditions. Unfortunately, sampling was not feasible in the

[1] U.S. EPA. Compilation of Air Pollutant Emission Factors, Fifth Edition, Office of Air Quality Planning and Standards, Research Triangle Park, NC. Section 13.2.2, revised November 2006.

winter due to snow cover. In the absence of local silt sampling, published default silt values for various industrial and publicly accessible road types are widely used.

The silt value we used (8.4%) is identical to the value GCC uses to characterize their unpaved roads, including the entrance road from the mine property line to the truck scale[2]. Presumably, this entrance road on GCC's property experiences the same traffic volume and type as we modeled on County Road 120, since all of the modeled traffic is either entering or leaving the mine property. To be consistent with GCC's road characterization, the 8.4% value was also used in our analysis. The 8.4% silt value is also reflective of typical values presented for public unpaved roads as published in EPA's AP-42.

A short history of EPA's AP-42, Section 13.2.2 for Unpaved Roads is helpful at this point. EPA maintains and periodically updates emission factor information in AP-42 for various emission source types. In 1998, the unpaved road section of AP-42 contained a single emission factor that calculated emissions for both industrial and publicly accessible roads. Table 13.2.2-1 of that document (Attachment 1 to this letter) presents typical silt contents for various industrial and rural unpaved road types. As shown in that table, publicly accessible gravel roads have a typical silt content of 6.4%, and dirt roads have a typical silt content of 11%.

A draft revision to Section 13.2.2 was produced in 2001. The single emission factor used previously for both industrial and public roads in the 1998 version was discarded and replaced by two separate emission factors, one for industrial roads and one for public roads. This revision also divided the table presenting typical silt contents into two separate tables; again, one table for silt contents typical of industrial roads and one table for silt contents of public roads. The silt values in the two tables are identical to those presented in the single table from the 1998 version of AP-42. These two tables were also incorporated into the WRAP Fugitive Dust Handbook[3], presented in Attachment 2 as Tables 6-1 and 6-2. Note, the typical silt contents published in Table 6-2 for gravel and dirt roads remain at 6.4% and 11%, respectively.

Later revisions to the unpaved road section of AP-42 in 2003 and 2006 maintain the use of separate emission factors and separate silt content tables for industrial and public roads. However, in these revisions the table presenting the silt content for public roads was inadvertently omitted. This table is referenced in the current text of AP-42 with the sentence "*Table 13.2.2-2 summarizes measured silt values for public unpaved roads*", but the table itself is not provided. It is reasonable to assume that the typical silt values published for public unpaved roads in the previous versions remain unchanged, despite the table's omission in the current revision.

It is unclear how to properly characterize the unpaved road surface of County Road 120 (gravel vs. dirt). The accident records provided in Appendix 7 of Roadrunner Engineering, LLC's Traffic Impact Assessment[4] use both "GRAVEL" and "DIRT" to describe the road surface. While the silt value chosen in our analysis is consistent with GCC's assumption for their access road, it is also consistent with the value obtained by averaging the published AP-42 silt values

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[2] GCC Energy, Permit modification package sent to Colorado Dept. of Public Health and Environment, February 7, 2013.
[3] WRAP Fugitive Dust Handbook, prepared by Countess Environmental, September 2006.
[4] Roadrunner Engineering, LLC. "GCC Energy LLC, King II Coal Mine, County Road 120 Traffic Impact Assessment", revised July 31, 2015.

spanning all gravel and dirt roads. Until surface samples can be obtained and analyzed for silt content, 8.4% remains an appropriate default value.

Trinity Comment: MMA did not use Equation 2, which provides natural control and reductions of PM_{10} emissions due to precipitation.

MMA Response:
Trinity references Equation 2 in AP-42, Section 13.2.2, which can be employed to consider reductions in annual emissions due to rainfall. Basically, the equation reduces annual emissions by the percentage of days in the year when there is measurable precipitation. This is an appropriate correction when calculating and modeling <u>annual</u> emissions, but is not appropriate in this case when calculating and modeling <u>daily</u> (24-hour) emissions. To estimate maximum 24-hour exposures to residents, the daily emissions must be calculated without regard to annual precipitation reductions in order to properly simulate a worst-case (i.e., dry) day.

The result of our three responses above is that we believe our calculated emissions should remain as provided in our December 2015 analysis until representative surface samples can be obtained and analyzed.

Trinity Comment: MMA used 50% control efficiency. I would recommend a control efficiency between 50% and 84%.

MMA Response:
As stated in our December 2015 analysis, we acknowledge that the road is treated with magnesium chloride and water. However, we do not have details of the treatments or information documenting the rigor with which the magnesium chloride and water is applied. Additional information would be welcome to help refine the appropriate control efficiency, as this chemical requires periodic re-application to provide proper dust control. We disagree, however, with the value of 84% cited and used in Trinity's review. The underlying study[5] that provides the cited 84% control value was performed for a chemical called Soil Sement. Soil Sement belongs to a different class of dust suppressants than magnesium chloride, and it provides a higher level of control due to its ability to bond the dust to the road surface.

Attachment 3 to this letter presents Table 6-6 of the WRAP Fugitive Dust Handbook. This table lists a 55% PM_{10} control efficiency for twice-daily watering, which approximates the value used in our December analysis.

<u>MMA response to comment in Section 8 (Depletion Option Selection) of Trinity's review:</u>

Trinity Comment: MMA did not select this option. Selection of this option lowers the impacts.

MMA Response:
Trinity references a modeling option that accounts for particulate matter settling to the ground as the vehicle dust plume travels downwind. This settling action reduces predicted PM_{10} concentrations, especially at increasing distances from the dust source. We initially ran

[5] California Air Resources Board Precertification Program, "Evaluation of the Air Quality Performance Claims for Midwest Industrial Supply, Inc. Soil Sement", April 2002.

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deposition options to determine if any meaningful reductions would be realized, and found (as did Trinity) that at the very short distances between the road and the resident locations, impacts are reduced by only 2-3%. We opted not to include this option in our December report since the negligible reduction does not alter our conclusion that the model-predicted impacts exceed the NAAQS at certain resident locations.

The appropriate use of emission factor equations plus reasonable and justifiable modeling input parameters are critical to the credibility of any air modeling study, especially when dealing with the serious issue of impacts to public health. Based on the information available, MMA believes we have selected proper parameters and methods in our analysis. While dispersion modeling is the tool used by regulatory agencies to determine predicted pollutant impacts to the public (and air permits may be approved or denied based on the modeling results), air monitoring would provide the definitive answer as to whether the dust from County Road 120 threatens the health of nearby residents. We applaud Trinity's recommendation that they advise GCC on air monitoring, and hope such a program is initiated. Please let us know if you have any questions.

Sincerely,

Gary Garman
McVehil-Monnett Associates, Inc.

Attachments

Attachment 1

Table 13.2.2-1 of AP-42, Published 1998

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL AND RURAL UNPAVED ROADS[a]

Industry	Road Use Or Surface Material	Plant Sites	No. Of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16 - 19	17
Iron and steel production	Plant road	19	135	0.2 - 19	6.0
Sand and gravel processing	Plant road	1	3	4.1 - 6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4 - 16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4 - 7.1	4.3
	Haul road to/from pit	1	12	3.9 - 9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8 - 18	8.4
	Plant road	2	2	4.9 - 5.3	5.1
	Scraper route	3	10	7.2 - 25	17
	Haul road (freshly graded)	2	5	18 - 29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2 - 21	6.4
Publicly accessible roads	Gravel/crushed limestone	9	46	0.1-15	6.4
	Dirt (i.e., local material compacted, bladed, and crowned)	8	24	0.83-68	11

[a]References 1,5-16.

Attachment 2

Tables 6-1 and 6-2 of WRAP Fugitive Dust Handbook, Published 2006

Table 6-1. Typical Silt Content Values of Surface Material on Industrial Unpaved Roads[a]

Industry	Road use or surface material	Plant sites	No. of samples	Silt content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16-19	17
Iron and steel production	Plant road	19	135	0.2-19	6.0
Sand and gravel processing	Plant road	1	3	4.1-6.0	4.8
	Material storage area	1	1	–	7.1
Stone quarry and processing	Plant road	2	10	2.4-16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4-7.1	4.3
	Haul road to/from pit	1	12	3.9-9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8-18	8.4
	Plant road	2	2	4.9-5.3	5.1
	Scraper route	3	10	7.2-25	17
	Haul road (freshly graded)	2	5	18-29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2-21	6.4

[a] References 1, 5-15.

Table 6-2. Typical Silt Content Values of Surface Material on Public Unpaved Roads[a]

Industry	Road use or surface material	Plant sites	No. of samples	Silt content (%)	
				Range	Mean
Publicly accessible roads	Gravel/crushed limestone	9	46	0.1-15	6.4
	Dirt (i.e., local material compacted, bladed, and crowned)	8	24	0.83-68	11

[a] References 1, 5-16.

6.2.1 Emission Factors

The PM10 emission factors presented below are the outcomes from stepwise linear regressions of field emission test results of vehicles traveling over unpaved surfaces. For vehicles traveling on unpaved surfaces at industrial sites, PM10 emissions are estimated from the following empirical equation:

$$E = 1.5\,(s/12)^{0.9}\,(W/3)^{0.45} \qquad (1a)$$

Attachment 3

Table 6-6 of WRAP Fugitive Dust Handbook, Published 2006

Table 6-5. Average Controlled PM10 Emission Factors for Specific Conditions

Period	Ground inventory, gal/yd^2	Average control efficiency, %[a]	Average controlled PM10 emission factor, lb/VMT
May	0.037	0	7.1
June	0.073	62	2.7
July	0.11	68	2.3
August	0.15	74	1.8
September	0.18	80	1.4

[a] From Figure 6-2. Zero efficiency assigned if ground inventory is less than 0.05 gal/yd^2.
1 lb/VMT = 281.9 g/VKT. 1 gal/yd^2 = 4.531 L/m^2.

Table 6-6 summarizes tested control measures and reported control efficiencies for measures that reduce the generation of fugitive dust from unpaved roads.

Table 6-6. Control Efficiencies for Control Measures for Unpaved Roads[36, 37]

Control measure	PM10 control efficiency	References/Comments
Limit maximum speed on unpaved roads to 25 miles per hour	44%	Assumes linear relationship between PM10 emissions and vehicle speed and an uncontrolled speed of 45 mph.
Pave unpaved roads and unpaved parking areas	99%	Based on comparison of paved road and unpaved road PM10 emission factors.
Implement watering twice a day for industrial unpaved road	55%	MRI, April 2001
Apply dust suppressant annually to unpaved parking areas	84%	CARB April 2002

6.6 Regulatory Formats

Fugitive dust control options have been embedded in many regulations for state and local agencies in the WRAP region. Regulatory formats specify the threshold source size that triggers the need for control application. Example regulatory formats downloaded from the Internet for several local air quality agencies in the WRAP region are presented in Table 6-7. The website addresses for obtaining information on fugitive dust regulations for local air quality districts within California, for Clark County, NV, and for Maricopa County, AZ, are as follows:

- Districts within California: www.arb.ca.gov/drdb/drdb.htm
- Clark County, NV: www.co.clark.nv.us/air_quality/regs.htm
- Maricopa County, AZ: www.maricopa.gov/envsvc/air/ruledesc.asp