APPENDIX K
Air Quality Specialist Report
Lewis & Clark National Forest
Travel Management Plan DEIS

Project: Little Belt, Castle, North Half Crazy Mountains Travel Management Plan Draft EIS
Date: February 15, 2006
Submitted by: Lori Clark, Air Quality Specialist, R1 Regional Office
Recommendation: No Effect, No further analysis needed

INTRODUCTION

Concern was raised over the potential effects of the proposed alternatives (particularly motorized uses) on air quality. This issue has been determined to be non-significant to the decision among travel plan alternatives. Public comment represents concerns about the undesirable effect of encountering motorized use emissions on Forest roads and trails. The Forest Service acknowledges that odor generated by combustion engines, particularly two-cycle engines, can diminish a non-motorized user's experience of Forest trails. However, this is a recreation (user satisfaction) issue rather than a general air quality issue. Air Quality is not significantly affected by potential motorized use of Forest roads and trails under any of the alternatives.

This air quality analysis examines area weather and meteorology and any potential for recreational travel to cause or contribute to violations of National or State Ambient Air Quality Standards, degrade air quality by more than any applicable PSD (Prevention of Significant Deterioration) increment, affect Class I areas, or cause or contribute to visibility impairment beyond any existing conditions.

Legal Framework

The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA), as amended in 1990 and 1999. The Clean Air Act was designed to "protect and enhance" air quality. The primary means by which this is to be accomplished is through implementation of National Ambient Air Quality Standards (NAAQS).

Section 160 of the CAA requires measures "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value." Stringent requirements are therefore established for areas designated as "Class I" attainment areas. Class I areas include Forest Service and Fish and Wildlife Service wilderness areas over 5,000 acres that were in existence before August 1977, and National Parks in excess of 6,000 as of August 1977. Designation as a Class I area allows only very small increments of new pollution above existing air pollution levels. The Bob Marshall and Gates of the Mountains Wildernesses, and Glacier National Park are Class I areas that were considered as part of this analysis.

If a community does not meet or "attain" the National Ambient Air Quality Standards, it is designated as a non-attainment area and must demonstrate to the public and the Environmental Protection Agency how it will meet standards in the future. This demonstration is done through the State Implementation Plan. Great Falls and East Helena are non-attainment areas considered in this report as they are within 100 km of the project area. More information regarding the status of the non-attainment designations can be found at Montana Department of Environmental Quality's website: deq.mt.gov/AirMonitoring/networkRev/network2003.

National Ambient Air Quality Standards (NAAQS)
The EPA has established NAAQS for six criteria pollutants that have been determined to be harmful to public and the environment. The primary standard is intended to protect human health.

Particulate is a term used to describe dispersed airborne solid and liquid particles that will remain in atmospheric suspension from a few seconds to several months. Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) or less than 10 microns in diameter (PM_{10}) describes particles small enough to enter the human respiratory system. Combustion processes produce ultra fine particles which are the bulk of $PM_{2.5}$. $PM_{2.5}$ is the principal cause of haze since it seldom settles and is usually removed from the air by rain. PM_{10} settles in hours and is often pollen and spores with some dust. Most geological dust is larger than PM_{10} (Hammer 2000).

Particulate emission sources in Montana are diverse. Point sources typically can be placed into one of the following categories: coal and ore mining, non-metallic mineral processing (e.g., talc, lime, and phosphate mines), wood products industries, slash burning, and wood and coal fired power generation. Although some of these sources are significant, they are typically located in relatively remote areas where the threat to public health is minimal. Of greater concern in the State are area sources. Examples of area sources include re-entrained road dust, residential wood combustion, and tailpipe emissions. These sources in combination with localized point sources are the cause for most of the particulate problems in Montana (MT DEQ 2003).

Federal and State Air Quality Standards are listed in the following table:

FEDERAL & STATE AIR QUALITY STANDARDS				
Pollutant	**Time Period**	**Federal NAAQS**	**Montana (MAAQS)**	**Standard Type**
Carbon Monoxide	Hourly average	35 ppm[1]	23 ppm[b]	Primary
	8-hour average	9 ppm[1]	9 ppm[b]	Primary
Hydrogen Sulfide	Hourly average	----	0.05 ppm[b]	---
Lead	90-day average	----	1.5 µg/m^{2}[c]	---
	Quarterly average	1.5 ppm[3d]	----	Prim. & Sec.
Nitrogen Dioxide	Hourly average	----	0.30 ppm[b]	---
	Annual average	0.053ppm[3d]	0.05 ppm[e]	Prim. & Sec.
Ozone	Hourly average	0.12 ppm[f]	0.10 ppm[b]	Prim. & Sec.
	Annual average	0.08 ppm[g]	----	Prim. & Sec.
PM-10	24-hour average	150 µg/m^{2}[k]	150 µg/m^{2}[k]	Prim. & Sec.
	Annual average	50 µg/m^{2}[l]	50 µg/m^{2}[l]	Prim. & Sec.
PM-2.5	24-hour average	65 µg/m^{2}[m]	-----	Prim. & Sec.
	Annual average	15 µg/m^{2}[n]	-----	Prim. & Sec.
Settleable Particulate	30-day average	----	10 g/m^{2}[c]	---
Sulfur dioxide	Hourly average	----	0.50 ppm[h]	----
	3-hour average	0.50 ppm[a]	---	Secondary
	24-hour average	0.14 ppm[a,i]	0.10 ppm[b,j]	Primary
	Annual average	0.03 ppm[d]	0.02 ppm[e]	Primary
Visibility	Annual average	-----	3 x 10^{-5}/m[e]	----

[l]Federal violation when exceeded more than once over any 12 consecutive months
[a] Federal Violation when exceeded more than once per calendar year
[b] State violation when exceeded more than once over any 12 consecutive months
[c] Not to be exceeded (ever) for the averaging time period as described in the state and/or federal regulation
[d] Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard
[e] State violation when the arithmetic average over any four consecutive quarters exceeds that standard
[f]Applies only to NA areas designated before the 8-hour standard was approved in July, 1997. MT has none.
[g] Federal violation when 3-year average of the annual 4th-highest daily max. 8-hour concentration exceeds the standard
[h] State violation when exceeded more than eighteen times in any 12 consecutive months
[i] Federal standard is based upon a calendar day (midnight to midnight)
[j] State standard is based upon 24-consecutive hours (rolling)
[k] State and federal violation when more than one expected exceedances per calendar year, averaged over 3-years
[l] State and federal violation when the 3-year average of the arithmetic means over a calendar year at each monitoring site exceed the standard
[m] Federal violation when 3-year average of the 98th percentile values at each monitoring site exceed the standard
[n] Federal violation when 3-year average of the spatially averaged calendar year means exceed the standard.

Visibility Protection and Regional Haze

Within Class I areas, visibility is the air quality related value that is most affected, especially by smoke or significant dust. Particulates that remain suspended in the atmosphere are efficient light scatterers and therefore contribute to visibility impairment. Very small particles can travel great distances and contribute to regional haze problems. Cumulative particulate load may be the result of fire use only or urban and industrial sources only, or it may be a combination of the two. (USFS 1995)

Prevention of Significant Deterioration

The Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act require measures "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreation, scenic, or historic value." Stringent requirements are therefore established for areas designated as "Class I" areas (42 U.S.C. § 7475 (d)(2)(B)). Designation as a Class I area allows only very small increments of new pollution above already existing air pollution levels.

Conformity

The general conformity provisions of the CAA (Section 176 (c)), prohibit federal agencies from taking action within a non-attainment area that causes or contributes to a new violation of the standards, increases frequency or severity of an existing violation, or delays the timely attainment of a standard as defined in the area plan. The Travel Management Plan is not subject to the Conformity process since it does not occur within a non-attainment area boundary.

AREA OF ANALYSIS

The analysis area for consideration of air quality impacts is the area within a radius of 62 miles (100 kilometers) from the edge of the project area. The EPA's air quality permitting system suggests that sources within a radius of 100 kilometers be considered especially those located downwind of the source.

Existing Condition and Affected Environment

Air Quality

Air quality throughout the project area, is considered good to excellent during most of the year due to limited emission sources and vigorous wind dispersion (Story, 1995). Air quality in the area is influenced by the meteorology and weather, topographical features, and local emission sources. An

air quality assessment for the Eastside National Forests (USDA FS, 2000) describes air quality conditions for the area in more detail. Local air pollution sources within the project area, include construction equipment, vehicle emissions, road dust, residential wood burning, wood fires and smoke from logging slash disposal. Emissions are very limited, with temporary local sources of impairment. The analysis area is considered "in attainment" by the Montana Department of Environmental Quality (DEQ).

Stationary sources (greater than 100 tons/yr emissions) listed in the EPA Air Data inventory within 100 km of the project area boundaries include:

Source	CO t/yr	NOx t/yr	VOC t/yr	SO2 t/yr	PM2.5 t/yr	PM10 t/yr	Totals t/yr
Malmstrom AFB-Great Falls	20	67	0.59	22	1.637	2.484	111
Montana Refining-Great Falls	50	82	19	165	776	16	1,131
Conoco Inc.—Great Falls			150				150
ASARCO, Inc. –E. Helena	4.69	19	0.36	9,820	66	81	9,925
Ash Grove Cement--Clancy	23	697	1.56	241	116	199	1,162

1999 data fromEPA AirData website: www.epa.gov

These are all relatively small sources except for the ASARCO lead smelter, which is the largest individual source of SO2 and lead in Montana. Most of the ASARCO emissions, however, disperse to well within NAAQS before impacting the Lewis and Clark National Forest. No other sources of industrial emissions occur in the analysis area. A more detailed description of facility emissions can be found in the Montana Air Monitoring Network Review (2003) at: http://deq.mt.gov/AirMonitoring/networkRev/network2003.

Visibility

Acheson (1993), in a summary of USFS R1 visibility monitoring data, reports very high standard visual range (SVR) from two IMPROVE protocol camera sites designated to monitor visibility for the Bob Marshall Wilderness. Slides from the camera sites were used to estimate SVR which ranged from 275km to 350 km.

Meteorology/Weather

Topography and weather patterns determine the extent to which airborne particulate matter accumulates within a given area. The Continental Divide to the west, and the Big Belt and Little Belt Ranges to the south are primary factors in producing the frequent wintertime Chinook winds in this part of Montana. The prevalence of Chinook winds creates a relatively high average wind speed, which promotes good ventilation in the area most of the time (http://deq.mt.gov/AirMonitoring/networkRev/network2003).

In Central Montana, the topography ranges from rolling foothills to steep rugged glaciated mountain peaks (Crazy Mountains). The climate is influenced by prevailing westerly winds and two seasonal maritime systems. At lower elevations precipitation may be as little as 12 inches annually, while at higher elevations precipitation may exceed 40 inches annually. Average annual temperatures range between 33 and 56 °F, average annual relative humidity ranges from 45-66 % (www.climate-zone.com). Monthly mean surface winds range from 8 to 12 mph (www.wrcc.dri.edu.htmlfiles/).

Daily Patterns and Dispersion
Diurnal daytime temperature changes affect how pollutants are dispersed. The cooling of the earth's surface at night creates downslope winds that carry pollutants from higher terrain to low lying areas. Here pollutants may pool or exit the region along the river drainages. The heating of the earth's surface during the day causes pollutants to rise with the heated air where they are diluted and dispersed with the south west to westerly flow (Acheson et al., 2001).

Dispersion of pollutants is generally excellent due to persistent and often very strong winds, however the diverse nature of the terrain and climate in this region can result in variable dispersion characteristics. Mountainous terrain can provide shelter from prevailing winds and severely limit dispersion of pollutants in one area while funneling high winds into another to greatly enhance the dispersion. Temperature inversions, which trap pollutants, are not common in the analysis area, but the depth, duration and intensity vary widely from the mountains to the plains. Inversions on the plains seldom persist past noon, and are usually shallow and weak. Inversions in the mountainous areas are usually much stronger and deeper, and can persist for several days during the fall and winter. Low-level wind speed and direction patterns in the mountains are affected by terrain and generalizations or comparisons to any existing measurements at other sites are not very practical (MT DEQ 2003). Wind patterns on the flatter portion of the analysis area can be evaluated by comparison to existing sites and generally show the prevailing winds to be from the west and southwest.

Fugitive Dust
Air quality is affected by fugitive dust produced by vehicular traffic, especially on native surface roads. The silt content of the road surface layer, the distance traveled the weight and speed of the vehicle as well as weather conditions, influence the amount of dust produced. Paved roads produce a relatively smaller amount of dust than do native surface roads, especially during dry weather (USDA, 2002).

Fugitive road dust is a result of motorized vehicle use when road surfaces are dry. When a motorized vehicle travels on an unpaved road, the force of the wheels moving across the road surface causes pulverization of surface material. Dust is lofted by the rolling wheels as well as by the turbulence caused by the vehicle itself. This air turbulence can persist for a period of time after the vehicle passes (USDA, 2002).

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Variables which influence the amount of dust produced include the average vehicle speed, the average vehicle weight, the average number of wheels per vehicle, the road surface texture, the fraction of road surface material which is classified as silt (particles less than 75 microns in diameter), and the moisture content of the road surface (USDA, 2002).

Dust from other sources:
Central Montana (Great Falls, Harlowton, White Sulfur Springs) is well below standards for particulate matter. Small, transient amounts of dust are likely to be generated by pack stock, while using Forest trails. Most fugitive dust in the areas is a result of farming activities in the spring and fall, but dust particles usually disperse quickly in the prevailing westerly/southwesterly winds. PM, in the analysis area is well within the National and State Standards. Dispersal is best when the daytime heating is greatest. This usually coincides with the period of greatest atmospheric instability for the day. Free air winds penetrate into lower elevation at this time resulting in good vertical motion and dilution. Dispersal is usually poor at night due to the increase in atmospheric stability as cool air pools in valleys. This process also results in the development of valley inversions.

Dust, originating from tilled farm land, during dry windy weather, can add to local haze and reduce air quality (Story, 1995).

Vehicle emissions
Vehicle emissions in the analysis area are most concentrated along secondary highways 12, 87, 89, and 191 closest to or within the analysis area. The Forest does not have jurisdiction on vehicle use levels or emissions in any of these concentrated motorized use areas. Recreation motorized use and emissions in the analysis area are more localized to roads and motorized trails, with generally suffient wind dispersion to avoid air quality concerns. The EPA has set standards for emissions of nonroad engines and vehicles (snowmobiles, ATVs, boats, etc). The standards set for emissions of oxides of nitrogen (NO_X), hydrocarbons (HC), and carbon monoxide (CO) are to ensure compliance with the CAA, and to regulate those emissions that contribute significantly to the formation of ozone and carbon monoxide. Compliance with these standards requires manufacturers to apply existing gasoline or diesel engine technologies to varying degrees, depending on the type of engine (US EPA, 2002).

Because the occurrence of inversion is more likely during the winter months, snowmobile and vehicle emissions might be more concentrated in parking areas and trailheads. Kings Hill, near Monarch, MT lies within the analysis area, and is a very popular snowmobile use area during the winter months. As a comparison, the West Entrance of Yellowstone National Park has been an area of considerable discussion relative to air quality effects from snowmobiles. The National Park Service provides information that indicates snowmobiles have a much higher per vehicle emission rate than autos and trucks. Monitoring in 1999 documented carbon monoxide (CO) and particulate matter concentrations at the West Entrance, which were very close to violation of the CO one-hour and eight-hour NAAQS. Measured concentrations were less at Madison and Old Faithful. Modeling various alternatives of winter use at the West Entrance, found that none of the alternatives for winter use management in Yellowstone Park would exceed one-hour average CO concentrations for NAAQS or MAAQS, although CO concentrations would be elevated considerably above background levels (National Park Service, 2002).

Air Quality Effects Analysis
This analysis includes the direct effects (effects resulting from the implementation of an alternative that occur at the same place and time), indirect effects (effects resulting from the implementation of an alternative that occur later in time or are further removed in distance but are reasonably foreseeable), and cumulative effects (effects resulting from the incremental impacts of past, present and reasonably foreseeable future actions regardless of who is responsible). (USDA FS, 1995)

Direct, Indirect and Cumulative Effects:
Fugitive Dust.
The direct effects of fugitive dust, as a result of implementing the travel plan, are directly related to the level of use the area receives. The No Action alternative would not produce fugitive dust beyond the amount produced by routine forest management or user activities. The direct effects of fugitive dust are; reduced visibility on and adjacent to roads; and increased level of small diameter particulates, specifically PM 2.5 and PM 10, of concern for human health reason.

The indirect effects of fugitive dust produced as a result of the implementation of one of the action alternatives would be directly related to the level of use. Indirect effects are limited to the air quality degradation, as a result of PM2.5 and PM10 particulates, since larger diameter materials would settle out near the point of production. PM2.5 and PM10 levels would rapidly disperse as they are carried by local and general winds.

The cumulative effects of fugitive dust on air quality, as a result of the implementation of one of the action alternatives, would result in only negligible differences than those currently experienced, as PM 2.5 and PM 10 particles from road dust combine with other particles produced both by the implementation of other aspects of this project, specifically prescribed burning, as well as other local and regional sources located downwind. Prescribed burning of logging slash, on other federal, state or private lands, would also contribute particulates, as would agricultural burning and fugitive dust from tilled ground. Particulates from industrial and automotive sources also contribute to regional particulate loading. Other vehicle traffic, agricultural and industrial sources within the analysis area would also contribute to the cumulative particulate loading. It is not possible to predict the amount of particulates contributed by these other sources.

Fugitive dust is typically discussed in terms of motorized travel over road surfaces when they are dry. By comparison, a string of pack animals traveling over a dry trail surface is expected to produce only negligible levels of dust.

Vehicle Emissions

Direct and indirect effects of vehicle emissions on air quality do not result in measurable variations from current conditions, since emissions from recreational vehicles (cars, trucks, ATVs, snowmobiles, motorbikes, etc) are spread over much of the project area with generally good emission dispersion. No direct exceedances of NAAQS or MAAQS from dispersed motorized travel (including snowmobile use in winter) within the analysis area would be expected.

While snowmobiles produce nuisance emissions that are objectionable to some non-motorized users, the Kings Hill area receives much less use than West Yellowstone. By comparison, monitoring of snowmobile emissions at West Yellowstone indicated no exceedances of NAAQS or MAAQS, it is reasonable to expect that there would be no exceedances in a better ventilated, lower use, Kings Hill area.

Cumulative effects of motorized travel on air resources are unique in that past impacts to air quality are not usually evident. The emissions associated with motorized travel would be cumulative only with local emission sources described in the affected environment. Since motorized emission sources in the project area are localized and transient, actual cumulative combinations of emissions are minor and do not result in significant effects.

Terrestrial and Aquatic Life and Habitats:

Only minor effects on terrestrial life would be expected as a result of the proposed travel management adjustments, such as actual site disturbance from soil displacement caused by vehicle or pack-stock travel, or from pollutant deposition into the atmosphere from vehicle exhaust.

Impacts on aquatic life would also be minor both in ground-level soil disturbance and vehicle exhaust with only minor amounts of water surface area exposed to airborne contamination or by deposition (Habeck, 2005).

Class I Areas

Effects resulting from the implementation of one of the action alternatives would be considered indirect effects since none of these areas are within close proximity to the project area. The probability of impacting the Bob Marshall and Gates of the Mountains Wildernesses and Glacier National Park is considered to be quite low due to the negligible amount of pollutants produced, distance to these areas and the prevailing winds. The Class I Areas analyzed are located to the west,

southwest, and north of the project area. Prevailing winds will move particles east and northeast, away from Class I areas.

The cumulative effects on Class I Areas from the implementation of one of the action alternatives and other present and reasonably foreseeable future actions are not known at this time. The production of air pollutants associated with the implementation of this project would be negligible.

Conclusion
Air quality regulations allow omission of certain pollution sources in air quality analyses if they are considered very minor and are certain to have no detrimental effects. Administrative Rules of Montana, Title 17, Chapter 8 Air Quality specifically exempt mobile sources such as motor vehicles, trains, and aircraft, because their emissions are minimal and temporary. These sources are considered to emit pollutant amounts below *de minimus* levels. Air pollution sources that pass the de minimus test do not need to be included in air pollution impact analyses (Peterson). The level of vehicle activity and emissions associated with recreational use is considered to be below de minimus levels and no further analysis is needed.

Recreational travel within the analysis area will not cause or significantly contribute to violations of NAAQS or MAAQS degrade air quality by more that any applicable PSD increment, or cause or contribute to visibility impairment beyond existing conditions.

The project complies with the provisions of the Clean Air Act regarding the protection of Class I Areas; therefore, there would be no effects to air quality within the Bob Marshall and Gates of the Mountains Wildernesses or Glacier National Park as a result of implementation of any of the action alternatives.

***Recommendation*: No further analysis needed**

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