Whitetail Hazardous Fuels Reduction Project

Air Quality Report

Prepared by:

Marty Mitzkus
Fuels Specialist
Ashland Ranger District

10/16/2007

Introduction

The Whitetail Hazardous Fuels Reduction Project is located on National Forest System Lands within Ashland Ranger District of Custer National Forest. The community of Ashland in the vicinity of the project area has been designated as a "Community at Risk" from wildfire as defined in the Federal Register, August 17, 2001 (Vol. 66, No. 160). This project area falls within an area identified as "at-risk" in the River County Community Fire Plan (PRCCFP). This area needs treatment to reduce the risk from an uncharacteristic wild land fire. The communities of Stacey and Volborg Montana are identified Wild land-Urban Interface Communities within the vicinity of federal lands that are at high risk from wildfire (PRCCFP 2004). The quickest access route to the communities of Stacey and Volborg for emergency response personnel is via the East Fork Otter Creek Road. This road would become impassable in the event of a wildfire and is the number one priority treatment area as identified in the PRCCFP. Also within the project area is a Forest Service public campground, and rental cabin.

Current Management Direction

Federal, State and Local Regulations and Standards Pertinent to Fuels Reduction Projects

Federal Clean Air Act

The framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act , as amended in 1977 and 1990 (*42 U.S.C. §7401 et seq.).* The CAA was designed to "protect and enhance" the quality of the nation's air resources. The CAA encourages reasonable Federal, State and local government actions for pollution prevention. State Implementation Plans (SIPs) are developed by each state to implement the provisions of the CAA. The SIPs describe the State's actions to achieve and maintain the NAAQS.

National and State Ambient Air Quality Standards

EPA developed the National Ambient Air Quality Standards (NAAQS) for a specific set of "criteria" pollutants designed to protect public health. States can adopt standards even more stringent than the federal standards. NAAQS are defined as the amount of a criteria pollutant above which detrimental effects to public health (or welfare) may result (Table 1). NAAQS are set at a conservative level with the intent of protecting even the most sensitive members of the public including children, asthmatics, and people with cardiovascular disease. If an area consistently violates one of the NAAQS, that area becomes federally designated as a "non-attainment" area. Table 1 displays Ambient Air Quality Standards for pollutants pertinent to prescribed burning projects.

Table 1. Montana and National Ambient Air Quality Standards (MAAQS) pertinent to the WHFR Project

NAAQS and MAAQS

Pollutant	Averaging Period	Primary NAAQS	Secondary NAAQS	MAAQS
Carbon Monoxide (CO)	1-hour	40,000 µg/m^3 35 ppm [a]	---------	26,450 µg/m^3 23 ppm [a]
	8-hour	10,000 µg/m^3 9 ppm [a]	---------	10,000 µg/m^3 9 ppm [a]
Lead (Pb)	Calendar Quarter	1.5 µg/m^3 [b]	1.5 µg/m^3 [b]	---------
	90-day Average	---------	---------	1.5 µg/m^3 [b]
Nitrogen Dioxide (NO_2)	1-hour	---------	---------	564 µg/m^3 0.30 ppm [a]
	Annual	100 µg/m^3 0.053 ppm [b]	100 µg/m^3 0.053 ppm [b]	94 µg/m^3 0.05 ppm [b]
Ozone (O_3)	1-hour	235 µg/m^3 0.12 ppm [a]	235 µg/m^3 0.12 ppm [a]	196 µg/m^3 0.10 ppm [a]
	8-hour	157 µg/m^3 0.08 ppm [a]	157 µg/m^3 0.08 ppm [a]	---------
Particulate Matter ≤ 10 µm (PM_{10})	24-hour	150 µg/m^3 [c]	150 µg/m^3 [c]	150 µg/m^3 [c]
	Annual	---------	---------	50 µg/m^3 [d]
Particulate Matter ≤ 2.5 µm ($PM_{2.5}$)	24-hour	35 µg/m^3 [e]	35 µg/m^3 [e]	---------
	Annual	15.0 µg/m^3 [f]	15.0 µg/m^3 [f]	---------
Sulfur Dioxide (SO_2)	1-hour	---------	---------	1,300 µg/m^3 0.5 ppm [g]
	3-hour	---------	1,300 µg/m^3 0.5 ppm [a]	--------
	24-hour	365 µg/m^3 0.14 ppm [a]	---------	262 µg/m^3 0.10 ppm [a]
	Annual	80 µg/m^3 0.030 ppm [b]	---------	52 µg/m^3 0.02 ppm [b]

Hydrogen Sulfide (H_2S)	1-hour	---------	---------	70 µg/m^3 0.05 ppm [a]
Fluoride in Forage	Monthly	---------	---------	50 µg/gm [b]
	Grazing Season	---------	---------	35 µg/gm [b]
Settled Particulate Matter	30-day	---------	---------	10 gm/m^2 [b]
Visibility	Annual			3×10^{-5} /m [b, h]

a) Not to be exceeded more than once per calendar year.
b) Not to be exceeded in the averaging period specified.
c) Not to be exceeded more than once per year, as determined in accordance with 40CFR50 Appendix K.
d) Not to be exceeded in a calendar year, as determined in accordance with 40CFR50 Appendix K.
e) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each monitor must not exceed 35 ug/m^3.
f) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple monitors must not exceed 15.0 ug/m^3.
g) Not to be exceeded more than eighteen times in twelve consecutive months.
h) Scattering coefficient of particulate mater; applicable to Class I areas only.
Sources: 40CFR50, July 1, 2004. ARM 17.8.210-230, updated through September 30, 2004.

Montana Department of Environmental Quality Modeling Guidance DRAFT – 3/29/2007

Nonattainment Areas

If a community does not "attain" the NAAQS for one or more pollutants, the EPA will designate it a "non-attainment area." States must demonstrate to the public and the EPA how a non-attainment area will meet the NAAQS, based upon the control of emission sources. Such demonstrations employ control plans that are part of each SIP, including emissions from prescribed fire.

Regional Haze Rule (1990 Clean Air Act Amendments), 40 CFR Part 51.

In 1999, EPA promulgated the Regional Haze Rule (40 CFR 51.308-309), which calls for states to establish goals for improving visibility in mandatory Class I areas and to develop long-term strategies for reducing the emissions of air pollutants that cause visibility impairment. Class I areas include wilderness or National Parks greater than 5000 acres which existed on August 7, 1977. The Regional Haze Rule requires states to demonstrate "reasonable progress" toward improving visibility in each Class I area over a sixty-year period (to 2064), during which visibility should be returned to natural conditions.

The Regional Haze Rule also requires states to address visibility impairment in mandatory class I areas due to emissions from fire activities. The Preamble to the Rule emphasizes the "implementation of smoke management programs to minimize effects of all fire activities on visibility." The Rule requires states to address visibility effects from all fire sources contributing to visibility impairment in mandatory class I areas (Dzomba 2005). Regional haze will not be considered further in this document.

The Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

The Interim Policy suggests that air quality and visibility impact evaluations of fire activities on Federal lands should consider several different items during planning (EPA 1998). In a project level NEPA document, it is appropriate to consider and address to the extent practical, a description of applicable regulations, plans, or policies, identification of sensitive areas

(receptors), and the potential for smoke intrusions in those sensitive areas. Other important disclosure items include applicable smoke management techniques, participation in a basic smoke management program, and potential for emission reductions. Typically ambient air quality, visibility monitoring, and cumulative impacts of fires on regional and sub regional air quality are not explained to the same level of detail. Ambient air quality and visibility monitoring (for Class I areas) are typically done collaboratively with the states. Impacts to regional and sub regional air are addressed operationally through a coordinated smoke management program. The EPA urges states to develop, implement and certify smoke management programs that meet the recommended requirements of the Interim Policy. If a "certified" program is in place and smoke exceeds the particulate standard, it may not be considered a violation by EPA (Dzomba 2005).

Montana's Open Burning Guidelines in Chapter 8 of the Adminstrative Rules of Montana(ARM) Title - 17

These burning guidelines address wild land vegetation management burning pertinent to this project. Wild land vegetation management burning is the use of prescribed burning conducted by a public agency, or through a cooperative agreement or contract involving a public agency, to burn agricultural or forest land predominantly covered with trees, grass, or standing brush. Prescribed burning is the planned application of fire to vegetation to achieve any specific objective on lands selected in advance of that application. The application of fire may include natural or planned ignition. .

Forest Plan Direction

Table 3 displays the Custer National Forest Plan and Guidelines for air quality (LMP USDA Forest Service 2005) pertinent to the project.

Table 3 Custer National Forest Management Plan Program Strategies and Tactics

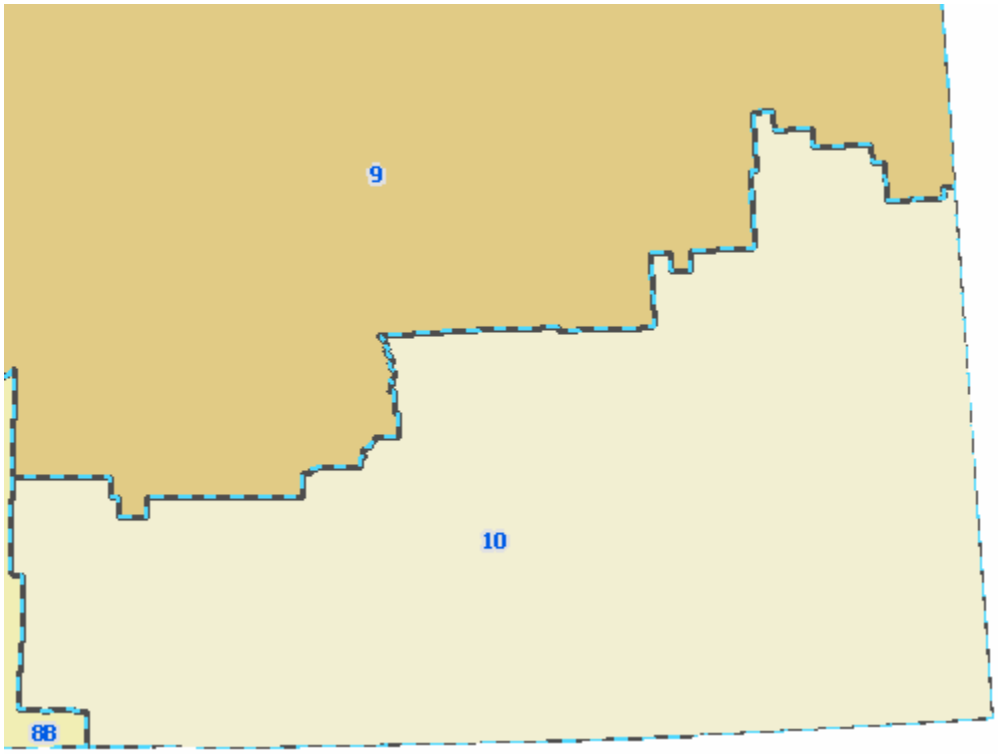
Standard	Discussion
Air Quality	1) Air quality will be protected by cooperating with Montana, North Dakota, and South Dakota Air Quality Bureaus in the Prevention of Significant Deterioration (PSD) program and State Implementation Plans (SIP). Requirements of the PSD, SIP, and State of Montana, North Dakota, and South Dakota Smoke Management Plans will be met whenever the FS has authority to do what is required. The Forest will cooperate with states, other agencies, and organizations in identifying, evaluating, proposing solutions, and monitoring air quality problems associated with activities permitted on National Forest and National Grassland surface. 2) The objective is to maintain air quality at or above levels required by federal and state laws, regulations, and standards. Air that passes over National Forest System lands will not be degraded below allowable increments by activities under Forest Service control. State and local governments and appropriate federal agencies will also be consulted and involved in monitoring and controlling air pollution originating on nonfederal lands and affecting air quality on federal lands. Standards

	developed in the Cooperative Smoke Management Plan will be used for prescribed burning activities in the applicable states.

Existing Condition

An airshed is primarily described by geography and topography. Montana Airshed 10 consists of fourteen counties, located in extreme southeastern Montana. It is bordered on the south by the Wyoming state line and east by the North Dakota and South Dakota state lines. The project is located in the south eastern part of the airshed in northern Powder River County. Refer to Figure 1 for Montana airshed locations. Montana Airshed 10 contains a largely rural population in the east with isolated urban areas around Billings in the central portion. Located within this geography is the Whitetail Hazardous Fuels Reduction Project in which approximately 9767 acres are being proposed for treatment.

Figure 1 Montana Airshed 10



Climate

The project area is located within a Dry Semi-arid climate zone characterized by hot dry summers and cold winters. Approximately 60 percent of precipitation falls within the months of March to June. Weather data at nearby Brandenburg between the years 1956 to 1995 show an average of 14.1 inches of precipitation per year (worldclimate.com 2005). A trace of precipitation falls during the winter months to a high of 2.6 inches in the month of June. Wind data collected from the Fort Howes weather station (1974-2006) shows winds throughout the year ranging between 2 and 17 miles per hour with an average 7 miles per hour. The most predominate wind direction is from the southwest. During frontal passages however, winds can be from the east.

Air Quality/Pollution

The project area lies within Powder River County. Air quality within the County is excellent with very limited local emission sources and consistent wind dispersion. Existing sources of emissions in the greater area include occasional construction equipment, vehicles, road dust, residential wood burning, wood/coal fires, and smoke from logging slash disposal. Emissions are very limited with no local visible sources of impairment. Wind dispersion throughout the entire area is robust, with no visible inversions or localized concentrations of emissions. The Whitetail Hazardous Fuels Reduction Project area is entirely within Montana airshed 10, and is considered to be in attainment by the Montana DEQ. The nearest non-attainment areas for PM_{10} are Lame Deer (30 miles to the west) and Sheridan, Wyoming (70 miles to the south). All of the remaining area is considered a Class II attainment area. The nearest Class I area is the Northern Cheyenne Indian Reservation which is approximately 15 miles to the west.

The major source of emissions in the vicinity of the project are the towns of Ashland and Colstrip, although both communities are in compliance with National Ambient Air Quality Standards (NAAQS). Ashland and Colstrip emissions visibly do not impact the area and are strongly dispersed by predominant south and southwest wind direction with generally good wind gradients.

Wildfires in Eastern Montana within the last 20 years have had a high frequency with several large fires in the last ten years. These fires produce considerable smoke though it is generally short duration (one to three days) and winds dissipate it quickly. Regional wildfire smoke has accumulated within the area during periods of extensive wildfire activity in 1988, 1994, 2000, 2003, 2006 and 2007. The prime source of wildfire emissions is from central and southern Idaho, Northern Wyoming and SW Montana.

Generally, the project area does not develop temperature inversions, which trap smoke and reduce smoke dispersal. Dispersion of emissions within the project area is very high due to the broken terrain and high wind activity.

Environmental Consequences

Direct and Indirect Effects

Proposed Action

Potential air quality effects of the Whitetail Fuels Reduction Project were analyzed using USFS R1 NEPA evaluation procedures for prescribed fire projects (Acheson et.al., 2000) which can be downloaded from the USFS R1 air quality website at http://www.fs.fed.us/r1/gallatin/air.index.shtml. The decision analysis in the procedure document was not used in lieu of the Smoke Impact Spreadsheet (SIS) model (Air Sciences, 2003) which updates the modeling specified in the USFS R1 guidance. The SIS model uses an excel spreadsheet to link to the FOFEM5 model for broadcast burn fuel loading, the Consume model for pile burn emissions, and the CalPuff model for dispersion modeling. Air quality mitigation measures are listed in Appendix B.

Below is a list of assumptions for modeling.

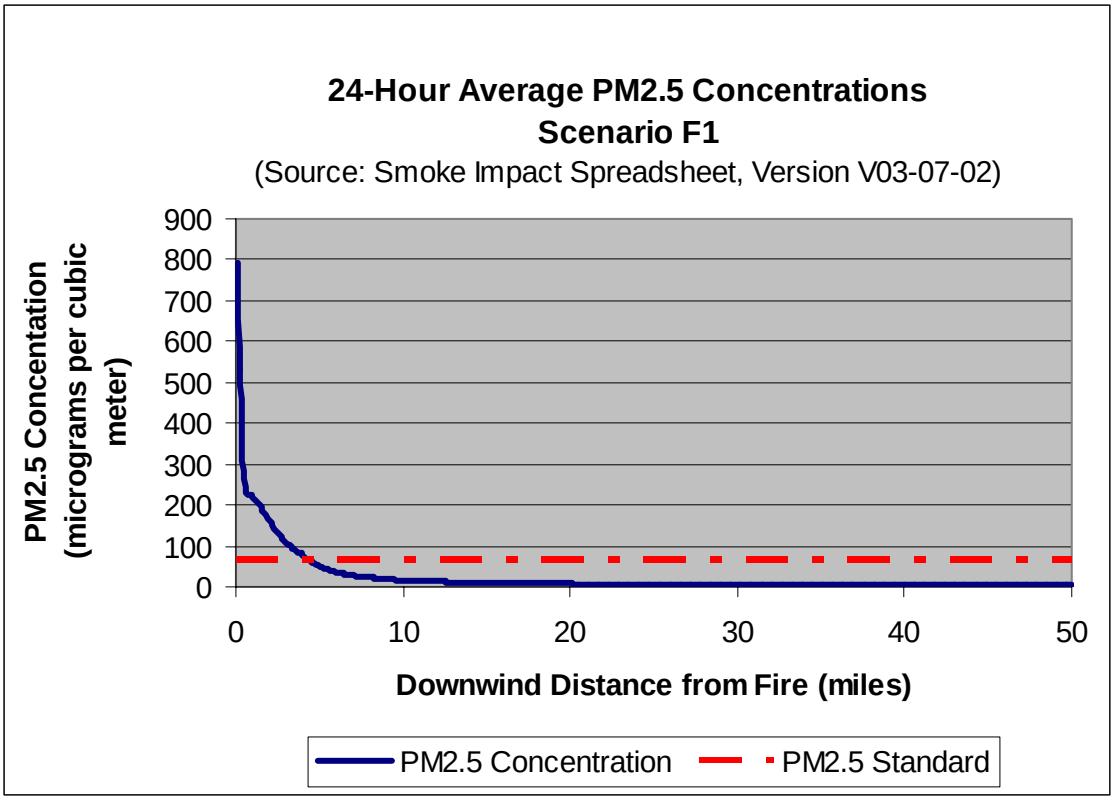
1. Conditions were developed from default fire behavior conditions in FOFEM.
2. FOFEM used an SAF 237 Ponderosa pine type to estimate smoke emissions for the treatments in ponderosa pine stands. In grassland types, SRM 309 Idaho Fescue- Western Wheatgrass was used.
3. Because not all of the area in each treatment will be burned, the project acres for smoke production have been corrected to reflect this effect. For information on area burned by treatment type, refer to the Fuels Specialist Report.

Direct effects of the burns include particulate emissions from prescribed burning. The under story burns produce a centralized plume due to a concentrated burn area while pile burns result in multiple plumes which consolidate into a central plume. Model results include:

Fuel Model	Project acres	Total PM 2.5 (Tons)	Total PM10 (Tons)	Total CO (Tons)
2	2365	4.7	5.9	13
9	1542	128	151	1,628
11	1340	112	131	1,415

The modeling results include projected emissions from all of the units which total 245 tons of $PM_{2.5}$ for prescribed burns. The burning would be implemented over a period of 1-5 years so any 1 year of emissions would likely not exceed 50 tons. Direct effects of the burns include particulate emissions from pile burning and under story burns. The under story burns produce a centralized plume due to a concentrated burn area while pile burns result in multiple plumes which consolidate into a central plume.

From these total emission figures and assuming a 300 acres per day, a n average $PM_{2.5}$ concentration was modeled. The chart below is from the SIS run for the project. Projected $PM_{2.5}$ emissions are below the 35 ug/m3 $PM_{2.5}$ standard at 6.2 miles from the burn. The minimum ambient distance is the spacing from the burn the public would have access to the air when outside of a vehicle. Access to the air triggers the 24hour average $PM_{2.5}$ 35 ug/m3 standard. All burns would disperse to low concentrations beyond 5-10 miles.



Spring burns would likely occur during a period of more wind dispersion than fall under story or pile burning, due to longer spring daytime length, and higher mixing heights. The under story and pile burn smoke plume would likely also disperse to the north and east. Outside of the minimum ambient distances the smoke concentrations are expected to be within NAAQS and State of Montana air quality standards. Whitetail Fuels Reduction Project burns would be coordinated with the Montana/Idaho State Airshed Group (http://www.smoke.org). The operations of the Montana/Idaho State Airshed Group are critical to minimize cumulative smoke/PM_{10} air quality impacts. The State Airshed Group, Monitoring Unit in Missoula, evaluates forecast meteorology and existing air quality statewide by individual airshed and specifies restrictions when smoke accumulation is probable due to inadequate dispersion.

Indirect effects would include some localized visibility reduction from the plumes. Some reduction in visibility driving along the Highway 212 could occur in narrow bands during under story or pile burning. Dispersion of the plumes would be expected to quickly mix the project smoke to insignificant visibility impact levels.

No Action

In the short run the air quality effects from the no action alternative are less than the preferred action since the emissions from the pile and under story burning would not occur. In the long run, the no action alternative would not allow the opportunity to reduce the amount of fuels in the treatment areas. Therefore, in the event of a wildfire increases in emissions would be seen. The no action alternative would forgo the fuels management opportunity to reduce the likelihood of intensive short term air quality impacts in exchange for a large wildfire.

Cumulative Effects:

Air resources are somewhat unique in that the past impacts to air quality are not usually evident or cumulative. The Whitetail Fuel Reduction Project emissions would be cumulative only with the local emission sources described in the affected environment occurring at the time of burning. Cumulative effects for air quality are very limited since there are very few sources of emissions in the analysis area. Cumulative concentrations from individual unit burns will not occur since only 1 under story burn unit or pile burn unit will occur at any one time with little potential for chronological overlapping. Cumulative effects would likely be the same as disclosed in the Direct and Indirect Effects.

Literature Review

Acheson, A, C. Stanich, and M. Story. 2000. Describing Air Resource Impacts from Prescribed Fire Projects in NEPA Documents, USGS Region 1. 38 pp.

Air Sciences, 2003. Users Guide Smoke Impact Spreadsheet (SIS). Portland, Oregon. http://www.airsci.com/SIS.htm.

Montana DSL, 1988, Montana Smoke Management, Memorandum of Agreement. p. D-15.

Elliott D.L., C.G. Holladay, W.R. Barchet, H.P. Foote, and W.F. Sandusky, 1986. Wind Energy Resource Atlas of the United States. US Department of Energy. p. 50.