U.S. Sheep Experiment Station Grazing and Associated Activities Project

Draft Prescribed Burning and Air Quality Report

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October 24, 2011

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Introduction

Smoke not only adversely affects visibility, but it contains a number of pollutants. For the purposes of analysis, we measure microscopic particles referred to as “particulate matter” (PM). Exposure to particulate matter can cause significant health problems, especially for people suffering from respiratory illnesses. The Environmental Protection Agency (EPA) has revised the air quality standards to provide improved health and visibility protection. With these standards in place land managers must consider using techniques that minimize prescribed fire emissions and the adverse impacts of smoke on public health and the environment. Careful planning and cooperation among land managers, air quality regulators, and local communities ensures that prescribed fire, clean air and public health goals can be met.

This report will discuss the effects on air quality from continuing operations of the Agricultural Research Service’s US Sheep Experiment Station (USSES). The purpose of this report is to describe the existing condition of air quality within the project area, evaluate the potential effects of the alternatives and whether continued operations would degrade air quality.

Overview of Issues Addressed

No concerns were brought forward during scoping regarding prescribed burning effects on air quality.

Measurement Indicators

Two standards apply to particulate matter and they are distinguished by the size of particulate matter described. PM_{10} describes all fine particles no larger than 10 microns in size. These particles can be harmful to human health because their small size allows them to bypass the filtration of the upper respiratory system and become lodged deep within the lungs. Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse." Sources of coarse particles include crushing or grinding operations and dust from paved or unpaved roads. Other particles may be formed in the air from the chemical change of gasses; they are indirectly formed when gases from burning fuels react with sunlight and water vapor. These can result from fuel combustion in motor vehicles, at power plants and in other industrial processes. PM_{10} has been the pollutant particulate level standard against which EPA has been measuring Clean Air Act compliance. Based on newer scientific findings, the Agency is considering regulations that will make $PM_{2.5}$ the new standard (EPA 2011a).

The description $PM_{2.5}$ refers to particles that are no larger than 2.5 microns (approximately $1/30^{th}$ the average width of a human hair). These are harmful in the same way as larger PM_{10} particles, but can lodge even deeper in the lungs due to their smaller size, and are associated with serious health problems and premature mortality. Particulate matter also has an adverse effect on maximum sight distance and scenic visibility. Sources of fine particles include all types of combustion activities (motor vehicles, power plants, wood burning) and certain industrial processes. The particulate level $PM_{2.5}$ would have the most significant impact in the project area as well as the area and people surrounding the project area. The measurement indicator will be the predicted smoke emissions ($PM_{2.5}$) on sensitive receptors and how that compares with appropriate Federal and State regulatory standards and requirements.

Regulatory Framework

Air quality is managed through a complex series of Federal, State, and local laws and regulations designed to assure compliance with the Clean Air Act. The USSES Grazing and Associated Activities Project is designed to meet the goals, objectives and standards set forth by the following Federal and local regulatory framework.

Federal Clean Air Act

In 1963 Congress passed the Federal Clean Air Act and amended the act in 1970, 1977, and 1990. The purpose of the act is to protect and enhance air quality while ensuring the protection of public health and welfare. The 1970 amendments established National Ambient Air Quality Standards (NAAQS), which must be met by most state and federal agencies, including the Forest Service.

States are given the primary responsibility for air quality management. Section 110 of the Clean Air Act requires states to develop State Implementation Plans (SIPs) that identify how the state will attain and maintain NAAQS. The Idaho Department of Environmental Quality (DEQ) are members of the Montana/Idaho Airshed Group (which is comprised of the State and Federal resource management agencies and private companies with a history of prescribed fire use) which mitigates smoke impacts through a burn approval process. The Clean Air Act requires that Forest Service actions have "no adverse effect" on air resources by meeting the NAAQS and non-degradation standards for Class I Areas. Managers are further directed to improve existing substandard existing conditions and reverse negative trends where practicable. All Prescribed Fire Burn plans will address mitigation measures to minimize smoke impacts and comply with the Clean Air Act. Table 1 shows the NAAQS for particle pollution set by the Clean Air Act for PM_{10} and $PM_{2.5}$. The USSES Grazing and Associated Activities Project is designed to meet the goals, objectives and standards set forth by this law and the State/local regulatory framework.

Table 1. NAAQS for particle pollution set by the Clean Air Act

National Ambient Air Quality Standards for Particle Pollution			
Pollutant	Primary Standards	Averaging Times	Secondary Standards
Particulate Matter (PM10)	150 µg/m3	24-hour[a]	
Particulate Matter (PM2.5)	15.0 µg/m3	Annual (Arith. Mean)[b]	Same as Primary
	35 µg/m3	24-hour[c]	

See the complete table of National Ambient Air Quality Standards at http://www.epa.gov/air/criteria.html)
Units of measure for the standards are micrograms per cubic meter of air (µg/m³).
a – With not more than one expected exceedence per year.
b - To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
c - To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).

Regional Haze Rule (1990 Clean Air Act Amendments, 40 CFR Part 5)

The Environmental Protection Agency's 1980 visibility rules (40 CFR 51.301-307) protect mandatory class 1 areas from human-caused impairments reasonably attributable to a single or small group of sources. In 1999, EPA adopted the Regional Haze Rule (40 CFR 51.308-309), mandating each state to develop a Regional Haze State Implementation Plan (SIP) to incorporate measures necessary to make reasonable progress towards national visibility goals. It 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. The Regional Haze Rule also requires states to address visibility impairment in mandatory class 1 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 1 areas (Story 2005). Visibility impairment is a basic indicator of air pollution concentrations and is recognized as a major air quality concern in the

Clean Air Act Amendments of 1977. Visibility variation occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere.

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 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 1 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. This project meets the intent of the Interim Policy through the NEPA analysis process and the practices of the Montana/Idaho Airshed Group.

General Conformity Rule

1990 Clean Air Act Amendments, Section 176 (c) of the Clean Air Act, part 51, subpart W, and part 93, subpart B

The General Conformity Rule implements the Clean Air Act conformity provision, which mandates that the Federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to an approved Clean Air Act implementation plan. In 2010, EPA promulgated revised General Conformity Rules (75 FR 17254). In the revised rules, prescribed fire activities are considered to “presume to conform” in states that have an EPA-certified state smoke management program. Since Idaho’s smoke management program is EPA-certified, prescribed fire activities are presumed to meet Clean Air Act General Conformity Rule requirements.

Western Regional Air Partnership

The Western Regional Air Partnership (WRAP), established in 1997, is a voluntary partnership of states, tribes, local air agencies, federal land managers and EPA. The Partnership recognizes the unique legal status and jurisdiction of tribes and seeks to promote policies that ensure fair and equitable treatment of all participating members of the WRAP. The Partnership also recognizes state, tribal and local air agency authority and responsibility to develop, adopt, and implement individual air quality plans within their jurisdictions. The WRAP revised their charter in 2009. The new purposes of the WRAP are as follows:

1. Maintain and update the regional haze work that WRAP has developed and continue to make the data and tools available for states and tribes to use as they implement their regional haze implementation plans;
2. Develop a common understanding of current and evolving regional air quality issues in the West, such as regional haze, ozone, fine and coarse particulate matter, nitrogen deposition and critical loads, and mercury and other hazardous air pollutants;
3. Examine and discuss Western regional air quality issues from a multi-pollutant perspective;

4. Develop and maintain regional databases that support regional and sub-regional technical analyses. This includes collection and analysis of data from various sources to produce regionally consistent, comparable, complete, and transparent results, able to be utilized and relied upon by individual jurisdictions and agencies;
5. Collaborate with EPA to ensure that, to the maximum extent possible, WRAP data and analyses are compatible with, and leverage work conducted at the national level. This could include WRAP work to compile data and analyses related to international, off-shore, and other sources of air pollution affecting Western air quality;
6. Evaluate the air quality impacts associated with regionally significant emission sources, such as mobile sources, fire, traditional and alternative energy development/extraction, windblown dust, and electricity generation, and, as warranted, to discuss regional and cross-jurisdictional strategies to improve air quality and mitigate the impacts from such sources;
7. Consult with air quality agencies in other regions to reduce duplication of effort and enhance efficiency and consistency of databases and analyses;
8. Evaluate how the impacts of climate change may affect air quality in the West; and
9. As requested by the membership, formulate and advance consensus positions on Western regional air quality issues.

State Guidance

Idaho DEQ defines open "outdoor" burning as any burning outdoors that does not pass through a stack, duct, or chimney. This includes outdoor residential, crop residue, and prescribed burning. The Idaho Administrative Code-DEQ Rules for the Control of Air Pollution in Idaho states:

> 614. PRESCRIBED BURNING.
>
> The use of open outdoor fires to obtain the objectives of prescribed fire management burning is an allowable form of open burning when the provisions of Section 614 are met. (5-1-94)
>
> 01. Burning Permits or Prescribed Fire Plans. (5-1-94)
>
> a. Whenever a burning permit or prescribed fire plan is required by the Department of Lands, U.S.D.A. Forest Service, or any other state or federal agency responsible for land management, any person who conducts or allows prescribed burning shall meet all permit and/or plan conditions and terms which control smoke. (5-1-94)
>
> b. The Department will seek interagency agreements to assure permits or plans issued by agencies referred to in Subsection 614.01.a. provide adequate consideration for controlling smoke from prescribed burning. (5-1-94) (Idaho Admin Code 2011)

In Idaho, burn permits are required for CRP and cultivated land burning. Permits are not required for forest land clearing or rangeland burning (Owen 2011). This would include prescribed burning being proposed on USSES lands. A site specific burn plan is developed for burning activities conducted on USSES lands and addresses measures to be taken to control potential smoke impacts to surrounding areas. All prescribed burning implemented within the USSES Grazing and Associated Activities Project area will comply according to the Idaho Administrative Code-DEQ Rules for the Control of Air Pollution in

Idaho. If ventilation problems are forecasted, prescribed burning is restricted by elevation or number of acres that can be burned or curtailed until good ventilation exists.

Montana/Idaho Airshed Group Guidance

In Idaho, land managers who conduct a "major" amount of prescribed burning participate in a bi-state smoke management program with Montana. The program is managed by the Montana/Idaho State Airshed Group (Idaho DEQ 2011). Through a Memorandum of Understanding, this group has established a smoke coordination system that provides air quality predictions /restrictions to its members. Burn restrictions in Idaho are based on recommendations from Idaho DEQ. Organizations use the Airshed Management System (AMS) database to coordinate burning through the Smoke Management Unit.

DEQ or the local air pollution control agency may take appropriate action according to applicable state or local statutes, rules, and regulations to ensure compliance. A member's failure to follow all procedures or burn restrictions or approvals issued under the SMP may result in Letters of Warning, Notices of Violation, or fines from state DEQs, or ultimately, may be considered grounds for revocation of membership in the Montana/Idaho Airshed Group (Montana/Idaho Airshed Group Operating Guide 2010).

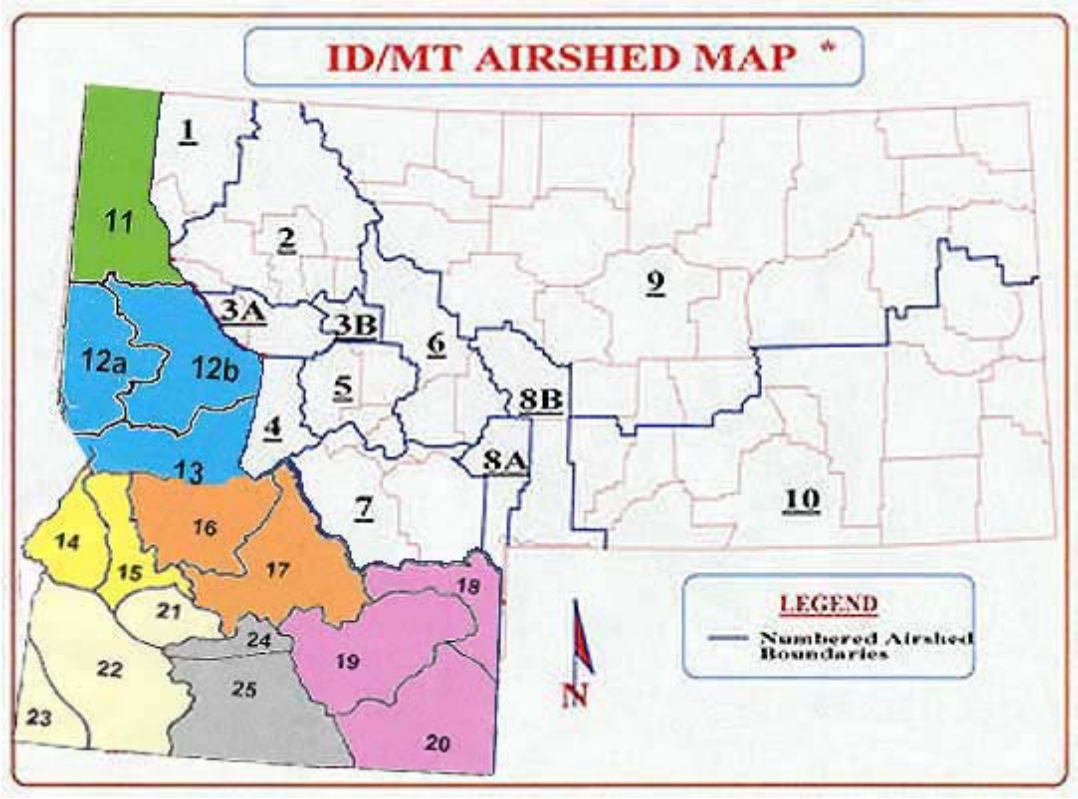
The USSES is not currently a member of the Airshed Group because of the small amount of burning conducted yearly on USSES lands. If other federal agencies, that are members of the Airshed Group, assist with burning on USSES lands it is advised they coordinate burning with the Airshed Group (Law 2011).

Affected Environment

Existing Condition

Analysis Area

The project area is the collective land of the ARS USSES, totaling 48,330 acres. This includes 2,600 acres at the Humphrey ranch, 1,200 acres at the Henninger ranch, 27,930 acres at the Headquarters and approximately 16,600 acres in the Centennial Mountains in Montana. The Centennial mountains land is used for summer grazing and rangeland research and is located approximately 25 miles west of Yellowstone National Park. Currently, the USSES grazes an average of 3,000 mature sheep on their land. The USSES project area lies within Montana/Idaho Airsheds 7 and 18 (Figure 1) in Clark County Idaho, and Beaverhead County Montana. Airsheds are defined and managed by Idaho DEQ.



Source: Montana/Idaho Airshed Group

Figure 1. Montana/Idaho airshed boundaries

Air Quality

Air quality within the project area is generally excellent. Limited local emission sources exist and there is consistent wind dispersion during much of the year. Wildland fires can produce substantial emissions in the summer and fall for short to moderate durations. Generally, there is consistent wind dispersion during much of the year.

Visibility at Class 1 Areas

The Clean Air Act (1963) establishes as a national goal "the prevention of any future, and the remedying of any existing impairment of visibility in mandatory class 1 Federal areas which impairment results from manmade air pollution" (42 U.S.C. §7491 et seq.).

The Clean Air Act Amendment of 1977 designated wilderness areas existing at that time to be class 1 areas. Areas designated Wilderness after 1977 are classified as class 2, unless they are additions to existing class 1 areas.

Idaho has five mandatory class 1 federal areas: Craters of the Moon National Monument, Hells Canyon Wilderness Area, Sawtooth Wilderness Area, Selway-Bitterroot Wilderness Area and Yellowstone National Park. The class 1 area nearest to the USSES Grazing and Associated Activities Project area is Yellowstone National Park, 49 air miles north east. Yellowstone Park could be affected by the proposed project during periods of atmospheric instability.

The Clean Air Act also allows the states to designate future wilderness areas as class 1 using normal state processes. These national park and wilderness areas are afforded visibility protection from anthropogenic

sources of air pollution, including emissions from prescribed burning. Figure 2 displays the geographic locations of all mandatory class 1 federal areas.

Figure 2. United States mandatory class 1 federal areas

Impaired visibility is a basic indicator of air pollution. The EPA has determined that regional variation in visibility needs to be addressed. The Regional Haze Regulations for Protection of Visibility in National Parks and Wilderness Areas (1997) are intended to improve visibility or visual air quality in 156 national parks and wilderness areas across the country. These regulations apply to all states, including those that do not have class 1 areas, because pollution that occurs in those states may contribute to impairment in other states or class 1 areas and must be accountable. The regional haze regulations propose "presumptive reasonable progress targets" for improving visibility in each class 1 area. The progress targets are described in terms of deciviews, a measure for describing perceived changes in visibility. For example, a deciview of zero represents pristine conditions.

A requirement of Prevention of Significant Deterioration (PSD) in class 1 areas is that new stationary sources must have a PSD permit. A stationary source is a source of pollution well defined, such as a smokestack. The USSES Grazing and Associated Activities Project is not considered a major stationary source and is not subject to the PSD permitting requirement.

Pollutants

Airsheds can include both attainment and nonattainment areas; designations EPA uses to describe the air quality in a given area for any of six common pollutants referred to as "criteria pollutants." The pollutants

are: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2) and particulate matter (PM). Carbon monoxide in high concentrations can be extremely hazardous to humans and animals, but its health impacts are usually only significant for personnel directly exposed to smoke (e.g. firefighters) (Hardy et al. 2001).

In addition to effects on health, some pollutants may also contribute to the formation of ozone in the atmosphere (Malm 1999). Lead at low levels can cause health problems either by inhalation or ingestion. Nitrogen dioxide may cause increased respiratory illnesses and harm lung function in people with existing respiratory illnesses. Breathing ozone can also trigger health problems and worsen bronchitis and asthma. Sulfur dioxide may also have adverse respiratory effects on humans with existing respiratory illnesses.

The main pollutants monitored for prescribed fire emissions are particulate matter. Particulate matter is fine material, of any substance, in sizes small enough to remain suspended in air for long periods.

Two standards apply to particulate matter and they are distinguished by the size of particulate matter described. PM_{10} describes all fine particles no larger than 10 microns in size. These particles can be harmful to human health because their small size allows them to bypass the filtration of the upper respiratory system and become lodged deep within the lungs. Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse." Sources of coarse particles include crushing or grinding operations and dust from paved or unpaved roads. Other particles may be formed in the air from the chemical change of gasses; they are indirectly formed when gases from burning fuels react with sunlight and water vapor. These can result from fuel combustion in motor vehicles, at power plants and in other industrial processes. PM_{10} has been the pollutant particulate level standard against which EPA has been measuring Clean Air Act compliance. Based on newer scientific findings, the Agency is considering regulations that will make $PM_{2.5}$ the new standard (EPA 2011a).

The description $PM_{2.5}$ refers to particles that are no larger than 2.5 microns (approximately $1/30^{th}$ the average width of a human hair). These are harmful in the same way as larger PM_{10} particles, but can lodge even deeper in the lungs due to their smaller size, and are associated with serious health problems and premature mortality. Particulate matter also has an adverse effect on maximum sight distance and scenic visibility. Sources of fine particles include all types of combustion activities (motor vehicles, power plants, wood burning) and certain industrial processes. The particulate level $PM_{2.5}$ would have the most significant impact in the project area as well as the area and people surrounding the project area, and is the focus of this analysis.

Nonattainment Areas

If a community does not attain the National Ambient Air Quality Standard (NAAQS) for one or more pollutants, the EPA would designate it a nonattainment area. States must demonstrate to the public and the EPA how a nonattainment area would meet the NAAQS, based upon the control of emission sources. Such demonstrations employ control plans that are part of each State Implementation Plan (SIP), including emissions from prescribed fire.

There are no designated non-attainment areas in Clark and Beaverhead County according to the EPA-Green Book (EPA 2011b).

Smoke-sensitive Areas

Smoke-sensitive areas are defined as:

> The distance and direction of sensitive areas should be disclosed. These are areas that could be impacted by the proposed burning activity and are considered sensitive due to

legislation, air quality concerns, or public concerns. Examples of sensitive areas are class 1 areas, non-attainment areas, impact zones identified by the Montana / Idaho State Airshed Group, major transportation corridors near or downwind from the proposed burning activity and population centers. To be consistent with other air quality permitting, it is suggested that areas within a 100 km radius, (62 miles) especially those areas downwind, should be identified (Acheson et al. 2005).

Table 2 displays a list of some of the sensitive receptors that could be impacted by smoke approximately 62 miles from the project area (list is not all-inclusive).

Table 2. Summary of sensitive receptors within 62 miles of the project area

Sensitive Receptors	Direction to Receptor	Approximate Distance to Receptor
Dubois, ID	S	2
Yellowstone National Park (Class 1)	E	50
Red Rocks NWR	N	27
US Interstate 15	W	Adjacent
US Highway 20	E	35
State Highway 22	S	1
State Highway 33	S	25
Island Park	NE	41
Lima, MT	NW	33
Ashton, ID	SE	37
Idaho Falls Area, ID	S	40
Dell, MT	NW	41
Spencer, ID	N	6
Humphrey, ID	N	15
St, Anthony, ID	SE	31
Monida, MT	N	21
Lakeview, MT	NE	30
West Yellowstone, MT	NE	59
Rexburg, ID	SE	35
Kilgore, ID	NE	15
Idmon, ID	E	13

Fugitive Dust from Vehicle Traffic on Unpaved Roads

Fugitive road dust is caused by the force of the tires of motorized vehicles moving across unpaved roads pulverizing the surface material. Dust is then lofted by the rolling wheels and the turbulence caused by the vehicle itself. This air turbulence can persist for a period of time after the vehicle passes. The quantity of dust emissions from a given segment of unpaved road varies with the volume of traffic. Variables that influence the amount of dust produced include the average vehicle speed, vehicle weight, number of wheels per vehicle, the road surface texture, and the fraction of road surface material classified as silt as well as the moisture content of the road surface. The moisture content of the road surface has the greatest influence on the amount of fugitive dust produced.

Several activities may contribute to fugitive dust effects within the project area including vehicle travel on roads during prescribed burning operations and bulldozers or other equipment constructing fire breaks. These activities should not cause significant impacts to regional air quality because of the transitory nature of fugitive dust; and therefore were not analyzed in detail.

Environmental Consequences

Methodology

Analysis of smoke production used current versions of FOFEM 5 (First Order Fire Effects Model), CONSUME 2.1, and SIS (Smoke Impact Spreadsheet) smoke production models (Schaaf and Norville 2002). Embedded in SIS is a module that calculates emissions using FOFEM 5 and the CONSUME 2.1 Pile Wizard. A dispersion module is also incorporated into the spreadsheet that calculates down-wind concentrations using the CALPUFF dispersion model.

Threshold for Significance

The threshold for significance will be the Federal and State regulatory standard of 35 μg/m³ for $PM_{2.5}$ and how the modeled $PM_{2.5}$ emissions compare with the regulatory standard.

Assumptions and Variables Used In the Models:

- 5448 feet (1661m) elevation at Sheep Headquarters, Dubois Idaho. Vegetation is primarily sagebrush-grass communities (Anderson 2007).
- Maud Mountain RAWS (BLM owned) approximately 20 miles west of Dubois Idaho was used as the representative weather station.
- Weather parameters used: 70 degree temperature, 10-m wind of 7 mph (Hitching Post Burn Plan 2005). Assumed 10 m and mid flame would be the same due to flat terrain and no over story vegetation to reduce winds at ground level.

All model runs were conducted using NFDRS fuel model T- Sagebrush Grass. For a fall and spring burn scenario it was assumed 200 acres would be ignited in a day and the meteorological values and mixing heights used resulted in a good ventilation index. Modeling outputs are located in the project record.

Limitations

Because model inputs are constant and there is no avenue to incorporate variability due to landscape, weather changes or human factors, the models will not precisely determine the exact amount of smoke or pollutant released. The possibility of increased smoke production and duration of smoke release exists due to the potential for multiple day burn windows, unpredicted stable air masses settling over the burn area and unexpected changes in weather conditions. Given the uncertainty of any modeling exercise, the results are best used to compare the relative effects, rather than as an indicator of absolute effects (Graham et al. 2004).

Spatial and Temporal Context for Effects Analysis

Spatial Bounds

A maximum perimeter distance of 50 miles was considered for effects. This is the maximum distance allowed in the SIS air modeling program and will be sufficient to show effects to class 1 areas.

Temporal Bounds

The time span of 1-3 days was chosen because smoke from prescribed burning is usually transitory in nature and impacts to air quality are expected to be relatively short lived, lasting 1-3 days after ignition is completed.

Measurement Indicators

The measurement indicator will be the predicted smoke emissions ($PM_{2.5}$) on sensitive receptors up to 50 miles downwind of the project area.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Because of the widespread and short-lived impacts of emissions from wildland fire and prescribed burning, no other projects were explicitly considered for cumulative impact analysis.

Connected Actions

Connected actions are considered necessary in order to implement proposed treatments. Fire control lines (fire breaks) and black lines are the connected actions proposed with this project.

Prescribed burning prescriptions developed prior to implementing the chosen alternative will define weather and fire behavior conditions which meet the objectives of the prescribed burn as well as minimize impacts to soil and residual vegetation. Fire control lines/ fire breaks will be constructed so that prescribed fire remains within designated unit boundaries. Control lines are defined as “all constructed or natural fire barriers and treated fire edges used to control a fire” (NWCG 1994). This includes but is not limited to the following; dozer lines, black lines, hand line, mowing and hose lays. Control lines may be constructed along existing trails, roads, ownership boundaries and in areas of thinner vegetation. The connected action discussed above would not have a measurable effect on the air resource and therefore was not analyzed in detail.

Alternative 2 – No Grazing Alternative

Direct Effects

This alternative has no direct effect on air quality because no activities would occur. All on-going activities on-going on USSES lands would stop including (but not limited to) grazing, prescribed burning and maintenance of sheep trails, firebreaks, roads and fences.

Indirect Effects

Under this alternative, no treatments would occur and there would be no degradation of air quality as a result of prescribed burning. However, this alternative could lead to increased fuel accumulations due to natural plant succession, and absence of sheep grazing and prescribed burning activities. This accumulation of fuels may lead to an increase in wildfire intensity in the future which could result in air quality degradation. Air quality can be degraded by smoke from wildfires to the point of human illness in some instances. Hardy (2001) noted emissions from wildfire are typically greater than emissions from a prescribed fire on the same acreage due to greater emission factor, fuel consumption, and fire intensity. The high levels of emissions associated with wildfires often violate NAAQS standards. Approximately 15,075 acres of USSES lands has been burned by wildfire from 1978- 2007 (Yurczyk 2011). Smoke from wildfire can cause visual impacts to the surrounding area and create hazardous driving conditions on adjacent state and county roads for extended periods of time. Should a wildfire occur, dust emissions from fire suppression equipment could also show a marked increase. In the short-term air quality impacts would be less because prescribed burning would not occur. In the long term the no grazing alternative would not meet the purpose and need of the project which is to provide for the continuation of historic and ongoing grazing and associated activities at the U.S. Sheep Experiment Station in support of the mission of the Agricultural Research Service.

Cumulative Effects

Emissions sources contributing to particulate matter and other pollutants would continue to be present in the area. These sources include but are not limited to vehicle exhaust, emissions associated with prescribed burning, fugitive dust and wildfires within or near the project area. Wildfire frequency is expected to continue as it has been observed in the past. An unwanted wildfire could lead to negative cumulative effects which would be dependent upon the size and intensity of the wildfire. Visibility impairment and human health impacts due to sudden and dramatic pollutant release are likely with a large wildfire event. Cumulative effects of smoke are unknown because the intensity and size of a wildfire is unknown. Research indicates wildfires can produce nearly twice the amount of smoke as prescribed fire (Huff et al. 1995).

Alternative 1 – Proposed Action - No New Federal Action

With the proposed action no new federal actions are proposed. The proposed action is a continuation of the historic and existing activities already occurring on the USSES. Prescribed burning to improve range land has been conducted on U.S. Sheep Experiment Station land since 1936. Prescribed burning is conducted for research, to improve forage production and provides secondary benefits for wildlife habitat and other resources. The USSES plans to burn mountain big sagebrush communities on Headquarters property on a 30 year rotation, or about 900 acres each year. Burning is conducted on 200-acre average size units and usually occurs in the fall with minor amounts of spring and late summer burning (USSES 2009). Burn units are unlikely to have complete combustion, so there would be unburned areas within the burn unit perimeter (Yurczyk 2011).

Table 3 and Table 4 below show the modeling results for a prescribed burn scenario conducted in the fall and spring. The projected $PM_{2.5}$concentration at 0.01 mile downwind is well below the Federal NAAQS and State 24-hour average concentration threshold of 35µg/m³ for both scenarios. Since the nearest class 1 area is approximately 50 air miles away, the results further show there would be no significant impacts to any class 1 area. The smoke concentrations from prescribed burning operations are expected to be within NAAQS and state of Idaho air quality standards. Idaho's smoke management program is EPA-certified, and the prescribed fire activities associated with the USSES project would meet Clean Air Act requirements.

Table 3. Estimated emissions for fall prescribed burn

Fall Prescribed Burn	
Downwind Distance (miles)	**24-hour Average $PM_{2.5}$ Concentrations (µg/m³)**
0.1	2.32
1.0	0.001
5.0	0.007
10.0	0.015
20.0	0.009
30.0	0.005
40.0	0.003
50.0	0.002

Table 4. Estimated emissions from a spring prescribed burn

Spring Prescribed Burn	
Downwind Distance (miles)	**24-hour Average $PM_{2.5}$ Concentrations (µg/m³)**
0.1	3.30
1.0	0.03
5.0	0.31
10.0	0.54
20.0	0.30
30.0	0.22
40.0	0.24
50.0	0.14

Alternatives- 3, 4 and 5

Alternatives 3, 4 and 5 would also meet all federal requirements and regulations as alternative 1 because the same number of acres are being proposed for burning so the effects on air quality would be the same. Alternative 1 provides a representative analysis and therefore alternatives 3, 4 and 5 were not analyzed in detail.

Design Features and Mitigation Measures Common to All Alternatives

All prescribed burning will be implemented in compliance with the Idaho Department of Environmental Quality (IDEQ).

All burning will take place under the guidelines set forth in a prescribed fire burn plan developed specifically for this project area. Prescribed burn plans address parameters for weather, air quality, smoke impacts and contingency resources.

Direct Effects Common to All Alternatives

Prescribed burning treatments would have direct, short-term impacts on air quality in the project area and surrounding areas. Prescribed burning for this project would occur during the spring and/or fall seasons and when weather conditions and dispersion forecasts are favorable and risk of escape is low. Transitory smoke as a result of implementation of the action alternatives could produce some smoky days in the local area, and may also result in the form of nuisance smoke, smell, or haze. Smoke would also be expected to settle into the lower draws during the evening hours following ignition, this would most likely occur during the burn smoldering phase.

Indirect Effects Common to All Alternatives

Wildfires present a risk to public health and damage both the environment and property. Wildfires are known to result in high levels of emissions and associated NAAQS violation, and poor visibility. Vegetation management treatments provide a long-term opportunity to reduce the magnitude of wildfire air quality problems. According to Wiedinmyer and Hurteau (2010) prescribed burning emissions on a per fire basis are considerably lower than emissions from wildfire. They state wide-scale prescribed fire application can reduce CO_2 fire emissions for the western United States by 18 to 25 percent. Analyses of the impacts of CO_2 emissions or sinks at the project level do not provide information meaningful to climate change. However research at the University of Wyoming found most of the carbon in sagebrush ecosystems is stored below ground and that it can remain stable for decades even after the sagebrush has

burned (Jones date unknown). Cleary (2005) found sagebrush organic pools were nearly at a steady state during a 40-year succession after fire and fire did not cause a permanent shift from shrub land to grassland. Cleary also noted ratios of carbon to nitrogen were not affected by succession after fire disturbance.

Prescribed burning practices that result in reduced fuel combustion will also release less greenhouse gases. Implementing emission reduction techniques to reduce smoke impacts and generate less emissions will also create a better CO_2 sink. Furthermore, shrub mortality rates from prescribed burning are typically lower than from wildfire, so surviving shrubs would continue to sequester carbon. While prescribed burning does not eliminate the occurrence of wildfire in these systems, there is evidence that treating fuels limits the severity of wildfire when it does occur because of reduced fuel availability. Wiedinmyer and Hurteau (2010) also conclude that fuel reduction treatments, such as prescribed burning, can be used to reduce CO_2 emissions from wildfires, although these treatments have direct carbon emissions associated with implementation while reducing carbon stocks.

The total amount of pollutants released by prescribed burning operations is unlikely to have a significant adverse effect on human health or visibility due to the small number of acres proposed for burning and the fuel type to be burned. It is probable that subsequent wildfires in the project area would produce fewer pollutants due to reduced fuel availability as a result of grazing and prescribed burning activities.

Cumulative Effects

Cumulative effects on air quality as a result of the implementation of any action alternative would result in an incremental decrease in air quality as pollutants from this project combine with other particles produced by the implementation of other aspects of this project, particularly fugitive road dust. Pollutants from fire do have an effect on an area, which depends on atmospheric conditions at the time of the fire. Fire pollutants can be cumulative with emissions from many local and regional sources, including other fires, vehicles, industrial sources, buildings and agriculture.

Compliance with Relevant Laws, Regulations, Policies and Plans

All prescribed burning would be implemented in full compliance with Idaho DEQ. All action alternatives would meet federal and state standards for air quality and comply with the Federal Clean Air Act.

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