
KEMMERER DRAFT
RESOURCE MANAGEMENT PLAN AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX J

Technical Support Document for Air Quality

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This technical support document describes the process used to conduct air quality impact analysis for the Kemmerer Resource Management Plan (RMP) revision, Draft Environmental Impact Statement (EIS). This document will serve as the basis for subsequent air quality impact analyses of other alternatives and the preferred alternative. Appendix J is divided into the following six sections:

- 1.0 Regulatory Framework
- 2.0 Agency Roles and Authorities
- 3.0 Existing Air Quality
- 4.0 Air Quality Impact Analysis
- 5.0 Emission Calculations
- 6.0 References

Copies of this technical support document and accompanying data files are available upon request from the Bureau of Land Management (BLM) Kemmerer Field Office.

1.0 REGULATORY FRAMEWORK

For quantitative analysis, the air quality criteria discussed in the paragraphs below apply. Although the criteria listed do not apply to the qualitative analysis presented in the Kemmerer Air Quality Analysis, they are identified here for reference purposes. The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA) and its amendments and the 1999 Regional Haze Regulations. The CAA addresses criteria air pollutants, state and national ambient air quality standards for criteria air pollutants, and the Prevention of Significant Deterioration program. The Regional Haze Regulations address visibility impairment.

Ambient Air Quality Constituents

Air pollutants addressed in this study include criteria pollutants, hazardous air pollutants (HAP), and sulfur and nitrogen compounds, which could cause visibility impairment or atmospheric deposition impacts.

Criteria Pollutants

Criteria pollutants are those for which national standards of concentration have been established. Ambient air concentrations of these constituents greater than the standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ozone (O₃), particulate matter (PM₁₀, PM_{2.5}), and lead, each of which is listed below.

Carbon Monoxide. CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation. Wildfires are natural sources of CO.

Nitrogen Dioxide. NO₂ is a red-brown gas formed during operation of internal combustion engines. Such engines emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_x). NO_x can contribute to brown cloud conditions and can convert to ammonium nitrate particles and nitric acid, which can cause visibility impairment and acid rain. Bacterial action in soil can be a natural source of nitrogen compounds.

Sulfur Dioxide. SO₂ forms during combustion from trace levels of sulfur in coal or diesel fuel. It can convert to ammonium sulfate and sulfuric acid, which can cause visibility impairment and acid rain. Volcanoes are natural sources of SO₂. Anthropogenic sources include refineries and power plants.

Ozone. O₃ is a gas that generally is not emitted directly into the atmosphere, but is formed from NO_x and volatile reactive organic compound (VOC) emissions. As stated above, internal combustion engines are the main source of NO_x. VOCs, such as terpenes, are very reactive. Sources of VOCs include, but are not limited to, paint, varnish, and types of vegetation. The faint acrid smell common after thunderstorms is caused by ozone formation caused by lightning. O₃ is a strong oxidizing chemical that can burn lungs and eyes, as well as damage plants.

Particulate Matter. Particulate matter (e.g., soil particles, hair, pollen) are essentially small particles suspended in the air that settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- PM₁₀ particles, particles with diameters of less than 10 micrometers, are small enough to be inhaled and can cause adverse health impacts.
- PM_{2.5} particles, particles with diameters of less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. Particles of this size also are the main cause of visibility impairment.

Lead. Before the widespread use of unleaded fuel in automobiles, lead particles were emitted from automobile tailpipes. Lead is not considered in this RMP/EIS because no proposed projects are expected to emit lead. The lead standard also will not be addressed in this appendix because lead is not a current concern; it will, however, be considered in future projects, as applicable.

Hazardous Air Pollutants

Although HAPs, including N-hexane, ethylbenzene, toluene, xylene, formaldehyde, and benzene, do not have ambient air quality standards, the U.S. Environmental Protection Agency (EPA) has issued reference concentrations for evaluating the inhalation risk for cancerous and noncancerous health impacts, known as reference concentrations for chronic inhalation.

The EIS associated with the Kemmerer RMP is a National Environmental Policy Act (NEPA) document and not a regulatory document, but the Record of Decision is binding and a “public record” (see 40 Code of Regulations [CFR] 1505.2). In addition, there are regulatory issues that should be taken into account in preparing this EIS and ensuing project-specific EISs. Regulation of HAPs is achieved through compliance with the applicable maximum achievable control technology (MACT) standards and not through ambient air quality standards. Regulatory agencies implement control through Section 112 programs, specifically Section 112(g) case-by-case MACT determinations based on 40 CFR Part 63, Subpart B, and Section 112(d) MACT emission standards.

Any source that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs is considered a major source and will require a Title V, Part 70, operating permit review and permit. This may include either a case-by-case 112(g) MACT determination, if the source is new or has had major modifications and no applicable MACT emission standard has been promulgated, or compliance with an applicable MACT emission standard. Specific regulations that may apply in the planning area include 40 CFR Part 63 Subpart HH, National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities; 40 CFR Part 63 Subpart HHH, National Emission Standards for Hazardous Air Pollutants From Natural Gas Transmission and Storage Facilities; and 40 CFR Part 63 Subpart ZZZ, National Emission Standards for Hazardous Air Pollutants

for Stationary Reciprocating Internal Combustion Engines. This last regulation, new in 2004, affects source categories using reciprocating engines for gas compression.

HAP emissions are associated with industrial activities, such as oil and gas operations, refineries, paint shops, dry cleaning facilities, and woodworking shops. Because this analysis is qualitative, no specific analyses of either short- or long-term HAP impacts are made.

Atmospheric Deposition Constituents

Sulfur and nitrogen compounds that can be deposited in terrestrial and aquatic ecosystems include nitric acid, nitrate, ammonium, and sulfate. Nitric acid and nitrate are not emitted directly into the air, but form in the atmosphere from industrial and automotive emissions of NO_x. Sulfate is formed in the atmosphere from industrial emission of sulfur dioxide (SO₂). Deposition of nitric acid, nitrate, and sulfate can adversely impact plant growth, soil chemistry, lichens, aquatic environments, and petroglyphs. Ammonium is primarily associated with feedlots and agricultural fertilization. Ammonium deposits can affect terrestrial and aquatic vegetation. Although deposition may be beneficial as a fertilizer, it can adversely impact the timing of plant growth and dormancy.

Although this analysis will be qualitative, future specific projects will require quantitative analyses using the criteria listed below.

Wyoming and National Ambient Air Quality Standards

Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based standards for the maximum concentration of air pollutants at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health. State standards must be as strict as, or stricter than, federal standards.

The EPA has developed standards for each pollutant for a specific averaging time (see Table J-1). Short averaging times (1, 3, and 24 hours) addresses short-term exposure, while the annual standards address long-term exposure. Longer-term standards are set to lower allowable concentrations than are short-term standards to recognize the cumulative impacts of long-term exposure.

Prevention of Significant Deterioration

The goal of the Prevention of Significant Deterioration (PSD) program is to ensure that air quality in areas with clean air does not significantly deteriorate, while a margin for future industrial growth is maintained. Under the PSD program, each area in the United States is classified by the air quality in that region according to the following system:

- **PSD Class I Areas.** Areas with pristine air quality, such as wilderness areas, national parks, and some Indian reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas.
- **PSD Class II Areas.** Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS).
- **PSD Class III Areas.** No areas have been designated yet as Class III. A larger incremental increase in pollutant concentrations would be allowed, up to the WAAQS and NAAQS.

Table J-1. National and Wyoming Ambient Air Quality Standards

Pollutant	Average Time	NAAQS (µg/m ³)	WAAQS (µg/m ³)
Carbon Monoxide (CO)	1 hour	40,000	40,000
	8 hours	10,000	10,000
Nitrogen Dioxide (NO ₂)	Annual ¹	100	100
Ozone (O ₃)	1 hour	235	235
	8 hours	157	157
Particulate Matter (PM ₁₀)	24 hours	150	150
	Annual	50	50
Particulate Matter (PM _{2.5})	24 hours	65	65
	Annual	15	15
Sulfur Dioxide (SO ₂)	3 hours	1,300 ²	1,300
	24 hours	365	260
	Annual	80	60
Hydrogen Sulfide (H ₂ S)	½ hour ³	-	70
	½ hour ⁴	-	40

Sources: Wyoming DEQ 2004; EPA 2006a

¹The standard of 100 µg/m³ NO₂ is equivalent to a standard of 0.05 ppm (Wyoming DEQ 2004).

²Secondary standard only, as there is no 3-hour federal primary standard for SO₂.

³Average not to be exceeded more than two times per year.

⁴Average not to be exceeded more than two times in any 5 consecutive days.

µg/m³ micrograms per cubic meter

NAAQS National Ambient Air Quality Standards

WAAQS Wyoming Ambient Air Quality Standards

Table J-2 provides the incremental increases allowed for specific pollutants in Class I and Class II areas.

Comparisons of potential PM₁₀, NO₂, and SO₂ concentrations with PSD increments are intended to evaluate a threshold of concern only and do not represent a regulatory PSD increment consumption analysis. Regulatory PSD increment consumption analyses are solely the responsibility of the State of Wyoming, which has been granted primacy (with EPA oversight) under the CAA.

In project-specific EISs, the BLM does not expect that a PSD analysis will be performed; rather, the PSD standards are used as a reference only to give the public a better understanding of the level of potential impact.

Table J-2. Prevention of Significant Deterioration Increments

Pollutant	Average Period	PSD Increment (µg/m ³) Class I	PSD Increment (µg/m ³) Class II
Sulfur Dioxide (SO ₂)	3-hours ¹	25	512
	24-hours ¹	5	91
	Annual	2	20
Particulate Matter (PM ₁₀)	24-hours	8	30
	Annual	4	17
Nitrogen Dioxide (NO ₂)	Annual	2.5	25
Carbon Monoxide (CO)	1-hour	None	None
	8-hours	None	None
Lead	3-months	None	None

Source: Wyoming DEQ 2004

¹The maximum allowable increment may be exceeded once per year at any receptor site (Wyoming DEQ, 2004).

PSD Prevention of Significant Deterioration

Regional Haze Regulations

Visibility impairment in the form of regional haze obscures the clarity, color, texture, and form of what we see. Haze-causing pollutants (mostly fine particles) are directly emitted into the atmosphere or are formed when gases emitted into the air form particles as they are carried downwind. Emissions from human-caused and natural sources can be carried great distances, contributing to regional haze. The Wyoming Department of Environmental Quality–Air Quality Division (DEQ AQD) submitted its Regional Haze State Implementation Plan (SIP) in accordance with 40 CFR, Part 51.309, in December 2003. The EPA has not taken action yet on this SIP.

Visual range, one of several ways to express visibility, is the farthest distance at which a person can distinguish a dark landscape feature from a light background, such as the sky. Without human-caused visibility impairment, natural visual range is estimated to average about 110 to 115 miles in the western United States and 60 to 80 miles in the eastern United States (Malm 1999).

The EPA developed regional haze regulations in response to the CAA amendments of 1977 and 1990. These regulations are intended to maintain visibility on the least-impaired days and to improve visibility on the most-impaired days in mandatory federal Class I areas across the United States, so that visibility in these areas is returned to natural conditions by the year 2064. These regulations require states to submit a regional haze SIP and progress reports to demonstrate reasonable progress toward the 2064 goal.

Applicability to the Kemmerer Planning Area

Air pollution impacts are limited by local, state, tribal, and federal air quality regulations, standards, and implementation plans established under the CAA and administered by the Wyoming DEQ AQD with oversight from the EPA. Air quality regulations require that proposed new, or modified existing, air pollutant emission stationary sources (including oil and gas compression facilities) undergo a permitting review before their construction can begin. Therefore, the Wyoming DEQ AQD has the primary authority and responsibility to review permit applications and to require emission permits, fees, and control devices before construction or start of operation.

Fugitive dust and exhaust from construction activities, along with air pollutants emitted during operation (for example, well operations, booster [field] and pipeline [sales] compressor engines associated with natural gas wells), are potential causes of air quality impacts. These issues are more likely to generate public concern where natural gas development activities occur near residential areas or near sensitive Class I and Class II areas.

The U.S. Forest Service (USFS), the National Park Service (NPS), and the U.S. Fish and Wildlife Service (USFWS), located throughout Wyoming, also have expressed concerns about potential atmospheric deposition (acid rain) and visibility impacts within downwind PSD Class I and PSD Class II sensitive areas under their administrations.

The NAAQS and the WAAQS are health-based standards for the maximum acceptable concentrations of air pollutants at locations to which the public has access. The analysis of the proposed alternatives must demonstrate continued compliance with all applicable local, state, tribal, and federal air quality standards. Existing air quality throughout the project area is in attainment of all ambient air quality standards, as demonstrated by the relatively low concentration levels presented in Tables J-3 and J-4.

Air quality regulations require that stationary proposed new or modified existing air pollutant emission sources (including oil and gas compression facilities) undergo a permitting review before their construction can begin. Therefore, the Wyoming DEQ AQD has been given primary authority over and responsibility for reviewing permit applications and for requiring emission permits, fees, and control device before construction and (or) operation. In addition, the U.S. Congress (through CAA Section 116) authorized local, state, and tribal air quality regulatory agencies to establish air pollution control

requirements more (but not less) stringent than federal requirements. Also, under both the Federal Land Policy and Management Act and the CAA, the BLM cannot authorize any activity that would not conform to all applicable local, state, tribal, and federal air quality laws, regulations, standards, and implementation plans.

Given the project area’s current attainment status, future development projects that have the potential to emit more than 250 tons per year of any criteria pollutant (or certain listed sources that have the potential to emit more than 100 tons per year) would be required to undergo a site-specific regulatory PSD increment consumption analysis under the federal New Source Review permitting regulations. Development projects that require PSD permits also may be required by the applicable air quality regulatory agencies to incorporate additional emission control measures (including a best available control technology [BACT] analysis and determination) to ensure protection of air quality resources and to demonstrate that the combined impacts of all PSD sources will not exceed the allowable incremental air quality impacts for NO₂, PM₁₀, and SO₂. Minor sources having emissions below the cutoff rates mentioned above do not require PSD permits; nevertheless, their emissions consume increment.

A regulatory PSD increment consumption analysis may be conducted, either as part of a New Source Review or independently. The determination of PSD increment consumption is a legal responsibility of the applicable air quality regulatory agencies, with EPA oversight. In addition, an analysis of cumulative impacts due to all existing sources and the permit applicant’s sources is required during a New Source Review to demonstrate that applicable ambient air quality standards will be met during the operational lifetime of the permit applicant’s operations.

Table J-3. Background Concentrations and Applicable Ambient Air Quality Standards

Pollutant/	Averaging Time/	Concentration (µg/m ³)	NAAQS (µg/m ³)	WAAQS (µg/m ³)	Location/Sampling Dates
Nitrogen Dioxide	Annual	3.4	100	100	Green River Basin Visibility Study, Green River, WY (2001)
Ozone	8 Hours	147	157	157	Green River Basin Visibility Study, Green River, WY (2001)
PM ₁₀	24 Hours	48	150	150	Moxa Arch Infill Project, Rock Springs, WY (2005)
	Annual	25	50	50	
Carbon monoxide	1 Hour	2229	40,000	40,000	Colorado Oil Shale Projects, Rifle and Mack, CO (early 1980's)
	8 Hours	1148	10,000	10,000	
Sulfur dioxide	3 Hours	29	1,300	1,300	Craig Power Plant and oil shale areas (1980-1984)
	8 Hours	18	365	260	
	Annual	5	80	60	

Source: Wyoming DEQ AQD 2006
 µg/m³ micrograms per cubic meter
 NAAQS National Ambient Air Quality Standards
 PM₁₀ particulate matter less than 10 microns in diameter
 ppm parts per million
 WAAQS Wyoming Ambient Air Quality Standards

Table J-4. Ambient Concentrations Measured near Specific Sources

Pollutant/Monitoring Station (Monitor ID)	Average Time/ Measurement	Concentration ($\mu\text{g}/\text{m}^3$) (Annual Average or 24- Hour Maximum)			NAAQS ($\mu\text{g}/\text{m}^3$ for PM_{10})
		2003	2004	2005	
PM₁₀ ($\mu\text{g}/\text{m}^3$)					
FMC Skull Point Mine, Kemmerer, Lincoln County (560230800) ¹	Annual 24 Hours	33 189	16 44	23 221	50 150
Pittsburg and Midway Coal #1, Kemmerer, Lincoln County (560230814)	Annual 24 Hours	7 22	5 18	7 16	50 150
Pittsburg and Midway Coal #2, Kemmerer, Lincoln County (560230815)	Annual 24 Hours	8 30	8 21	9 23	50 150
Pacificorp Naughton Plant, Kemmerer, Lincoln County (560230820)	Annual 24 Hours	18 104	18 110	13 60	50 150
FMC Trona Site 002, Sweetwater County (560371002)	Annual 24 Hours	12 39	11 34	13 32	50 150
FMC Trona Site 866, Sweetwater County (560371002)	Annual 24 Hours	19 54	18 63	19 101	50 150
General Chemical Site 1, Sweetwater County (560370013)	Annual 24 Hours	20 68	20 72	18 57	50 150
General Chemical Site 3, Sweetwater County (560370013)	Annual 24 Hours	12 33	11 29	11 26	50 150
General Chemical Site 4, Sweetwater County (560370013)	Annual 24 Hours	16 48	14 55	15 38	50 150

Source: EPA 2006a

¹Although this mine is now held by Pittsburg and Midway Coal Company and is no longer called Skull Point Mine, this is still the name of the monitoring station used in EPA (2006a).

$\mu\text{g}/\text{m}^3$ micrograms per cubic meter
 ID Identification
 N/A not applicable
 NAAQS National Ambient Air Quality Standards
 PM_{10} particulate matter less than 10 microns in diameter
 ppm parts per million

Sources subject to the PSD permit review procedure also are required to demonstrate potential impacts on air quality-related values (AQRV). These include visibility impacts, degradation of mountain lakes due to atmospheric deposition (acid rain), and impacts on sensitive flora and fauna in Class I areas. The CAA also provides specific visibility protection procedures for the mandatory federal Class I areas designated by the U.S. Congress on August 7, 1977, which included wilderness areas greater than 5,000 acres in size, as well as national parks and national memorial parks greater than 6,000 acres in size as of that date.

2.0 AGENCY ROLES AND AUTHORITIES

U.S. Environmental Protection Agency

The EPA administers the federal CAA (42 U.S. Code [U.S.C.] 7401 et seq.) to maintain the NAAQS that protect human health and to preserve the rural air quality in the region by ensuring the PSD Class I and Class II increments for SO_2 , NO_2 , and PM_{10} are not exceeded. The EPA has delegated this CAA authority to the State of Wyoming.

Wyoming Department of Environmental Quality

Wyoming regulates pollutants emitted into the air through the Wyoming Environmental Quality Act (W.S. 35-11-101 et seq.). Wyoming also is authorized by an approved SIP to administer all requirements of the PSD permit program under the CAA. In addition, the approved Wyoming SIP contains a number of programs that provide for the implementation, maintenance, and enforcement of the NAAQS, including a New Source Review program for minor source permitting that requires, among other things, an application of BACT for all new or modified sources, regardless of size or source category. Included, as well, are authorities for the control of particulate emissions, such as including fugitive particulate emissions from haul roads, access roads, or general facility boundaries. Wyoming also has been delegated the responsibility for operating an approved ambient air quality monitoring network for the purpose of demonstrating compliance with the NAAQS and the WAAQS.

Bureau of Land Management

NEPA requires that federal agencies consider mitigation of direct, indirect, and cumulative impacts during their preparation of an EIS (BLM Land Use Planning Manual 1601). Under the CAA, federal agencies must comply with SIPs regarding the control and abatement of air pollution. Before approval of RMPs or amendments to RMPs, the state director is to submit any known inconsistencies with SIPs to the governor of that state. If the governor of the state recommends changes in the proposed RMP or amendment to meet SIP requirements, the state director shall give the public an opportunity to comment on those recommendations (BLM Land Use Planning Manual, Section 1610.3-2).

U.S. Forest Service

The USFS administers national forests, which include several wilderness areas that could be affected by direct impacts associated with the project, such as the Bridger and Fitzpatrick wilderness areas which have mandatory federal Class I designations. As federal land managers, the USFS could act as a consultant to recommend that the BLM impact analysis results, or any future EPA- or state-administered PSD refined impact analysis results (if justified), trigger adverse impairment status. If the USFS determines impairment of wilderness areas, the BLM, the state, and/or the EPA might need to mitigate this predicted adverse air quality impact.

National Park Service

Two areas administered by the NPS with a mandatory federal Class I area designation, Grand Teton and Yellowstone National Parks, could be affected by direct impacts associated with emissions within the planning area. As federal land managers, the NPS could act as a consultant to recommend that the BLM impact analysis results, or any future EPA- or state-administered PSD refined impact analysis results (if justified), trigger adverse impairment status. If the NPS determines impairment of NPS-administered Class I areas, the BLM, the state, and/or EPA might need to mitigate this predicted adverse air quality impact.

3.0 EXISTING AIR QUALITY

As described in Chapter 3, Affected Environment (Air Quality section), specific air quality monitoring is not conducted throughout most of the project area, but air quality conditions are considered to be generally good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations. Table J-3 summarizes the ambient air quality background concentrations in the planning area. This information was provided by the Wyoming DEQ. Although monitoring is conducted primarily in urban or industrial areas, the data

selected are considered to be the best available representation of background air pollutant concentrations throughout the project area. The assumed background pollutant concentrations are below applicable ambient air quality standard for all pollutants and averaging times (although ozone levels approach the standards). Federal standards, Wyoming standards, and PSD increment values are presented in Tables J-1 and J-2.

4.0 AIR QUALITY IMPACT ANALYSIS

As described in Chapter 4, Environmental Consequences (Air Quality section), a qualitative emission comparison approach was used for this assessment. A qualitative method was selected because of a lack of specific project information on location, types, and magnitude of potential projects.

Emissions calculations were based on the best available engineering data and assumptions, emission inventory procedures, and professional and scientific judgment. However, where specific data or procedures were not available, activity assumptions were incorporated, as documented in the emission spreadsheets.

For any future projects, significance criteria for potential air quality impacts will include local, state, tribal, and federally enforced legal requirements to ensure that air pollutant concentrations remain within specific allowable levels. Table J-1 presents these requirements and legal limits.

Because the potential air pollutant emission sources comprise many small sources spread out over a very large area, discrete visible plumes are not likely to impact the distant sensitive areas, but the potential for cumulative visibility impacts (increased regional haze) is a concern. Regional haze degradation is caused by fine particles' and gases' scattering and absorbing light. Potential changes to regional haze are calculated in terms of a perceptible "just noticeable change" (1.0 deciview) in visibility when compared to background conditions in mandatory federal PSD Class I areas.

It is important to note that before actual development could occur, the applicable air quality regulatory agencies (including the state, tribe, or the EPA) would need to review specific air pollutant emissions preconstruction permit applications that examine potential project-specific air quality impacts. As part of these permit reviews (depending on source size), the air quality regulatory agencies could require additional air quality impact analyses or mitigation measures. Thus, before development occurred, additional site-specific air quality analyses would be performed to ensure protection of air quality. Federal land managers would require a demonstration that potential effects from proposed projects would not adversely impact AQRV (including visibility) in sensitive Class I and Class II areas.

5.0 EMISSION CALCULATIONS

When reviewing the emission inventory, it is important to understand that assumptions were made regarding development. For example, there is uncertainty regarding ultimate development of energy resources (e.g., number of wells, equipment used, specific locations of wells, etc.). In general, the assumptions that were made would tend to result in a conservatively high estimate of emissions. For instance, given the number of sources included in this analysis, the likelihood that all emission sources would actually operate at their reasonable, foreseeable maximum emission rates over an entire year (or even 24 hours) is small.

Summary emission inventories for each of the BLM activities for all of the alternatives are found in Chapter 4, Air Quality section. Activity data used to estimate emissions for proposed emission sources were obtained from Kemmerer Field Office staff and NEPA analyses performed for BLM actions within Wyoming that are similar to those associated with the actions proposed in this RMP/EIS (BLM 2002; BLM 2005). Emission factors used to estimate proposed emissions were obtained from (1) the EPA NONROAD Emissions Model (EPA 2004), (2) Wyoming DEQ AQD BACT levels for natural gas-fired

internal combustion engines (Hanify 2006 and Wyoming DEQ 2000), (3) MOBILE6 emissions models for on-road vehicles (EPA 2003), and (4) EPA AP-42 emission factors for various activities (EPA 2006b).

The analysis includes emissions estimates for the following activities: (1) oil development, (2) coalbed natural gas and conventional natural gas development, (3) coal mine development, (4) salable and locatable minerals development, (5) renewable energy development, (6) livestock management activities, (7) vegetation management, (8) fire management (including prescribed fire), (9) forest and woodlands activities, (10) rights-of-way, (11) OHV use, (12) resource roads, and (13) trona mining and processing. Activities related to cultural resources, paleontology, recreation, noxious and invasive weed control, and wildlife and fish would produce inconsequential amounts of air emissions.

Assumptions Used in Developing Emissions for the Kemmerer RMP

The following assumptions were used in the emission calculations:

- All emission sources operated at their reasonably foreseeable maximum emission rates (as identified in the other resource sections of this document) simultaneously throughout the area.
- All producing coalbed natural gas (CBNG) and conventional oil and gas wells projected in the RFD and existing currently were assumed to be fully operational and to remain operating, except for normal projected well closures throughout the area (well numbers are from BLM 2006a).
- For oil, gas, and CBNG wells, development of new federal producing wells was assumed to occur at a uniform rate from 2004 through 2020.
- Induced or secondary growth (e.g., increases in vehicle miles traveled) is not included in the emissions inventory. In addition, emissions from burning fossil fuels produced from BLM mineral estate are not included (unless the emissions are from a facility sited on BLM surface land or are directly attributable to activities on BLM surface). Only activities directly related to BLM actions are considered.
- Emissions from skid-mounted or portable asphalt hot mix plants that are occasionally sited on BLM land at sand and gravel pits are not included. These plants are temporary (typically seasonal).
- Stationary sources associated with oil and gas development would operate at emission levels based on currently observed BACT levels, and compressor stations for natural gas and CBNG would be equipped with nonselective catalytic reduction (NSCR) catalyst.
- Activity data associated with management actions other than those related to oil and gas wells (including CBNG wells) were averaged over the entire analysis period to produce annual average emissions, except for renewable energy development, where one development activity was assumed to occur in one year (2011) for modeling purposes and, for Alternatives C and D (which have 2 and 1.5 development activities, respectively), any remaining development activity was assumed to occur in 2020.
- EPA off-road emission standards were used to estimate emissions for non-road sources in project years 2006, 2011, and 2020. This approach simulates the replacement of existing sources by new lower-emitting equipment with future EPA off-road emission standards.
- Use of water application as a Best Management Practice (BMP) would reduce fugitive dust emissions from ground-disturbing activities during construction and reclamation activities and maintenance of roads at project sites by 50 percent from uncontrolled levels.
- BMPs for surface-disturbing activities are applied under all alternatives. BMPs provide protection to soil resources and minimize adverse impacts to soil stability, compaction, and productivity.

Also, it should be noted that the estimates of emissions often employ resource-specific assumptions about equipment use (e.g., horsepower, load factor, operating hours per day, and number of days per activity) that are based on the best professional judgment of BLM staff. BLM has taken all possible steps to ensure the assumptions are reasonable; however, the estimates of current and future emissions are just that – estimates.

Detailed descriptions for emissions estimation for each activity follow. Individual tables of air emissions for all BLM activities were calculated in spreadsheets for each activity. These spreadsheets are available on CD.

Oil and Gas Wells Emissions Estimation

Criteria pollutant emissions from oil, coalbed natural gas, and conventional natural gas wells development were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions from coalbed natural gas and conventional natural gas wells include the following:

- Fugitive dust and combustive emissions from well pad construction activities
- Fugitive dust and combustive emissions from road traffic
- Combustive emissions from natural gas-fired compressors
- Fugitive VOC emissions from well-site pneumatic pumps
- Fugitive dust and combustive emissions from separators, dehydrators, and water-tank heater operations
- Fugitive dust and combustive emissions from compressor station visits
- Fugitive dust and combustive emissions from well workover operations
- Fugitive dust and combustive emissions from well and pipeline visits for inspection and repair
- VOC emissions from tank condensate and truck loadout (for natural gas wells only)
- Fugitive dust and combustive emissions from road-maintenance activities
- Fugitive dust and combustive emissions from road and well reclamation activities.

Estimated emissions from oil wells include the following:

- Fugitive dust and combustive emissions from well pad construction activities
- Fugitive dust and combustive emissions from road traffic
- Fugitive dust and combustive emissions from well workover operations
- Fugitive dust and combustive emissions from well and pipeline visits for inspection and repair
- Fugitive dust and combustive emissions from road maintenance activities.

The estimated numbers of oil and gas wells are provided by the Kemmerer Field Office and shown in Table J-5 (this table accounts for net wells in operation and subtracts wells that have been abandoned).

Table J-5. Producing Oil and Gas Wells in the Planning Area

Well Type	Existing Wells 2001	2011 Operational Wells	2020 Operational Wells
Alternative A			
Coalbed Natural Gas	0	97	189
Natural Gas	590	866	1,118
Oil	572	520	468
Alternative B			
Coalbed Natural Gas	0	46	91
Natural Gas	590	748	878
Oil	572	516	461
Alternative C			
Coalbed Natural Gas	0	94	184
Natural Gas	590	868	1,122
Oil	572	520	469
Alternative D (Preferred Alternative)			
Coalbed Natural Gas	0	94	183
Natural Gas	590	864	1,115
Oil	572	520	468

Source: BLM 2006a. Includes only those wells on federal land or mineral estate.

Coal Mine Emission Estimation

Criteria pollutant emissions from coal mine operations were based on actual emissions for 2001 from Kemmerer Mine operations (Potter 2006), projected for the years 2011 and 2020 based on estimated future production (BLM 2006b). Note that emissions from the proposed surface coal mine in the Haystack area, which could be leased under Alternatives A, C and D, are not included in the estimate because there is not enough information at this time to reliably forecast production quantity, or when the coal mine might become active.

Trona Mining and Processing Emission Estimation

Criteria pollutant emissions from trona mining and processing operations were based on actual 2001 emissions from operations at the four trona mines and processing plants in the planning area (two operated by FMC Corporation, and one each by General Chemical and Solvay Minerals) (Bott 2006). Emissions for the years 2011 and 2020 were estimated to be the same as current emissions, based on projected production being essentially constant for the foreseeable future (CREG 2006; BLM 2006b).

Salable and Locatable Minerals Emission Estimation

Criteria pollutant emissions from salable and locatable minerals operations were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust emissions from sand and gravel or mineral processing
- Emissions from truck traffic on unpaved roads at the sand and gravel or mineral processing plant
- Emissions from batch-drop operations
- Fugitive dust and combustive emissions from development and reclamation activities.

Renewable Energy Emissions Estimation

Criteria pollutant emissions from renewable energy activities were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust and combustive emissions from wind-energy development
- Fugitive dust emissions from commuting vehicles on unpaved roads
- Combustive emissions from commuting vehicles on unpaved and paved roads.

Livestock Grazing Emissions Estimation

Criteria pollutant emissions from livestock grazing operations were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust and combustive emissions from construction of springs, reservoirs and pits, wells, pipelines, fences, and reservoir maintenance
- Fugitive dust emissions from commuting vehicles on unpaved roads
- Combustive emissions from commuting vehicles on unpaved and paved roads.

Vegetation Emissions Estimation

Criteria pollutant emissions from vegetation operations were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust and combustive emissions from vegetative mechanical treatments (excluding hand work)
- Fugitive dust emissions from commuting vehicles on unpaved roads
- Combustive emissions from commuting vehicles on unpaved and paved roads.

Fire-Management Emissions Estimation

Criteria pollutant emissions from fire-management activities were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust and combustive emissions from mechanical treatments (hand work) and prescribed fire
- Fugitive dust emissions from commuting vehicles on unpaved roads
- Combustive emissions from commuting vehicles on unpaved and paved roads.

Forest and Woodlands Emissions Estimation

Criteria pollutant emissions from forest and woodlands activities were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust and combustive emissions from silviculture treatments
- Fugitive dust emissions from commuting vehicles on unpaved roads
- Combustive emissions from commuting vehicles on unpaved and paved roads.

Rights-of-Way Corridors Emissions Estimation

Criteria pollutant emissions from rights-of-way corridors operations were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include the following:

- Fugitive dust and combustive emissions from construction of roads, telephone and fiber optics, powerlines, pipelines (mineral/water), communication sites, and other facilities
- Fugitive dust and combustive emissions for commuting vehicle road traffic.

Off-Highway Vehicles Emission Estimation

Criteria pollutant emissions from off-highway vehicles were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Off-highway vehicles include all terrain vehicles, motorcycles, and snowmobiles.

Road Maintenance Emission Estimation

Criteria pollutant emissions from road maintenance activities (excluding well road maintenance) were calculated based on data provided by the Kemmerer Field Office and used best available information, BACT, AP-42, and the emission studies from other BLM documents. Estimated emissions include fugitive dust and combustive emissions resulting from the use of a grader. It was assumed that road maintenance would occur twice in the summer and once in the winter.

Summary of Emissions for All BLM Activities

Tables J-6 through J-112 summarizes the projected total annual emissions by resource. In most cases, year 2011 and 2020 are presented. These years vary for select resources.

**Table J-6. Summary of Output – Alternative A
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	5.73	0.86	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.24	0.24	4.75	0.15	0.97	0.28	0.03
Commuting Vehicles - Construction	1.38	0.21	0.04	0.01	0.10	0.02	0.00
Sub-total: Construction	7.35	1.31	4.78	0.16	1.07	0.30	0.03
Natural Gas Compression - Operations ^a	4.00	4.00	22.21	0.04	44.43	22.21	3.55
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.07	0.00	0.06	0.00	0.00
Station Visits - Operations	3.82	0.57	0.02	0.00	0.19	0.01	0.00
Well Workover - Operations	1.07	0.17	0.22	0.00	0.05	0.01	0.00
Well & Pipeline visits for Inspection & Repair - Operations	2.44	0.36	0.01	0.00	0.12	0.01	0.00
Sub-total: Operations	11.33	5.11	22.53	0.05	44.86	22.25	3.56
Road Maintenance	0.34	0.04	0.09	0.00	0.02	0.01	0.00
Sub-total: Maintenance	0.34	0.04	0.09	0.00	0.02	0.01	0.00
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.00	0.00	0.00	0.00
Total Emissions	19.07	6.50	27.41	0.21	45.95	22.56	3.59

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-7. Summary of Output – Alternative A
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	5.73	0.86	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.24	0.24	4.75	0.15	0.97	0.28	0.03
Commuting Vehicles - Construction	1.38	0.21	0.04	0.01	0.10	0.02	0.00
Sub-total: Construction	7.35	1.31	4.78	0.16	1.07	0.30	0.03
Natural Gas Compression - Operations ^a	9.87	9.87	54.83	0.11	109.65	54.83	8.77
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.18	0.00	0.15	0.01	0.00
Station Visits - Operations	9.43	1.41	0.02	0.00	0.19	0.01	0.001
Well Workover - Operations	2.06	0.31	0.02	0.00	0.01	0.01	0.001
Well & Pipeline visits for Inspection & Repair - Operations	4.75	0.71	0.02	0.00	0.24	0.02	0.002
Sub-total: Operations	26.12	12.31	55.06	0.12	110.25	54.87	8.78
Road Maintenance	0.66	0.06	0.01	0.001	0.01	0.01	0.001
Sub-total: Maintenance	0.66	0.06	0.01	0.001	0.01	0.01	0.001
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	34.18	13.73	59.86	0.27	111.33	55.18	8.81

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-8. Summary of Output – Alternative B
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	2.67	0.40	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.11	0.11	2.21	0.07	0.46	0.13	0.01
Commuting Vehicles - Construction	0.64	0.10	0.02	0.00	0.05	0.01	0.00
Sub-total: Construction	3.43	0.61	2.23	0.07	0.51	0.14	0.01
Natural Gas Compression - Operations ^a	1.94	1.94	10.78	0.02	21.56	10.78	1.72
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.00	0.00	0.03	0.00	0.03	0.00	0.00
Station Visits - Operations	1.85	0.28	0.01	0.00	0.09	0.01	0.00
Well Workover - Operations	0.51	0.08	0.10	0.00	0.02	0.01	0.00
Well & Pipeline visits for Inspection & Repair - Operations	1.16	0.17	0.01	0.00	0.06	0.00	0.00
Sub-total: Operations	5.46	2.47	10.93	0.02	21.77	10.80	1.73
Road Maintenance	0.16	0.02	0.04	0.00	0.01	0.00	0.00
Sub-total: Maintenance	0.16	0.02	0.04	0.00	0.01	0.00	0.00
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.00	0.00	0.00	0.00
Total Emissions	9.10	3.14	13.20	0.10	22.28	10.94	1.74

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-9. Summary of Output – Alternative B
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	2.67	0.40	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.11	0.11	2.21	0.07	0.46	0.13	0.01
Commuting Vehicles - Construction	0.64	0.10	0.02	0.00	0.05	0.01	0.00
Sub-total: Construction	3.43	0.61	2.23	0.07	0.51	0.14	0.01
Natural Gas Compression - Operations ^a	4.67	4.67	25.94	0.05	51.89	25.94	4.15
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.08	0.00	0.07	0.00	0.00
Station Visits - Operations	4.46	0.67	0.01	0.00	0.09	0.01	0.001
Well Workover - Operations	0.99	0.15	0.01	0.00	0.01	0.00	0.000
Well & Pipeline visits for Inspection & Repair - Operations	2.29	0.34	0.01	0.00	0.12	0.01	0.001
Sub-total: Operations	12.42	5.84	26.05	0.06	52.17	25.97	4.15
Road Maintenance	0.32	0.03	0.01	0.000	0.00	0.00	0.000
Sub-total: Maintenance	0.32	0.03	0.01	0.000	0.00	0.00	0.000
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	16.21	6.52	28.29	0.13	52.68	26.11	4.17

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-10. Summary of Output – Alternative C
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	5.73	0.86	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.24	0.24	4.75	0.15	0.97	0.28	0.03
Commuting Vehicles - Construction	1.38	0.21	0.04	0.01	0.10	0.02	0.00
Sub-total: Construction	7.35	1.31	4.78	0.16	1.07	0.30	0.03
Natural Gas Compression - Operations ^a	3.78	3.78	21.01	0.04	42.01	21.01	3.36
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.07	0.00	0.06	0.00	0.00
Station Visits - Operations	3.61	0.54	0.02	0.00	0.18	0.01	0.00
Well Workover - Operations	1.03	0.16	0.22	0.00	0.05	0.01	0.00
Well & Pipeline visits for Inspection & Repair - Operations	2.36	0.35	0.01	0.00	0.12	0.01	0.00
Sub-total: Operations	10.79	4.84	21.32	0.05	42.43	21.04	3.36
Road Maintenance	0.33	0.04	0.09	0.00	0.02	0.01	0.00
Sub-total: Maintenance	0.33	0.04	0.09	0.00	0.02	0.01	0.00
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.00	0.00	0.00	0.00
Total Emissions	18.52	6.23	26.20	0.20	43.52	21.35	3.40

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-11. Summary of Output – Alternative C
 Total Annual Emissions from Coalbed Natural Gas Wells – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	5.73	0.86	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.24	0.24	4.75	0.15	0.97	0.28	0.03
Commuting Vehicles - Construction	1.38	0.21	0.04	0.01	0.10	0.02	0.00
Sub-total: Construction	7.35	1.31	4.78	0.16	1.07	0.30	0.03
Natural Gas Compression - Operations ^a	9.56	9.56	53.08	0.11	106.17	53.08	8.49
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.17	0.00	0.14	0.01	0.00
Station Visits - Operations	9.13	1.37	0.02	0.00	0.18	0.01	0.001
Well Workover - Operations	2.01	0.30	0.02	0.00	0.01	0.01	0.001
Well & Pipeline visits for Inspection & Repair - Operations	4.62	0.69	0.02	0.00	0.24	0.02	0.002
Sub-total: Operations	25.32	11.93	53.31	0.11	106.74	53.13	8.50
Road Maintenance	0.64	0.06	0.01	0.001	0.01	0.01	0.001
Sub-total: Maintenance	0.64	0.06	0.01	0.001	0.01	0.01	0.001
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	33.36	13.34	58.11	0.27	107.83	53.43	8.53

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-12. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	5.73	0.86	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.24	0.24	4.75	0.15	0.97	0.28	0.03
Commuting Vehicles - Construction	1.38	0.21	0.04	0.01	0.10	0.02	0.00
Sub-total: Construction	7.35	1.31	4.78	0.16	1.07	0.30	0.03
Natural Gas Compression - Operations ^a	3.78	3.78	21.01	0.04	42.01	21.01	3.36
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.07	0.00	0.06	0.00	0.00
Station Visits - Operations	3.61	0.54	0.02	0.00	0.18	0.01	0.00
Well Workover - Operations	1.03	0.16	0.22	0.00	0.05	0.01	0.00
Well & Pipeline visits for Inspection & Repair - Operations	2.36	0.35	0.01	0.00	0.12	0.01	0.00
Sub-total: Operations	10.79	4.84	21.32	0.05	42.43	21.04	3.36
Road Maintenance	0.33	0.04	0.09	0.00	0.02	0.01	0.00
Sub-total: Maintenance	0.33	0.04	0.09	0.00	0.02	0.01	0.00
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.00	0.00	0.00	0.00
Total Emissions	18.52	6.23	26.20	0.20	43.52	21.35	3.40

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-13. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Coalbed Natural Gas Wells – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	5.73	0.86	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.24	0.24	4.75	0.15	0.97	0.28	0.03
Commuting Vehicles - Construction	1.38	0.21	0.04	0.01	0.10	0.02	0.00
Sub-total: Construction	7.35	1.31	4.78	0.16	1.07	0.30	0.03
Natural Gas Compression - Operations ^a	9.55	9.55	53.06	0.11	106.11	53.06	8.49
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.17	0.00	0.14	0.01	0.00
Station Visits - Operations	9.12	1.37	0.02	0.00	0.18	0.01	0.001
Well Workover - Operations	2.00	0.30	0.02	0.00	0.01	0.01	0.001
Well & Pipeline visits for Inspection & Repair - Operations	4.60	0.69	0.02	0.00	0.23	0.02	0.002
Sub-total: Operations	25.28	11.92	53.28	0.11	106.69	53.10	8.49
Road Maintenance	0.63	0.06	0.01	0.001	0.01	0.01	0.001
Sub-total: Maintenance	0.63	0.06	0.01	0.001	0.01	0.01	0.001
Road Reclamation	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.06	0.04	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	33.32	13.33	58.08	0.27	107.77	53.41	8.52

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-14. Summary of Output – Alternative A
Total Annual Emissions from Natural Gas Wells – Year 2001

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	10.36	1.55	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	6.78	6.78	140.92	3.03	45.59	11.50	1.15
Well Completion Flaring	0.14	0.14	1.30	55.66	7.08	63.22	6.32
Commuting Vehicles - Construction	16.18	2.73	1.77	0.35	4.57	1.07	0.11
Sub-total: Construction	33.46	11.21	143.99	59.04	57.23	75.78	7.58
Natural Gas Compression & Pneumatic Pumps - Operations ^a	8.91	8.91	134.91	0.27	269.82	136.72	21.77
Separator, Dehydrator & Water Tank Heaters - Operations ^a	44.68	44.68	587.86	3.53	493.80	5,410.86	541.09
Station Visits - Operations	8.57	1.28	0.04	0.00	0.44	0.03	0.00
Well Workover - Operations	0.17	0.06	1.51	0.01	0.30	0.06	0.01
Well & Pipeline visits for Inspection & Repair - Operations	15.25	2.29	0.07	0.01	0.78	0.05	0.00
Tanks Condensate and Loadout	---	---	---	---	---	523.90	52.39
Sub-total: Operations	77.58	57.22	724.38	3.82	765.14	6,071.62	615.26
Road Maintenance	2.64	0.32	1.48	0.03	0.49	0.12	0.01
Sub-total: Maintenance	2.64	0.32	1.48	0.03	0.49	0.12	0.01
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions	113.70	68.76	869.86	62.88	822.86	6,147.52	622.85

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-15. Summary of Output – Alternative A
Total Annual Emissions from Natural Gas Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	21.43	3.21	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	7.38	7.38	209.39	6.29	31.62	9.39	0.94
Well Completion Flaring	0.17	0.17	1.56	66.93	8.51	76.02	7.60
Commuting Vehicles - Construction	33.57	5.67	3.67	0.72	9.47	2.21	0.22
Sub-total: Construction	62.56	16.44	214.63	73.94	49.60	87.62	8.76
Natural Gas Compression & Pneumatic Pumps - Operations ^a	12.70	12.70	192.29	0.38	384.59	194.87	31.02
Separator, Dehydrator & Water Tank Heaters - Operations ^a	63.64	63.64	837.33	5.02	703.36	4,485.97	448.60
Station Visits - Operations	12.22	1.83	0.05	0.01	0.62	0.04	0.00
Well Workover - Operations	0.35	0.13	3.13	0.02	0.63	0.13	0.01
Well & Pipeline visits for Inspection & Repair - Operations	21.74	3.26	0.10	0.01	1.11	0.07	0.01
Tanks Condensate and Loadout	---	---	---	---	---	432.47	43.25
Sub-total: Operations	110.65	81.56	1,032.90	5.44	1,090.30	5,113.54	522.89
Road Maintenance	3.70	0.40	1.03	0.01	0.24	0.09	0.01
Sub-total: Maintenance	3.70	0.40	1.03	0.01	0.24	0.09	0.01
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions	176.93	98.40	1,248.57	79.39	1,140.15	5,201.25	531.66

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-16. Summary of Output – Alternative A
Total Annual Emissions from Natural Gas Wells – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	21.43	3.21	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	7.38	7.38	209.39	6.29	31.62	9.39	0.94
Well Completion Flaring	0.17	0.17	1.56	66.93	8.51	76.02	7.60
Commuting Vehicles - Construction	33.57	5.67	3.67	0.72	9.47	2.21	0.22
Sub-total: Construction	62.56	16.44	214.63	73.94	49.60	87.62	8.76
Natural Gas Compression & Pneumatic Pumps - Operations ^a	16.40	16.40	248.32	0.50	496.64	251.64	40.06
Separator, Dehydrator & Water Tank Heaters - Operations ^a	82.16	82.16	1081.09	6.49	908.11	4563.77	456.38
Station Visits - Operations	15.78	2.36	0.07	0.01	0.80	0.05	0.005
Well Workover - Operations	0.27	0.05	0.21	0.02	0.07	0.10	0.010
Well & Pipeline visits for Inspection & Repair - Operations	28.08	4.21	0.12	0.01	1.43	0.09	0.009
Tanks Condensate and Loadout	---	---	---	---	---	438.74	43.87
Sub-total: Operations	142.68	105.18	1329.81	7.02	1407.06	5254.39	540.34
Road Maintenance	4.73	0.46	0.09	0.007	0.06	0.04	0.004
Sub-total: Maintenance	4.73	0.46	0.09	0.007	0.06	0.04	0.004
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	209.98	122.09	1,544.54	80.97	1,456.72	5,342.05	549.10

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-17. Summary of Output – Alternative B
Total Annual Emissions from Natural Gas Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	15.12	2.27	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	5.20	5.20	147.51	4.43	22.28	6.61	0.66
Well Completion Flaring	0.11	0.11	0.99	42.26	5.37	48.00	4.80
Commuting Vehicles - Construction	23.65	4.00	2.59	0.51	6.67	1.56	0.16
Sub-total: Construction	44.08	11.58	151.08	47.20	34.33	56.17	5.62
Natural Gas Compression & Pneumatic Pumps - Operations ^a	10.96	10.96	166.03	0.33	332.05	168.25	26.79
Separator, Dehydrator & Water Tank Heaters - Operations ^a	54.94	54.94	722.88	4.34	607.22	3,476.36	347.64
Station Visits - Operations	10.55	1.58	0.05	0.01	0.54	0.03	0.00
Well Workover - Operations	0.25	0.09	2.20	0.01	0.44	0.09	0.01
Well & Pipeline visits for Inspection & Repair - Operations	18.77	2.81	0.08	0.01	0.96	0.06	0.01
Tanks Condensate and Loadout	---	---	---	---	---	334.74	33.47
Sub-total: Operations	95.47	70.39	891.24	4.69	941.21	3,979.54	407.92
Road Maintenance	3.20	0.35	0.89	0.00	0.21	0.08	0.01
Sub-total: Maintenance	3.20	0.35	0.89	0.00	0.21	0.08	0.01
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions	142.77	82.31	1,043.22	51.90	975.75	4,035.79	413.54

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-18. Summary of Output – Alternative B
Total Annual Emissions from Natural Gas Wells – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	15.12	2.27	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	5.20	5.20	147.51	4.43	22.28	6.61	0.66
Well Completion Flaring	0.11	0.11	0.99	42.26	5.37	48.00	4.80
Commuting Vehicles - Construction	23.65	4.00	2.59	0.51	6.67	1.56	0.16
Sub-total: Construction	44.08	11.58	151.08	47.20	34.33	56.17	5.62
Natural Gas Compression & Pneumatic Pumps - Operations ^a	12.88	12.88	195.01	0.39	390.01	197.61	31.46
Separator, Dehydrator & Water Tank Heaters - Operations ^a	64.51	64.51	848.88	5.09	713.06	3076.36	307.64
Station Visits - Operations	12.39	1.86	0.05	0.01	0.63	0.04	0.004
Well Workover - Operations	0.19	0.03	0.15	0.01	0.05	0.07	0.007
Well & Pipeline visits for Inspection & Repair - Operations	22.05	3.30	0.10	0.01	1.12	0.07	0.007
Tanks Condensate and Loadout	---	---	---	---	---	295.11	29.51
Sub-total: Operations	112.02	82.58	1044.18	5.51	1104.88	3569.26	368.63
Road Maintenance	3.71	0.36	0.07	0.005	0.04	0.03	0.003
Sub-total: Maintenance	3.71	0.36	0.07	0.005	0.04	0.03	0.003
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	159.83	94.53	1,195.34	52.72	1,139.25	3,625.47	374.25

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-19. Summary of Output – Alternative C
Total Annual Emissions from Natural Gas Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	21.43	3.21	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	7.38	7.38	209.39	6.29	31.62	9.39	0.94
Well Completion Flaring	0.17	0.17	1.57	67.01	8.52	76.11	7.61
Commuting Vehicles - Construction	33.57	5.67	3.67	0.72	9.47	2.21	0.22
Sub-total: Construction	62.56	16.44	214.63	74.02	49.61	87.71	8.77
Natural Gas Compression & Pneumatic Pumps - Operations ^a	12.72	12.72	192.68	0.39	385.35	195.25	31.09
Separator, Dehydrator & Water Tank Heaters - Operations ^a	63.76	63.76	839.00	5.03	704.76	4,500.22	450.02
Station Visits - Operations	12.24	1.83	0.05	0.01	0.62	0.04	0.00
Well Workover - Operations	0.35	0.13	3.13	0.02	0.63	0.13	0.01
Well & Pipeline visits for Inspection & Repair - Operations	21.79	3.26	0.10	0.01	1.11	0.07	0.01
Tanks Condensate and Loadout	---	---	---	---	---	433.85	43.39
Sub-total: Operations	110.87	81.72	1,034.95	5.45	1,092.47	5,129.56	524.52
Road Maintenance	3.71	0.40	1.04	0.01	0.24	0.09	0.01
Sub-total: Maintenance	3.71	0.40	1.04	0.01	0.24	0.09	0.01
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions	177.15	98.57	1,250.62	79.48	1,142.32	5,217.36	533.30

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-20. Summary of Output – Alternative C
Total Annual Emissions from Natural Gas Wells – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	21.43	3.21	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	7.38	7.38	209.39	6.29	31.62	9.39	0.94
Well Completion Flaring	0.17	0.17	1.57	67.01	8.52	76.11	7.61
Commuting Vehicles - Construction	33.57	5.67	3.67	0.72	9.47	2.21	0.22
Sub-total: Construction	62.56	16.44	214.63	74.02	49.61	87.71	8.77
Natural Gas Compression & Pneumatic Pumps - Operations ^a	16.45	16.45	249.09	0.50	498.17	252.42	40.19
Separator, Dehydrator & Water Tank Heaters - Operations ^a	82.42	82.42	1084.41	6.51	910.91	4585.16	458.52
Station Visits - Operations	15.83	2.37	0.07	0.01	0.81	0.05	0.005
Well Workover - Operations	0.27	0.05	0.21	0.02	0.07	0.10	0.010
Well & Pipeline visits for Inspection & Repair - Operations	28.16	4.22	0.12	0.01	1.43	0.09	0.009
Tanks Condensate and Loadout	---	---	---	---	---	440.81	44.08
Sub-total: Operations	143.12	105.50	1333.90	7.04	1411.39	5278.63	542.81
Road Maintenance	4.74	0.47	0.09	0.007	0.06	0.04	0.004
Sub-total: Maintenance	4.74	0.47	0.09	0.007	0.06	0.04	0.004
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	210.44	122.41	1,548.63	81.07	1,461.06	5,366.38	551.58

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

Table J-21. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Natural Gas Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	21.43	3.21	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	7.38	7.38	209.39	6.29	31.62	9.39	0.94
Well Completion Flaring	0.17	0.17	1.56	66.82	8.49	75.90	7.59
Commuting Vehicles - Construction	33.57	5.67	3.67	0.72	9.47	2.21	0.22
Sub-total: Construction	62.56	16.44	214.63	73.83	49.59	87.50	8.75
Natural Gas Compression & Pneumatic Pumps - Operations ^a	12.66	12.66	191.78	0.38	383.57	194.35	30.94
Separator, Dehydrator & Water Tank Heaters - Operations ^a	63.47	63.47	835.11	5.01	701.49	4,467.01	446.70
Station Visits - Operations	12.18	1.83	0.05	0.01	0.62	0.04	0.00
Well Workover - Operations	0.35	0.13	3.13	0.02	0.63	0.13	0.01
Well & Pipeline visits for Inspection & Repair - Operations	21.68	3.25	0.10	0.01	1.10	0.07	0.01
Tanks Condensate and Loadout	---	---	---	---	---	430.64	43.06
Sub-total: Operations	110.36	81.34	1,030.17	5.43	1,087.41	5,092.23	520.73
Road Maintenance	3.69	0.40	1.03	0.01	0.24	0.09	0.01
Sub-total: Maintenance	3.69	0.40	1.03	0.01	0.24	0.09	0.01
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions	176.62	98.19	1,245.83	79.27	1,137.24	5,179.81	529.49

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-22. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Natural Gas Wells – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	21.43	3.21	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	7.38	7.38	209.39	6.29	31.62	9.39	0.94
Well Completion Flaring	0.17	0.17	1.56	66.82	8.49	75.90	7.59
Commuting Vehicles - Construction	33.57	5.67	3.67	0.72	9.47	2.21	0.22
Sub-total: Construction	62.56	16.44	214.63	73.83	49.59	87.50	8.75
Natural Gas Compression & Pneumatic Pumps - Operations ^a	16.35	16.35	247.59	0.50	495.19	250.90	39.95
Separator, Dehydrator & Water Tank Heaters - Operations ^a	81.92	81.92	1077.92	6.47	905.45	4551.90	455.19
Station Visits - Operations	15.73	2.36	0.07	0.01	0.80	0.05	0.005
Well Workover - Operations	0.27	0.05	0.21	0.02	0.07	0.10	0.010
Well & Pipeline visits for Inspection & Repair - Operations	27.99	4.19	0.12	0.01	1.42	0.09	0.009
Tanks Condensate and Loadout	---	---	---	---	---	437.60	43.76
Sub-total: Operations	142.26	104.87	1325.91	7.00	1402.93	5240.64	538.92
Road Maintenance	4.71	0.46	0.09	0.007	0.06	0.04	0.004
Sub-total: Maintenance	4.71	0.46	0.09	0.007	0.06	0.04	0.004
Road Reclamation	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Reclamation	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Reclamation	0.01	0.00	0.00	0.0000	0.00	0.000	0.0000
Total Emissions	209.55	121.78	1,540.63	80.84	1,452.58	5,328.18	547.67

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression

**Table J-23. Summary of Output – Alternative A
Total Annual Emissions from Oil Wells – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.07	0.01	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.18	0.18	6.08	0.82	1.52	0.19	0.02
Well Completion Flaring	0.11	0.02	0.00	0.00	0.01	0.00	0.00
Sub-total: Construction	0.36	0.21	6.08	0.82	1.53	0.19	0.02
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.01	0.01	0.15	0.01	0.03	0.01	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Workover - Operations	3.47	0.52	0.02	0.00	0.18	0.01	0.00
Sub-total: Operations	3.48	0.53	0.17	0.01	0.21	0.02	0.00
Road Maintenance	2.52	0.34	1.19	0.15	0.27	0.06	0.01
Sub-total: Maintenance	2.52	0.34	1.19	0.15	0.27	0.06	0.01
Total Emissions	6.37	1.08	7.44	0.97	2.01	0.27	0.03

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

**Table J-24. Summary of Output – Alternative A
Total Annual Emissions from Oil Wells – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.14	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.38	0.38	12.63	1.69	3.15	0.39	0.04
Well Completion Flaring	0.24	0.04	0.01	0.00	0.02	0.00	0.00
Sub-total: Construction	0.76	0.44	12.63	1.70	3.17	0.39	0.04
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.31	0.02	0.07	0.03	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Workover - Operations	3.15	0.47	0.01	0.00	0.16	0.01	0.00
Sub-total: Operations	3.17	0.49	0.33	0.02	0.23	0.04	0.00
Road Maintenance	2.29	0.31	1.08	0.13	0.25	0.06	0.01
Sub-total: Maintenance	2.29	0.31	1.08	0.13	0.25	0.06	0.01
Total Emissions	6.22	1.24	14.04	1.85	3.64	0.48	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

Table J-25. Summary of Output – Alternative A
Total Annual Emissions from Oil Wells – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.14	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.38	0.38	12.63	1.69	3.15	0.39	0.04
Well Completion Flaring	0.24	0.04	0.01	0.00	0.02	0.00	0.00
Sub-total: Construction	0.76	0.44	12.63	1.70	3.17	0.39	0.04
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.31	0.02	0.07	0.03	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Well Workover - Operations	2.83	0.42	0.01	0.00	0.14	0.01	0.001
Sub-total: Operations	2.86	0.45	0.33	0.02	0.21	0.03	0.00
Road Maintenance	3.38	0.46	1.59	0.195	0.36	0.08	0.008
Sub-total: Maintenance	3.38	0.46	1.59	0.195	0.36	0.08	0.008
Total Emissions	7.00	1.34	14.55	1.91	3.74	0.51	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

**Table J-26. Summary of Output – Alternative B
Total Annual Emissions from Oil Wells – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.10	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.27	0.27	8.89	1.19	2.22	0.27	0.03
Well Completion Flaring	0.17	0.03	0.00	0.00	0.01	0.00	0.00
Sub-total: Construction	0.53	0.31	8.90	1.19	2.23	0.27	0.03
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.22	0.01	0.05	0.02	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Workover - Operations	3.12	0.47	0.01	0.00	0.16	0.01	0.00
Sub-total: Operations	3.14	0.48	0.23	0.02	0.21	0.03	0.00
Road Maintenance	2.27	0.31	1.07	0.13	0.24	0.05	0.01
Sub-total: Maintenance	2.27	0.31	1.07	0.13	0.24	0.05	0.01
Total Emissions	5.95	1.10	10.20	1.34	2.68	0.36	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

**Table J-27. Summary of Output – Alternative B
Total Annual Emissions from Oil Wells – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.10	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.27	0.27	8.89	1.19	2.22	0.27	0.03
Well Completion Flaring	0.17	0.03	0.00	0.00	0.01	0.00	0.00
Sub-total: Construction	0.53	0.31	8.90	1.19	2.23	0.27	0.03
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.22	0.01	0.05	0.02	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Well Workover - Operations	2.79	0.42	0.01	0.00	0.14	0.01	0.001
Sub-total: Operations	2.81	0.43	0.23	0.02	0.19	0.03	0.00
Road Maintenance	3.33	0.45	1.57	0.192	0.36	0.08	0.008
Sub-total: Maintenance	3.33	0.45	1.57	0.192	0.36	0.08	0.008
Total Emissions	6.67	1.19	10.70	1.40	2.78	0.38	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

**Table J-28. Summary of Output – Alternative C
Total Annual Emissions from Oil Wells – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.14	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.38	0.38	12.63	1.69	3.15	0.39	0.04
Well Completion Flaring	0.24	0.04	0.01	0.00	0.02	0.00	0.00
Sub-total: Construction	0.76	0.44	12.63	1.70	3.17	0.39	0.04
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.31	0.02	0.07	0.03	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Workover - Operations	3.15	0.47	0.01	0.00	0.16	0.01	0.00
Sub-total: Operations	3.17	0.49	0.33	0.02	0.23	0.04	0.00
Road Maintenance	2.29	0.31	1.08	0.13	0.25	0.06	0.01
Sub-total: Maintenance	2.29	0.31	1.08	0.13	0.25	0.06	0.01
Total Emissions	6.22	1.24	14.04	1.85	3.64	0.48	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

Table J-29. Summary of Output – Alternative C
Total Annual Emissions from Oil Wells – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.14	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.38	0.38	12.63	1.69	3.15	0.39	0.04
Well Completion Flaring	0.24	0.04	0.01	0.00	0.02	0.00	0.00
Sub-total: Construction	0.76	0.44	12.63	1.70	3.17	0.39	0.04
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.31	0.02	0.07	0.03	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Well Workover - Operations	2.84	0.42	0.01	0.00	0.14	0.01	0.001
Sub-total: Operations	2.86	0.45	0.33	0.02	0.21	0.03	0.00
Road Maintenance	3.38	0.46	1.59	0.195	0.36	0.08	0.008
Sub-total: Maintenance	3.38	0.46	1.59	0.195	0.36	0.08	0.008
Total Emissions	7.00	1.34	14.55	1.91	3.74	0.51	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

Table J-30. Summary of Output - Alternative D (Preferred Alternative)
Total Annual Emissions from Oil Wells – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.14	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.38	0.38	12.63	1.69	3.15	0.39	0.04
Well Completion Flaring	0.24	0.04	0.01	0.00	0.02	0.00	0.00
Sub-total: Construction	0.76	0.44	12.63	1.70	3.17	0.39	0.04
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.31	0.02	0.07	0.03	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Well Workover - Operations	3.14	0.47	0.01	0.00	0.16	0.01	0.00
Sub-total: Operations	3.17	0.49	0.33	0.02	0.23	0.04	0.00
Road Maintenance	2.29	0.31	1.08	0.13	0.25	0.06	0.01
Sub-total: Maintenance	2.29	0.31	1.08	0.13	0.25	0.06	0.01
Total Emissions	6.22	1.24	14.04	1.85	3.64	0.48	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

Table J-31. Summary of Output – Alternative D (Preferred Alternative)
 Total Annual Emissions from Oil Wells – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Well Pad & Station Construction - Fugitive Dust	0.14	0.02	---	---	---	---	---
Heavy Equipment Combustive Emissions ^a	0.38	0.38	12.63	1.69	3.15	0.39	0.04
Well Completion Flaring	0.24	0.04	0.01	0.00	0.02	0.00	0.00
Sub-total: Construction	0.76	0.44	12.63	1.70	3.17	0.39	0.04
Natural Gas Compression - Operations ^a	0.00	0.00	---	---	---	---	---
Separator, Dehydrator & Water Tank Heaters - Operations ^a	0.02	0.02	0.31	0.02	0.07	0.03	0.00
Station Visits - Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.000
Well Workover - Operations	2.83	0.42	0.01	0.00	0.14	0.01	0.001
Sub-total: Operations	2.86	0.45	0.33	0.02	0.21	0.03	0.00
Road Maintenance	3.38	0.46	1.59	0.195	0.36	0.08	0.008
Sub-total: Maintenance	3.38	0.46	1.59	0.195	0.36	0.08	0.008
Total Emissions	7.00	1.34	14.55	1.91	3.74	0.51	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1

**Table J-32. All Alternatives
Total Annual Emissions from Coal Mining Operations**

	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Total Emissions - 2001	407.1	142.1	1320.3	1.5	285.1	0	0
Total Emissions - 2011, 2020	452.3	157.9	1467.0	1.7	316.8	0	0

Source: Potter 2006; Easley 2006

^aPM_{2.5} = PM₁₀ * 0.349 for this source (EPA 1999)

^bHAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note the following assumptions:

1. Emissions for PM₁₀, NO_x, SO_x, CO, VOCs and HAPs are actual emissions from 2001 as reported by Potter (2006).
2. PM_{2.5} emissions are not included in Potter (2006). PM_{2.5} emissions are estimated based on the ratio of PM_{2.5} to PM₁₀ emissions for this mine as reported by EPA (1999).
3. Future emissions are estimated based on ratio of current to future production (current = 4.5 million tons/yr, future = 5.0 million tons/yr). Easley (2006) provided the production info, and MacDonald (2006) provided the method for projecting emissions.

**Table J-33. All Alternatives
Total Annual Emissions from Trona Mining and Processing Operations – 2001**

	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^a
FMC Granger	65.50	65.50	495.20	107.00	635.70	183.00	1.05
FMC Wyoming Green River Soda Ash facility	870.40	870.40	258.80	0.00	105.70	251.00	109.70
General Chemical	838.90	838.90	2810.10	4896.20	238.50	5103.50	127.70
Solvay	159.30	159.30	1291.00	40.10	3509.80	1667.20	234.80
Total Emissions	1934.10	1934.10	4855.10	5043.30	4489.70	7204.70	473.25

Source: Bott 2006

^aHAPs = Hazardous Air Pollutants

Note the following assumptions:

1. Emissions for PM_{2.5} assumed equal to PM₁₀.
2. Emissions for PM₁₀, NO_x, SO₂, CO, VOCs, HAPs reported by Bott 2006.
3. Emissions projected constant for 2011 and 2020 based on no projected change in trona production (CREG 2006).

**Table J-34. Summary of Output – Alternative A
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment - Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment - Combustive	0.50	0.50	10.40	0.22	3.35	0.84	0.08
Total	289.59	34.00	20.35	0.23	3.41	0.86	0.09

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-35. Summary of Output – Alternative A
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles – Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment – Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment – Combustive	0.16	0.16	5.00	0.02	1.15	0.33	0.03
Total	289.26	33.67	14.95	0.03	1.21	0.35	0.03

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-36. Summary of Output – Alternative A
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment - Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment - Combustive	0.01	0.01	0.35	0.02	0.12	0.16	0.02
Total	289.11	33.52	10.29	0.03	0.18	0.18	0.02

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-37. Summary of Output – Alternative B
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	232.83	25.61	9.23	---	---	---	---
Unpaved Roads	0.73	0.11	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.00	0.06	0.02	0.00
Batch Drop Operations	0.84	0.27	---	---	---	---	---
Heavy Equipment - Dust	35.43	5.31	---	---	---	---	---
Heavy Equipment - Combustive	0.15	0.15	4.65	0.02	1.07	0.31	0.03
Total	269.98	31.45	13.90	0.03	1.12	0.32	0.03

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-38. Summary of Output – Alternative B
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	232.83	25.61	9.23	---	---	---	---
Unpaved Roads	0.73	0.11	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.00	0.06	0.02	0.00
Batch Drop Operations	0.84	0.27	---	---	---	---	---
Heavy Equipment - Dust	35.43	5.31	---	---	---	---	---
Heavy Equipment - Combustive	0.01	0.01	0.32	0.02	0.11	0.15	0.02
Total	269.84	31.32	9.57	0.03	0.17	0.17	0.02

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-39. Summary of Output – Alternative C
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles – Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment – Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment – Combustive	0.16	0.16	5.00	0.02	1.15	0.33	0.03
Total	289.26	33.67	14.95	0.03	1.21	0.35	0.03

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-40. Summary of Output – Alternative C
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment - Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment - Combustive	0.01	0.01	0.35	0.02	0.12	0.16	0.02
Total	289.11	33.52	10.29	0.03	0.18	0.18	0.02

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-41. Summary of Output – Alternative D (Preferred Alternative)
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment - Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment - Combustive	0.16	0.16	5.00	0.02	1.15	0.33	0.03
Total	289.26	33.67	14.95	0.03	1.21	0.35	0.03

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-42. Summary of Output – Alternative D (Preferred Alternative)
Annual Emissions Estimation for Salable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage	250.35	27.54	9.92	---	---	---	---
Unpaved Roads	0.78	0.12	---	---	---	---	---
Commuting Vehicles - Exhaust	0.01	0.01	0.03	0.01	0.06	0.02	0.00
Batch Drop Operations	0.91	0.29	---	---	---	---	---
Heavy Equipment - Dust	37.05	5.56	---	---	---	---	---
Heavy Equipment - Combustive	0.01	0.01	0.35	0.02	0.12	0.16	0.02
Total	289.11	33.52	10.29	0.03	0.18	0.18	0.02

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-43. Summary of Output – Alternative A
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.30	0.04	---	---	---	---	---
Commuting - Exhaust	0.05	0.04	0.20	0.04	0.42	0.12	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.87	0.87	17.09	0.37	5.70	1.45	0.15
Total	1.22	0.96	17.28	0.41	6.11	1.57	0.16

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-44. Summary of Output – Alternative A
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.30	0.04	---	---	---	---	---
Commuting - Exhaust	0.05	0.04	0.20	0.04	0.42	0.12	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.29	0.29	8.88	0.04	1.95	0.44	0.04
Total	0.63	0.37	9.08	0.08	2.36	0.56	0.06

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-45. Summary of Output – Alternative A
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.30	0.04	---	---	---	---	---
Commuting - Exhaust	0.05	0.04	0.20	0.04	0.42	0.12	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.02	0.02	0.58	0.04	0.19	0.27	0.03
Total	0.37	0.11	0.78	0.08	0.60	0.39	0.04

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-46. Summary of Output – Alternative B
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.15	0.02	---	---	---	---	---
Commuting - Exhaust	0.02	0.02	0.10	0.02	0.21	0.06	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.14	0.14	4.44	0.02	0.97	0.22	0.02
Total	0.32	0.19	4.54	0.04	1.18	0.28	0.03

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-47. Summary of Output – Alternative B
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.15	0.02	---	---	---	---	---
Commuting - Exhaust	0.02	0.02	0.10	0.02	0.21	0.06	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.01	0.01	0.29	0.02	0.09	0.13	0.01
Total	0.18	0.05	0.39	0.04	0.30	0.19	0.02

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-48. Summary of Output – Alternative C
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.30	0.04	---	---	---	---	---
Commuting - Exhaust	0.05	0.04	0.20	0.04	0.42	0.12	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.29	0.29	8.88	0.04	1.95	0.44	0.04
Total	0.63	0.37	9.08	0.08	2.36	0.56	0.06

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-49. Summary of Output – Alternative C
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Product Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.30	0.04	---	---	---	---	---
Commuting - Exhaust	0.05	0.04	0.20	0.04	0.42	0.12	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.02	0.02	0.58	0.04	0.19	0.27	0.03
Total	0.37	0.11	0.78	0.08	0.60	0.39	0.04

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-50. Summary of Output – Alternative D (Preferred Alternative)
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.15	0.02	---	---	---	---	---
Commuting - Exhaust	0.02	0.02	0.10	0.02	0.21	0.06	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.14	0.14	4.44	0.02	0.97	0.22	0.02
Total	0.32	0.19	4.54	0.04	1.18	0.28	0.03

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-51. Summary of Output – Alternative D (Preferred Alternative)
Annual Emissions Estimation for Locatable Minerals Equipment Usage – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5} ^a	NO _x	SO ₂	CO	VOC	HAPs ^b
Sand Handling, Transfer, and Storage ^c	---	---	---	---	---	---	---
Unpaved Roads	0.15	0.02	---	---	---	---	---
Commuting - Exhaust	0.02	0.02	0.10	0.02	0.21	0.06	0.01
Heavy Equipment - Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Combustive	0.01	0.01	0.29	0.02	0.09	0.13	0.01
Total	0.18	0.05	0.39	0.04	0.30	0.19	0.02

^a Emission factor for PM_{2.5} = PM₁₀ for combustive emissions.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

^c Handling (including batch drop), transfer, and storage does not apply since locatable operations are primarily building stone.

**Table J-52. Summary of Output – Alternative A
Total Annual Emissions from Renewable Energy Development – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1,170.00	175.50	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.05	0.05	1.43	0.01	0.32	0.07	0.01
Sub-total: Heavy Equipment	1,170.05	175.55	1.43	0.01	0.32	0.07	0.01
Commuting Vehicles - Fugitive Dust	20.75	3.10	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.11	0.10	0.48	0.09	1.43	0.29	0.03
Sub-total: Commuting Vehicles	20.86	3.20	0.48	0.09	1.43	0.29	0.03
Total	1,190.90	178.75	1.91	0.10	1.75	0.36	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-53. Summary of Output – Alternative A
Total Annual Emissions from Renewable Energy Development – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.00	0.00	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Commuting Vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-54. Summary of Output – Alternative B
Total Annual Emissions from Renewable Energy Development – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1,170.00	175.50	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.05	0.05	1.43	0.01	0.32	0.07	0.01
Sub-total: Heavy Equipment	1,170.05	175.55	1.43	0.01	0.32	0.07	0.01
Commuting Vehicles - Fugitive Dust	20.75	3.10	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.11	0.10	0.48	0.09	1.43	0.29	0.03
Sub-total: Commuting Vehicles	20.86	3.20	0.48	0.09	1.43	0.29	0.03
Total	1,190.90	178.75	1.91	0.10	1.75	0.36	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-55. Summary of Output – Alternative B
Total Annual Emissions from Renewable Energy Development – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.00	0.00	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Commuting Vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-56. Summary of Output – Alternative C
Total Annual Emissions from Renewable Energy Development – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1,170.00	175.50	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.05	0.05	1.43	0.01	0.32	0.07	0.01
Sub-total: Heavy Equipment	1,170.05	175.55	1.43	0.01	0.32	0.07	0.01
Commuting Vehicles - Fugitive Dust	20.75	3.10	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.11	0.10	0.48	0.09	1.43	0.29	0.03
Sub-total: Commuting Vehicles	20.86	3.20	0.48	0.09	1.43	0.29	0.03
Total	1,190.90	178.75	1.91	0.10	1.75	0.36	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-57. Summary of Output – Alternative C
Total Annual Emissions from Renewable Energy Development – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	1,170.00	175.50	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.09	0.01	0.03	0.04	0.00
Sub-total: Heavy Equipment	1,170.00	175.50	0.09	0.01	0.03	0.04	0.00
Commuting Vehicles - Fugitive Dust	20.75	3.10	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.11	0.10	0.48	0.09	1.43	0.29	0.03
Sub-total: Commuting Vehicles	20.86	3.20	0.48	0.09	1.43	0.29	0.03
Total	1,190.86	178.71	0.57	0.10	1.46	0.33	0.03

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-58. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Renewable Energy Development – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1,170.00	175.50	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.05	0.05	1.43	0.01	0.32	0.07	0.01
Sub-total: Heavy Equipment	1,170.05	175.55	1.43	0.01	0.32	0.07	0.01
Commuting Vehicles - Fugitive Dust	20.75	3.10	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.11	0.10	0.48	0.09	1.43	0.29	0.03
Sub-total: Commuting Vehicles	20.86	3.20	0.48	0.09	1.43	0.29	0.03
Total	1,190.90	178.75	1.91	0.10	1.75	0.36	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-59. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Renewable Energy Development – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	585.00	87.75	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.05	0.00	0.02	0.02	0.00
Sub-total: Heavy Equipment	585.00	87.75	0.05	0.00	0.02	0.02	0.00
Commuting Vehicles - Fugitive Dust	10.92	1.63	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.06	0.05	0.25	0.05	0.75	0.15	0.02
Sub-total: Commuting Vehicles	10.98	1.69	0.25	0.05	0.75	0.15	0.02
Total	595.98	89.44	0.30	0.05	0.77	0.17	0.02

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Note: For alternatives A and B, the one activity is assigned to year 2011 for analysis purposes. For alternatives C and D, it is assumed that at most one activity occurs in a given year.

**Table J-60. Summary of Output – Alternative A
Total Annual Emissions from Livestock Grazing Projects – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.05	0.05	1.07	0.02	0.36	0.09	0.01
Sub-total: Heavy Equipment	0.92	0.18	1.07	0.02	0.36	0.09	0.01
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.36	0.41	1.12	0.03	0.52	0.12	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-61. Summary of Output – Alternative A
Total Annual Emissions from Livestock Grazing Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.53	0.00	0.13	0.04	0.00
Sub-total: Heavy Equipment	0.88	0.15	0.53	0.00	0.13	0.04	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.32	0.37	0.58	0.01	0.29	0.07	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-62. Summary of Output – Alternative A
Total Annual Emissions from Livestock Grazing Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.04	0.00	0.01	0.02	0.00
Sub-total: Heavy Equipment	0.87	0.13	0.04	0.00	0.01	0.02	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.31	0.36	0.09	0.01	0.17	0.05	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-63. Summary of Output – Alternative B
Total Annual Emissions from Livestock Grazing Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.53	0.00	0.13	0.04	0.00
Sub-total: Heavy Equipment	0.88	0.15	0.53	0.00	0.13	0.04	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.32	0.37	0.58	0.01	0.29	0.07	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-64. Summary of Output – Alternative B
Total Annual Emissions from Livestock Grazing Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.04	0.00	0.01	0.02	0.00
Sub-total: Heavy Equipment	0.87	0.13	0.04	0.00	0.01	0.02	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.31	0.36	0.09	0.01	0.17	0.05	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-65. Summary of Output – Alternative C
Total Annual Emissions from Livestock Grazing Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.53	0.00	0.13	0.04	0.00
Sub-total: Heavy Equipment	0.88	0.15	0.53	0.00	0.13	0.04	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.32	0.37	0.58	0.01	0.29	0.07	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table J-66. Summary of Output – Alternative C
Total Annual Emissions from Livestock Grazing Projects – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.04	0.00	0.01	0.02	0.00
Sub-total: Heavy Equipment	0.87	0.13	0.04	0.00	0.01	0.02	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.31	0.36	0.09	0.01	0.17	0.05	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table J-67. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Livestock Grazing Projects – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.53	0.00	0.13	0.04	0.00
Sub-total: Heavy Equipment	0.88	0.15	0.53	0.00	0.13	0.04	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.32	0.37	0.58	0.01	0.29	0.07	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-68. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Livestock Grazing Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.87	0.13	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.04	0.00	0.01	0.02	0.00
Sub-total: Heavy Equipment	0.87	0.13	0.04	0.00	0.01	0.02	0.00
Commuting Vehicles - Fugitive Dust	1.43	0.21	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.05	0.01	0.16	0.03	0.00
Sub-total: Commuting Vehicles	1.44	0.22	0.05	0.01	0.16	0.03	0.00
Total	2.31	0.36	0.09	0.01	0.17	0.05	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-69. Summary of Output – Alternative A
Total Annual Emissions from Vegetation Projects – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.01	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.02	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-70. Summary of Output – Alternative A
Total Annual Emissions from Vegetation Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.01	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-71. Summary of Output – Alternative A
Total Annual Emissions from Vegetation Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.00	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-72. Summary of Output – Alternative B
Total Annual Emissions from Vegetation Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	0.83	0.13	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-73. Summary of Output – Alternative B
Total Annual Emissions from Vegetation Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	0.83	0.13	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table J-74. Summary of Output – Alternative C
Total Annual Emissions from Vegetation Projects – Year 2011

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.01	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table J-75. Summary of Output – Alternative C
Total Annual Emissions from Vegetation Projects – Year 2020

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.00	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-76. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Vegetation Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.01	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-77. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Vegetation Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	1.04	0.16	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total: Heavy Equipment	1.04	0.16	0.00	0.00	0.00	0.00	0.00
Commuting Vehicles - Fugitive Dust	0.83	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.05	0.00	0.00
Sub-total: Commuting Vehicles	0.83	0.13	0.01	0.00	0.05	0.00	0.00
Total	1.87	0.28	0.01	0.00	0.05	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-78. Summary of Output – Alternative A
Total Annual Emissions from Fire Management Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	67.60	10.14	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.21	0.00	0.88	0.30	0.03
Sub-total: Heavy Equipment	67.62	10.16	0.21	0.00	0.88	0.30	0.03
Commuting Vehicles - Fugitive Dust	0.79	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.02	0.02	0.06	0.01	0.29	0.17	0.02
Sub-total: Commuting Vehicles	0.81	0.14	0.06	0.01	0.29	0.17	0.02
Total	68.43	10.30	0.27	0.01	1.16	0.46	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-79. Summary of Output – Alternative A
Total Annual Emissions from Fire Management Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	67.60	10.14	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.02	0.00	0.68	0.12	0.01
Sub-total: Heavy Equipment	67.62	10.16	0.02	0.00	0.68	0.12	0.01
Commuting Vehicles - Fugitive Dust	0.79	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.02	0.02	0.06	0.01	0.29	0.17	0.02
Sub-total: Commuting Vehicles	0.81	0.14	0.06	0.01	0.29	0.17	0.02
Total	68.43	10.29	0.07	0.01	0.96	0.29	0.03

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-80. Summary of Output – Alternative B
Total Annual Emissions from Fire Management Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	67.60	10.14	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.21	0.00	0.88	0.30	0.03
Sub-total: Heavy Equipment	67.62	10.16	0.21	0.00	0.88	0.30	0.03
Commuting Vehicles - Fugitive Dust	0.79	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.02	0.02	0.06	0.01	0.29	0.17	0.02
Sub-total: Commuting Vehicles	0.81	0.14	0.06	0.01	0.29	0.17	0.02
Total	68.43	10.30	0.27	0.01	1.16	0.46	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-81. Summary of Output – Alternative B
Total Annual Emissions from Fire Management Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	67.60	10.14	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.02	0.00	0.68	0.12	0.01
Sub-total: Heavy Equipment	67.62	10.16	0.02	0.00	0.68	0.12	0.01
Commuting Vehicles - Fugitive Dust	0.79	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.02	0.02	0.06	0.01	0.29	0.17	0.02
Sub-total: Commuting Vehicles	0.81	0.14	0.06	0.01	0.29	0.17	0.02
Total	68.43	10.29	0.07	0.01	0.96	0.29	0.03

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-82. Summary of Output – Alternative C
Total Annual Emissions from Fire Management Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.11	0.00	0.86	0.29	0.03
Sub-total: Heavy Equipment	0.02	0.02	0.11	0.00	0.86	0.29	0.03
Commuting Vehicles - Fugitive Dust	0.49	0.07	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.04	0.01	0.24	0.16	0.02
Sub-total: Commuting Vehicles	0.50	0.09	0.04	0.01	0.24	0.16	0.02
Total	0.53	0.11	0.15	0.01	1.10	0.45	0.04

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-83. Summary of Output – Alternative C
Total Annual Emissions from Fire Management Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	0.00	0.00	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.01	0.00	0.68	0.12	0.01
Sub-total: Heavy Equipment	0.02	0.02	0.01	0.00	0.68	0.12	0.01
Commuting Vehicles - Fugitive Dust	0.49	0.07	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.01	0.01	0.04	0.01	0.24	0.16	0.02
Sub-total: Commuting Vehicles	0.50	0.09	0.04	0.01	0.24	0.16	0.02
Total	0.52	0.11	0.05	0.01	0.92	0.27	0.03

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-84. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Fire Management Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	67.60	10.14	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.21	0.00	0.88	0.30	0.03
Sub-total: Heavy Equipment	67.62	10.16	0.21	0.00	0.88	0.30	0.03
Commuting Vehicles - Fugitive Dust	0.79	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.02	0.02	0.06	0.01	0.29	0.17	0.02
Sub-total: Commuting Vehicles	0.81	0.14	0.06	0.01	0.29	0.17	0.02
Total	68.43	10.30	0.27	0.01	1.16	0.46	0.05

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-85. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Fire Management Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	67.60	10.14	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.02	0.02	0.02	0.00	0.68	0.12	0.01
Sub-total: Heavy Equipment	67.62	10.16	0.02	0.00	0.68	0.12	0.01
Commuting Vehicles - Fugitive Dust	0.79	0.12	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.02	0.02	0.06	0.01	0.29	0.17	0.02
Sub-total: Commuting Vehicles	0.81	0.14	0.06	0.01	0.29	0.17	0.02
Total	68.43	10.29	0.07	0.01	0.96	0.29	0.03

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-86. Summary of Output – Alternative A
Total Annual Emissions from Forest and Woodlands Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	6.50	0.98	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.01	0.01	0.00	0.00	0.23	0.08	0.01
Sub-total: Heavy Equipment	6.51	0.98	0.00	0.00	0.23	0.08	0.01
Commuting Vehicles - Fugitive Dust	0.59	0.09	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.04	0.01	0.00
Sub-total: Commuting Vehicles	0.59	0.09	0.01	0.00	0.04	0.01	0.00
Total	7.10	1.07	0.01	0.00	0.27	0.09	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-87. Summary of Output – Alternative A
Total Annual Emissions from Forest and Woodlands Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	6.50	0.98	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.01	0.01	0.00	0.00	0.19	0.03	0.00
Sub-total: Heavy Equipment	6.51	0.98	0.00	0.00	0.19	0.03	0.00
Commuting Vehicles - Fugitive Dust	0.59	0.09	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.04	0.01	0.00
Sub-total: Commuting Vehicles	0.59	0.09	0.01	0.00	0.04	0.01	0.00
Total	7.10	1.07	0.01	0.00	0.23	0.04	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-88. Summary of Output – Alternative B
Total Annual Emissions from Forest and Woodlands Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	5.20	0.78	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.19	0.06	0.01
Sub-total: Heavy Equipment	5.20	0.78	0.00	0.00	0.19	0.06	0.01
Commuting Vehicles - Fugitive Dust	0.47	0.07	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.03	0.01	0.00
Sub-total: Commuting Vehicles	0.47	0.07	0.01	0.00	0.03	0.01	0.00
Total	5.68	0.86	0.01	0.00	0.22	0.07	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-89. Summary of Output – Alternative B
Total Annual Emissions from Forest and Woodlands Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	5.20	0.78	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.00	0.00	0.00	0.00	0.15	0.03	0.00
Sub-total: Heavy Equipment	5.20	0.78	0.00	0.00	0.15	0.03	0.00
Commuting Vehicles - Fugitive Dust	0.47	0.07	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.01	0.00	0.03	0.01	0.00
Sub-total: Commuting Vehicles	0.47	0.07	0.01	0.00	0.03	0.01	0.00
Total	5.68	0.86	0.01	0.00	0.18	0.03	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-90. Summary of Output – Alternative C
Total Annual Emissions from Forest and Woodlands Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	7.80	1.17	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.01	0.01	0.00	0.00	0.28	0.10	0.01
Sub-total: Heavy Equipment	7.81	1.18	0.00	0.00	0.28	0.10	0.01
Commuting Vehicles - Fugitive Dust	0.71	0.11	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.02	0.00	0.05	0.01	0.00
Sub-total: Commuting Vehicles	0.71	0.11	0.02	0.00	0.05	0.01	0.00
Total	8.51	1.28	0.02	0.00	0.33	0.10	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-91. Summary of Output – Alternative C
Total Annual Emissions from Forest and Woodlands Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	7.80	1.17	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.01	0.01	0.00	0.00	0.22	0.04	0.00
Sub-total: Heavy Equipment	7.81	1.18	0.00	0.00	0.22	0.04	0.00
Commuting Vehicles - Fugitive Dust	0.71	0.11	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.02	0.00	0.05	0.01	0.00
Sub-total: Commuting Vehicles	0.71	0.11	0.02	0.00	0.05	0.01	0.00
Total	8.51	1.28	0.02	0.00	0.27	0.05	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-92. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Forest and Woodlands Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	7.80	1.17	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.01	0.01	0.00	0.00	0.28	0.10	0.01
Sub-total: Heavy Equipment	7.81	1.18	0.00	0.00	0.28	0.10	0.01
Commuting Vehicles - Fugitive Dust	0.71	0.11	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.02	0.00	0.05	0.01	0.00
Sub-total: Commuting Vehicles	0.71	0.11	0.02	0.00	0.05	0.01	0.00
Total	8.51	1.28	0.02	0.00	0.33	0.10	0.01

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-93. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Forest and Woodlands Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	7.80	1.17	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	0.01	0.01	0.00	0.00	0.22	0.04	0.00
Sub-total: Heavy Equipment	7.81	1.18	0.00	0.00	0.22	0.04	0.00
Commuting Vehicles - Fugitive Dust	0.71	0.11	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0.00	0.00	0.02	0.00	0.05	0.01	0.00
Sub-total: Commuting Vehicles	0.71	0.11	0.02	0.00	0.05	0.01	0.00
Total	8.51	1.28	0.02	0.00	0.27	0.05	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-94. Summary of Output – Alternative A
Summary of ROWs and Corridors Emissions – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	49.25	49.25	883.78	19.56	307.65	79.49	7.95
Sub-total: Heavy Equipment	52.10	49.68	883.78	19.56	307.65	79.49	7.95
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	72.73	54.36	892.53	21.29	328.28	84.72	8.47

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-95. Summary of Output – Alternative A
Summary of ROWs and Corridors Emissions – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	17.60	17.60	468.75	2.17	119.80	28.05	2.80
Sub-total: Heavy Equipment	20.46	18.03	468.75	2.17	119.80	28.05	2.80
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	41.08	22.72	477.50	3.91	140.42	33.28	3.33

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-96. Summary of Output – Alternative A
Summary of ROWs and Corridors Emissions – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	1.20	1.20	61.70	2.17	11.88	14.13	1.41
Sub-total: Heavy Equipment	4.05	1.63	61.70	2.17	11.88	14.13	1.41
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	24.68	6.31	70.45	3.91	32.51	19.36	1.94

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-97. Summary of Output – Alternative B
Summary of ROWs and Corridors Emissions – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	2.81	0.42	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	17.60	17.60	468.75	2.17	119.79	28.05	2.80
Sub-total: Heavy Equipment	20.42	18.03	468.75	2.17	119.79	28.05	2.80
Commuting Vehicles - Fugitive Dust	18.49	2.76	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.07	1.90	8.72	1.73	20.55	5.21	0.52
Sub-total: Commuting Vehicles	20.56	4.67	8.72	1.73	20.55	5.21	0.52
Total	40.98	22.69	477.47	3.90	140.35	33.26	3.33

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-98. Summary of Output – Alternative B
Summary of ROWs and Corridors Emissions – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	2.81	0.42	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	1.20	1.20	61.70	2.17	11.88	14.13	1.41
Sub-total: Heavy Equipment	4.02	1.62	61.70	2.17	11.88	14.13	1.41
Commuting Vehicles - Fugitive Dust	18.49	2.76	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.07	1.90	8.72	1.73	20.55	5.21	0.52
Sub-total: Commuting Vehicles	20.56	4.67	8.72	1.73	20.55	5.21	0.52
Total	24.58	6.29	70.41	3.90	32.44	19.34	1.93

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-99. Summary of Output – Alternative C
Summary of ROWs and Corridors Emissions – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	17.60	17.60	468.75	2.17	119.80	28.05	2.80
Sub-total: Heavy Equipment	20.46	18.03	468.75	2.17	119.80	28.05	2.80
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	41.08	22.72	477.50	3.91	140.42	33.28	3.33

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-100. Summary of Output – Alternative C
Summary of ROWs and Corridors Emissions – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	1.20	1.20	61.70	2.17	11.88	14.13	1.41
Sub-total: Heavy Equipment	4.05	1.63	61.70	2.17	11.88	14.13	1.41
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	24.68	6.31	70.45	3.91	32.51	19.36	1.94

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-101. Summary of Output – Alternative D (Preferred Alternative)
Summary of ROWs and Corridors Emissions – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Heavy Equipment - Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	17.60	17.60	468.75	2.17	119.80	28.05	2.80
Sub-total: Heavy Equipment	20.46	18.03	468.75	2.17	119.80	28.05	2.80
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	41.08	22.72	477.50	3.91	140.42	33.28	3.33

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-102. Summary of Output – Alternative D (Preferred Alternative)
Summary of ROWs and Corridors Emissions – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Fugitive Dust	2.85	0.43	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust ^a	1.20	1.20	61.70	2.17	11.88	14.13	1.41
Sub-total: Heavy Equipment	4.05	1.63	61.70	2.17	11.88	14.13	1.41
Commuting Vehicles - Fugitive Dust	18.55	2.77	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	2.08	1.91	8.75	1.73	20.62	5.23	0.52
Sub-total: Commuting Vehicles	20.63	4.68	8.75	1.73	20.62	5.23	0.52
Total	24.68	6.31	70.45	3.91	32.51	19.36	1.94

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table J-103. All Alternatives Total of All OHV Emissions

Year	Emissions (Tons/Year)				
	Hydro-carbons (HC)	Carbon Monoxide (CO)	Nitrogen Oxides (NO _x)	Particulate Matter (PM)	HAPs ^a
2000	233.50	433.98	2.99	7.11	23.35
2005	354.14	971.04	4.54	11.35	35.41
2010	456.85	1,220.07	6.39	14.99	45.69
2020	551.81	1,505.53	8.48	18.04	55.18

^a Hazardous air pollutants; assumed equal to HC * 0.10.

**Table J-104. Summary of Output – Alternative A
Total Annual Emissions from Road Maintenance Projects – Year 2001**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.02	0.02	0.45	0.01	0.14	0.04	0.00
Total	3.80	0.43	0.45	0.01	0.14	0.04	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-105. Summary of Output – Alternative A
Total Annual Emissions from Road Maintenance Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.01	0.01	0.22	0.00	0.05	0.02	0.00
Total	3.79	0.41	0.22	0.00	0.05	0.02	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-106. Summary of Output – Alternative A
Total Annual Emissions from Road Maintenance Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Total	3.78	0.41	0.01	0.00	0.00	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-107. Summary of Output – Alternative B
Total Annual Emissions from Road Maintenance Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.01	0.01	0.22	0.00	0.05	0.02	0.00
Total	3.79	0.41	0.22	0.00	0.05	0.02	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-108. Summary of Output – Alternative B
Total Annual Emissions from Road Maintenance Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Total	3.78	0.41	0.01	0.00	0.00	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-109. Summary of Output – Alternative C
Total Annual Emissions from Road Maintenance Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.01	0.01	0.22	0.00	0.05	0.02	0.00
Total	3.79	0.41	0.22	0.00	0.05	0.02	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-110. Summary of Output – Alternative C
Total Annual Emissions from Road Maintenance Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Total	3.78	0.41	0.01	0.00	0.00	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-111. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Road Maintenance Projects – Year 2011**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.01	0.01	0.22	0.00	0.05	0.02	0.00
Total	3.79	0.41	0.22	0.00	0.05	0.02	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

**Table J-112. Summary of Output – Alternative D (Preferred Alternative)
Total Annual Emissions from Road Maintenance Projects – Year 2020**

Activity	Annual Emissions (Tons)						
	PM ₁₀	PM _{2.5}	NO _x	SO ₂	CO	VOC	HAPs ^b
Road Maintenance - Fugitive Dust	3.78	0.41	---	---	---	---	---
Road Maintenance - Combustive Emissions ^a	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Total	3.78	0.41	0.01	0.00	0.00	0.01	0.00

^a PM_{2.5} assumed = PM₁₀ for this source.

^b HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

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