United States Department of the Interior
Office of Surface Mining Reclamation and Enforcement

DRAFT
Environmental Impact Statement
Spring Creek Mine
Big Horn County, Montana
Mining Plan
for
Federal Coal Lease MTM 94378

August 2024

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°C	degrees Celsius
°F	degrees Fahrenheit
µg/m^3	microgram per cubic meter
A/D	Anderson-Dietz
ADEQ	Arizona Department of Environmental Quality
AERMOD	AMS/EPA Regulatory Model
AQRV	Air Quality Related Value
ARM	Administrative Rules of Montana
ASLM	Assistant Secretary for Lands and Minerals Management
AVFs	alluvial valley floors
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe
CAA	Clean Air Act of 1972
CBNG	coal bed natural gas
CCUS	carbon capture, utilization, and storage
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPE	Cloud Peak Energy
CPRG	Climate Pollution Reduction Grant
dBA	A-weighted decibels
DNRC	Department of Natural Resource Conservation
DOI	U.S. Department of Interior
DR	Decision Record
dv	deciview
EA	Environmental Assessment
EGLE	Michigan Department of Environmental Great Lakes, and Energy
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESR	Environmental Summary Report
FAS	Montana Federal-Aid Secondary Route
FLIGHT	Facility Level Information on Greenhouse Gases Tool
FONSI	Finding of No Significant Impact
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GPO	Government Publishing Office
GRSG	Greater sage-grouse
Gt	gigaton
GWP	global warming potential
HAPs	hazardous air pollutants

Hg	Mercury
HRRP	Habitat Recovery and Replacement Plan
IMPROVE	Interagency Monitoring of Protected Environments
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act of 2022
IWG	Interagency Working Group
JMOE	Japan Ministry of the Environment
LAC	level of acceptable change
LBA	Lease by Application
L_{dn}	day-night noise level
LMU	logical mining unit
LOM	life of mine
MAAQS	Montana Ambient Air Quality Standards
MACT	Maximum Available Control Technology
MAQP	Montana Air Quality Permit
MARPOL	Marine Pollution
MATS	Mercury and Air Toxics Standards
MBTA	Migratory Bird Treaty Act
MDEQ	Montana Department of Environmental Quality
MEPA	Montana Environmental Policy Act
MFP	Management Framework Plan
MFWP	Montana Fish, Wildlife and Parks
mg/L	milligrams per liter
MLA	Mineral Leasing Act of 1920, as amended
MMT	million metric ton
MOA	Memorandum of Agreement
MPCA	Minnesota Pollution Control Agency
MPDD	mining plan decision document
MPDES	Montana Pollutant Discharge Elimination System
MSGHCP	Montana Sage Grouse Habitat Conservation Program
MSUMRA	Montana Strip and Underground Mine Reclamation Act
Mt	million tons
MTNHP	Montana Natural Heritage Program
Mtpy	million tons per year
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NCTF	United States National Climate Task Force
NDC	national determined contribution
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act of 1969, as amended
NESHAP	Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTEC	Navajo Transitional Energy Company
O_3	ozone

OSMRE	Office of Surface Mining Reclamation and Enforcement
PAP	permit application package
Pb	lead
PCD	Permitting and Compliance Division
PM_{10}	particulate matter small than 10 micrometers
$PM_{2.5}$	fine particulate matter
ppb	parts per billion
ppm	parts per million
PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
R2P2	resource recovery and protection plan
ROK	Republic of Korea
SC-CH_4	social cost of methane
SC-CO_2	social cost of carbon dioxide
SC-GHG	social cost of greenhouse gases
SCM	Spring Creek Mine
SC-N_2O	social cost of nitrous oxide
SHPO	State Historic Preservation Office
SMCRA	Surface Mining Control and Reclamation Act of 1977, as amended
SMP	State Mining Permit
SO_2	sulfur dioxide
SOSI	species of special interest
STB	Surface Transportation Board
STP	standard temperature and pressure
SWCAA	Southwest Clean Air Agency
T&E	threatened and endangered
TBGPEA	Thunder Basin Grasslands Prairie Ecosystem Association
TDS	total dissolved solids
THPO	Tribal Historic Preservation Office
tpy	tons per year
TSP	total suspended particulate
TSS	total suspended solids
U.S.C.	United States Code
UNEP	United Nations Environment Programme
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VOCs	volatile organic compounds
VRM	Visual Resource Management
WDOE	Washington Department of Energy

Chapter 1- Purpose and Need

1.0 PURPOSE AND NEED

1.1 Introduction

This Environmental Impact Statement (EIS) analyzes the Spring Creek Mine (SCM) Lease by Application (LBA) 1 Mining Plan Modification. The Office of Surface Mining Reclamation and Enforcement (OSMRE) initially published an environmental assessment (EA) for LBA1 on October 3, 2016 (hereafter 2016 LBA1 EA, OSMRE 2016). The United States District Court for the District of Montana (the Court) held in *WildEarth Guardians v. Haaland*, No. CV 17-80-BLG-SPW (D. Mont 2021) that the 2016 LBA1 EA failed to take a hard look at the following:

- Indirect and cumulative effects of diesel emissions, noise, vibrations, and coal dust emissions from rail cars based on the final destination and routes of SCM coal shipments (addressed in Sections 4.4.3, 4.14 and 4.15 of this EIS).
- Indirect effects of non-greenhouse gas from downstream combustion emissions (addressed in Section 4.4.4 of this EIS).
- Effects related to the social cost of greenhouse gases (addressed in Section 4.4.5 of this EIS).

This draft EIS provides additional analysis on those three impacts, as well as updating the environmental analysis contained in the 2016 LBA1 EA, as appropriate. It has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) as amended, 42 U.S.C. §§ 4321-4347 (2023); the Council on Environmental Quality's (CEQ's) regulations for implementing the NEPA, 40 Code of Federal Regulations (C.F.R.) Parts 1500 through 1508 (2022); the U.S. Department of the Interior (DOI) NEPA regulations, 43 C.F.R. Part 46; and the OSMRE NEPA Handbook.

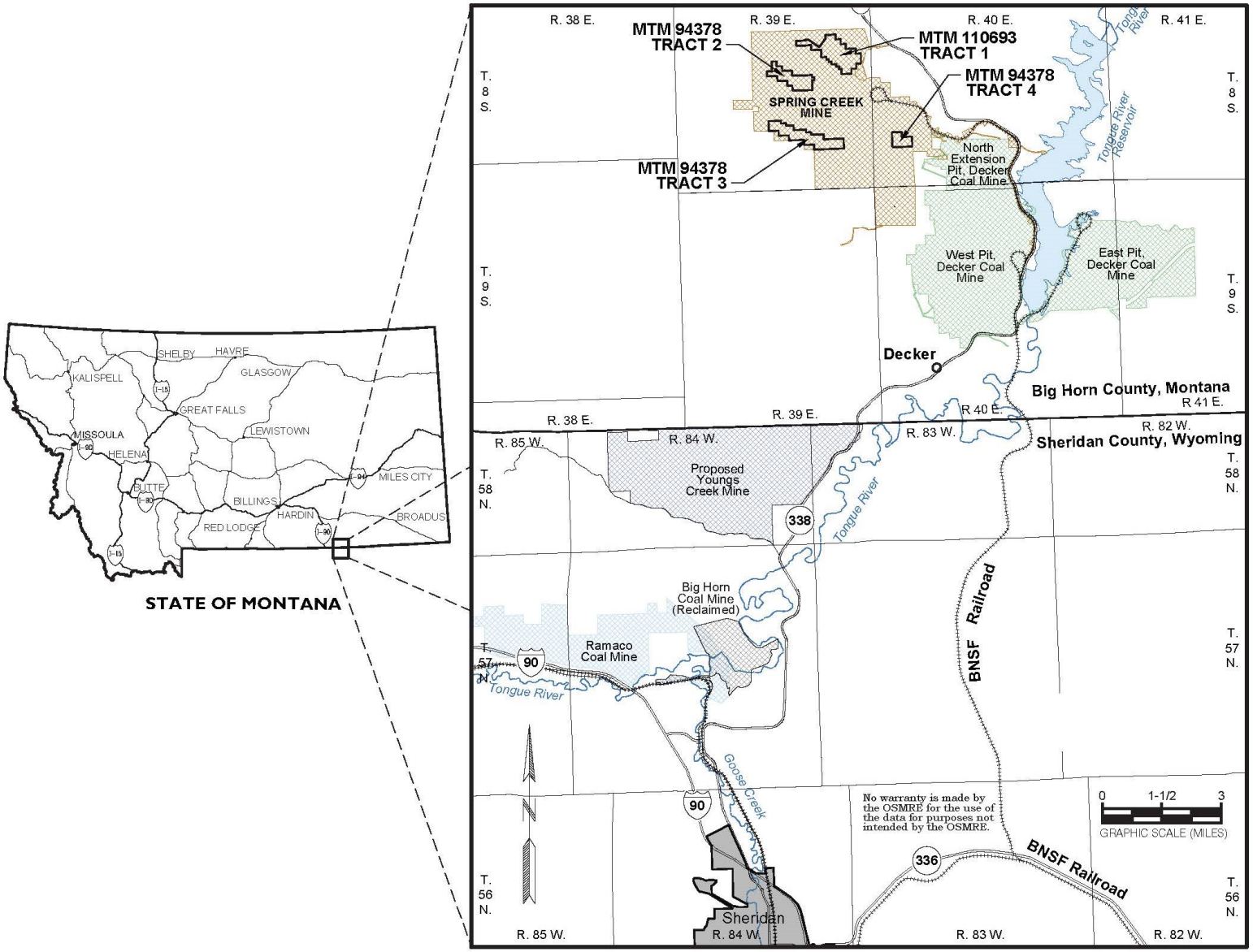
1.2 Project Location

The SCM is located in Big Horn County, Montana, approximately 32 miles north of Sheridan, Wyoming (Map 1.2-1). Coal has been mined on a commercial scale at the SCM since 1979. The SCM is currently operated by Navajo Transitional Energy Company, LLC (NTEC) following NTEC's acquisition in 2019 of substantially all the assets owned by Cloud Peak Energy, Inc., including the assets held by Spring Creek Coal, LLC.

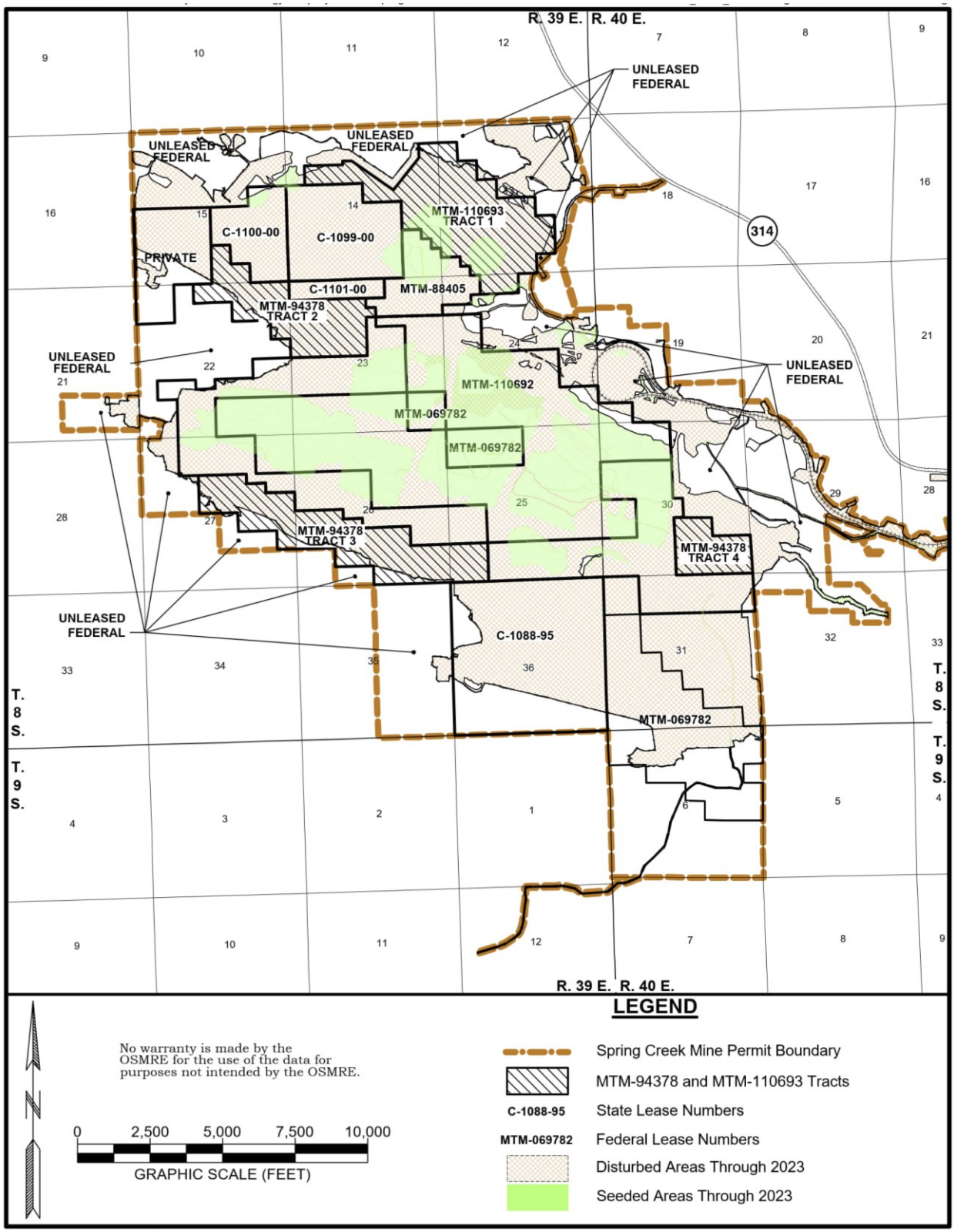
NTEC is a wholly owned limited liability company of the Navajo Nation. Ownership of the surface and mineral estate within the permit boundary was thoroughly discussed in Section 3.11 of the Bureau of Land Management (BLM) coal leasing EA for LBA MTM 94378 EA# MT-020-2007-34 (hereafter 2006 LBA EA; BLM 2006). The only update to the information in the 2006 LBA EA is to note the change of operator at SCM and the related transfer of mineral leasehold interests to NTEC. The SCM recovers coal under eight distinct coal leases, as shown on Map 1.2-2.

1.3 Project Background

In 2018, Spring Creek Coal, LLC provided an application to the BLM to consolidate Federal coal leases into a logical mining unit (LMU; BLM 2018), which included Tracts 2, 3, and 4 of MTM 94378. Because only a portion of the Federal coal lease MTM 94378 was included in the LMU, the remaining tract (Tract 1) was segregated into a new Federal coal lease (MTM 110693) per 43 C.F.R. § 3487.1(f)(3). For consistency in this EIS, the three tracts associated with MTM 94378 and the tract associated with MTM 110693 are referred to collectively as the LBA1 tracts. The lease configuration is presented on Map 1.2-2.



Map 1.2-1. General Location of the LBA1 Tracts



Map 1.2-2. Configuration of the LBA1 Tracts and Coal Leases within the Spring Creek Mine Permit Boundary

In anticipation of needing additional coal reserves, Spring Creek Coal, LLC, filed an application in 2005 with BLM to lease Federal coal in four separate tracts, under leasing by application regulations at 43 C.F.R. § 3425.1 and the provisions of the Energy Policy Act of 2005 (Government Publishing Office (GPO) 1982 and U.S. Public Law No: 109-58 (2005), respectively). At the time, SCM applied for the four tracts as maintenance tracts for SCM to maintain operation at the mine's then average annual level of production of 18 million tons per year (Mtpy).

BLM prepared the 2006 LBA EA to satisfy NEPA requirements for the LBA. The 2006 LBA EA analyzed the potential impacts associated with approving the lease of the Federal coal associated with MTM 94378, which would allow SCM to continue producing coal at the rate of 18 Mtpy instead of ceasing production, as recoverable coal reserves were nearly exhausted. OSMRE was a cooperating agency on the 2006 LBA EA. Based in part on the analysis in the 2006 LBA EA, BLM concluded that the coal within the tracts was acceptable for leasing and that maximum economic recovery of the Federal coal would be achieved by mining the tracts. BLM selected a modification of the 2006 LBA EA Proposed Action that removed approximately 89.9 acres of Federal coal from the proposed lease that was associated with a prairie falcon eyrie and a rock art site in Tract 1. The modified tracts included approximately 1,117.7 acres of Federal coal.

2006: BLM issues EA for MTM 94378
2007: BLM issues MTM 94378 to Spring Creek Coal, LLC
2011: MDEQ approves permit revision to add MTM 94378
2012: OSMRE adopts 2006 BLM EA and issues FONSI
ASLM approves Federal Mining Plan Modification
2016: 2012 Federal Mining Plan Modification challenged
Court orders OSMRE to prepare an updated EA
OSMRE completes the 2016 LBA1 EA and issues FONSI
2021: 2016 Federal Mining Plan Modification challenged
Court orders OSMRE to prepare an EIS
2023: Court grants extension for OSMRE to complete NEPA to May 10, 2024, extended to March 14, 2025.

After providing the public with a 30-day public comment period and after conducting a public meeting on the proposed lease sale in Billings, Montana, BLM issued a Finding of No Significant Impact (FONSI) for the modified LBA, as modified by BLM, on March 2, 2007. The only comment received during the 30-day public comment period and BLM's December 6, 2006, public meeting was one verbal comment at the public meeting in support of the project. BLM offered lease MTM 94378 for competitive sale on April 17, 2007. BLM issued the Federal coal associated with MTM 94378 to Spring Creek Coal, LLC on November 9, 2007, with an effective date of December 1, 2007.

To comply with the Surface Mining Control and Reclamation Act of 1977 (SMCRA), as amended, Spring Creek Coal, LLC requested a permit revision from the Montana Department of Environmental Quality (MDEQ) to include the Federal coal from the newly acquired MTM 94378. Spring Creek Coal, LLC submitted the permit application package (PAP) to MDEQ on January 23, 2008, under the approved Montana State Program for a permit revision (Amendment Application 00183) for State Mining Permit (SMP) C1979012. The PAP included modifications to include coal from MTM 94378 and from previously approved leases MTM 069782 and MTM 088405, which would open access to MTM 94378. In August 2009, MDEQ determined Spring Creek Coal, LLC's application to be administratively complete and that an EIS under the Montana Environmental Policy Act (MEPA) was not necessary. The completion notice was published in the newspaper for four consecutive weeks followed by a 30-day public comment period. No comments were received on the application. MDEQ completed a checklist EA pursuant to the MEPA to assess the potential environmental impacts of the PAP in May 2011 (MDEQ 2011a). The MDEQ checklist EA fulfilled MEPA requirements based on the level of analysis and the anticipated degree of public involvement, which depended on the significance of the potential or identified environmental impacts. The MDEQ provided Determination of Acceptability and the EA followed by a public notice period in May 2011. No comments were received. MDEQ approved the permit revision on June 21, 2011 (MDEQ 2011b). It

should be noted that the 2011 amendment to SMP C1979012 reduced the disturbance amount for MTM 94378 to 627.9 acres from the BLM previously approved 799 acres in the 2006 LBA EA.

Spring Creek Coal, LLC also received mining authorization for Federal lease MTM 94378 through the Federal mining plan modification process required by the Mineral Leasing Act of 1920 (MLA). The Federal mining plan modification was initially proposed to OSMRE by Spring Creek Coal, LLC in 2008. On June 5, 2012, OSMRE conducted a NEPA adequacy review and determined that the 2006 BLM EA adequately analyzed the potential environmental impacts of the proposed Federal mining plan modification. OSMRE adopted the EA and issued a FONSI on June 5, 2012, recommending to the Assistant Secretary for Land and Minerals Management (ASLM) approval of the SCM Federal mining plan modification. The ASLM approved the Federal mining plan modification on June 27, 2012, to add approximately 1,117.7 acres of federal coal and approximately 1,224.0 acres of disturbance to the previously approved Federal mining plan, which also included all of leases MTM 069782 and MTM 088405.

Environmental groups filed a NEPA challenge to the ASLM's 2012 Federal mining plan modification approval. On January 21, 2016, the Court issued a decision holding that OSMRE had failed to fulfill certain of its obligations under NEPA when it approved the 2012 Federal mining plan modification in *WildEarth Guardians v. OSMRE*, Civil Nos. 14-13-SPW & 14-103-SPW (D. Mont. 2016). According to the Court, OSMRE failed to notify the public after it issued its FONSI for the Federal mining plan modification in contravention of 43 C.F.R. § 46.305(c). The Court also held that OSMRE failed to adequately demonstrate that OSMRE had taken a "hard look" at the environmental effects of approving the 2012 Federal mining plan modification. Because of these deficiencies, the Court ordered OSMRE to prepare an updated EA within 240 days to analyze the environmental effects of the mining plan modification for lease MTM 94378.

OSMRE prepared the 2016 LBA1 EA to correct the NEPA deficiencies identified by the Court in its 2016 ruling. OSMRE did not reevaluate all potential impacts previously analyzed in the 2006 LBA EA. Rather, the 2016 EA rectified those specific procedural deficiencies in OSMRE's documentation and approval of the NEPA analysis for the 2012 Federal mining plan modification and analyzed potential changes to the extent or nature of those potential impacts previously evaluated, based on information included in SMP C1979012 (Spring Creek Coal, LLC 2014) and new information related to the environmental consequences specific to the action. Disturbance and permit-boundary changes incorporated at the SCM since June 27, 2012, were included in the 2016 LBA1 EA. OSMRE completed the 2016 LBA1 EA in September 2016 and issued a FONSI on October 3, 2016, recommending to the ASLM approval of the SCM Federal mining plan modification. The ASLM approved the Federal mining plan modification on October 3, 2016. Environmental groups then challenged that approval (*WildEarth Guardians v. Haaland, No. CV 17-80-BLG-SPW* (D. Mont. 2021)). As discussed above, the court determined that OSMRE failed to take a hard look at several environmental impacts and directed OSMRE to complete a remedial NEPA analysis. The court deferred vacatur of the Federal mining plan modification to allow OSMRE time to complete the remedial NEPA analysis. Under the most recent order from the court, the deferred vacatur will end on March 14, 2025.

1.4 Purpose and Need

As described above in Section 1.1, the Court identified several deficiencies in the 2016 LBA1 EA that OSMRE must reevaluate in this EIS. OSMRE's purpose in preparing this EIS is to fully analyze the environmental impacts from the Federal mining plan modification, with particular attention to addressing the deficiencies identified in the Court Order, so that OSMRE can make a recommendation to the ASLM (in the form of a mining plan decision document [MPDD]) to approve, disapprove, or conditionally approve the proposed Federal mining plan modification for the LBA1 tracts. The ASLM will decide whether the mining plan modification is approved, disapproved, or approved with conditions. Mining and reclamation would not have Federal authorization to

proceed in the LBA1 tracts beyond March 14, 2025, (the deadline of deferred vacatur) without this approval.

NTEC, the current operator, will not be able to access or recover the remaining LBA1 tracts coal reserves after March 14, 2025, unless OSMRE completes its NEPA analysis and the ASLM approves the Federal mining plan modification.

1.5 Agency Authority and Actions

This EIS satisfies OSMRE's NEPA obligation to fully disclose the potential direct, indirect and cumulative effects of the Proposed Action. In particular, in light of the deficiencies identified by the Court, OSMRE notes that it has evaluated the potential indirect and cumulative effects of diesel emissions, noise, vibrations, and coal dust based on the final destinations and routes of SCM coal shipments; potential indirect effects of non-greenhouse gas from downstream combustion emissions; and potential effects to global climate using the social cost of carbon protocol.

In addition to this NEPA review, Federal law requires two other consultations: Section 7 of the Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act (NHPA). OSMRE pursued these consultations parallel to the NEPA process. OSMRE has initiated government to government consultation with the Tribes that would be affected by the Proposed Action at Spring Creek Mine. Letters were mailed to Tribes requesting initiation of consultation with OSMRE and informing the Tribes of the agency's intent to prepare an EIS in response to the Court's decision.

1.5.1 Lead Agency – Office of Surface Mining Reclamation and Enforcement

OSMRE is the lead agency directing EIS preparation for the Project. OSMRE will make a recommendation to the ASLM about whether to approve, disapprove, or conditionally approve the proposed mining plan modification, and associated reclamation activities, in the LBA1 tracts at the SCM.

1.5.2 Other Agencies

Table 1.5-1 provides a summary of the state and Federal permits and licenses, and their purposes. Table 1.5-1 is not a comprehensive list of all permits, consultations, or approvals, but it includes the primary Federal and state agencies with permitting responsibilities.

1.5.2.1 Montana Sage Grouse Habitat Conservation Program

The Montana Sage Grouse Habitat Conservation Program (Sage Grouse Program) was established in 2015 from collaborative work of the Montana Sage Grouse Habitat Conservation Advisory Council and other diverse stakeholders. The Sage Grouse Program was created to implement Montana Executive Orders (EOs) 12-2015 and 21-2015 across state government, federal land management agencies, and private entities wishing to develop projects in key Greater sage-grouse (GRSG) habitats. The Sage Grouse Program is overseen by the Montana Sage Grouse Oversight Team and administratively hosted by the Montana Department of Natural Resources and Conservation (DNRC).

Permit applications submitted in GRSG general, core, or connectivity habitat, dated on or after January 1, 2016, must include a consultation letter from the Sage Grouse Program. According to Executive Order No. 12-2015, existing land uses and activities (including those authorized by existing permit but not yet conducted) are recognized and respected by state agencies, and those uses and activities that exist at the time the Program becomes effective would not be managed under the stipulations of the Montana Sage Grouse Conservation Strategy. Because the tracts evaluated under the Proposed Action are entirely within the SCM's currently approved SMP C1979012 permit boundary, these activities would not be managed according to the executive order. However, NTEC has developed and implemented a detailed Habitat Recovery and

Replacement Plan (HRRP) for GRSG at the mine and its voluntary participation in the Thunder Basin Grasslands Prairie Ecosystem Association (TBGPEA) to offset potential impacts to GRSG due to mine-related activities.

Table 1.5-1. Federal and State Permits, Consultations, and Approvals Required for the Project

Agency	Permit/Consultation	Approval Purpose
ASLM	Approval of Mining Plan Modification (30 C.F.R. Part 746)	To allow NTEC to mine Federal coal leases. Review of the proposed plan is coordinated with MDEQ and Federal agencies such as BLM. OSMRE recommends approval, disapproval, or conditional approval of the mining plan to the DOI ASLM.
BLM	Resource Recovery and Protection Plan (30 C.F.R. 746.13)	To allow NTEC to mine Federal coal leases. BLM must make a finding and recommendation to OSMRE with respect to NTEC's Resource Recovery and Protection Plan and other requirements of NTEC's lease.
U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act of 1973 (ESA) Section 7 Consultation (16 U.S.C. § 1536)	To protect Threatened and Endangered species and any designated critical habitat.
MDEQ	Montana Strip and Underground Mine Reclamation Act (MSUMRA; Section 82-4-201, et seq., MCA) Surface Mine Operating Permit	To regulate surface coal mining. Proposed activities must comply with state environmental standards and criteria, which are at least as stringent as those set by SMCRA. Approval may include stipulations for final design of facilities and monitoring plans. A sufficient reclamation bond must be posted with MDEQ before implementing an operating permit modification. MDEQ will coordinate with OSMRE.
	Clean Air Act of Montana (Section 75-2-102, et seq., MCA) Air Quality Permit	To control particulate emissions of more than 25 tons per year.
	Montana Water Quality Act (Section 75-5-201 et seq., MCA) Montana Pollutant Discharge Elimination System (MPDES) Permit No MT0024619 and storm water MTR000514	To establish effluent limits, treatment standards, and other requirements for point source discharges, which includes storm water discharges to state waters. Coordinate with the U.S. Environmental Protection Agency (EPA). The MPDES and storm water permits have no changes associated with LBA1.
	Hazardous Waste and Solid Waste Registration (various laws)	To ensure safe storage and transport of hazardous materials to and from the site and proper storage, transport, and disposal of solid wastes.
Montana State Historic Preservation Office (SHPO)	NHPA Section 106 Review (16 U.S.C. § 470)	To review and comment on Federal compliance with the NHPA.

1.5.3 Cooperating Agencies

As defined in the NEPA regulations, (40 C.F.R. § 1508.1(e)), "cooperating agency" means any Federal, State, Tribal, or local agency with jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal designated by the lead agency. OSMRE mailed letters to federal agencies, state agencies, tribes, counties, municipalities and conservation districts, non-government organizations, and individuals on March 17, 2022. To date, no agencies have indicated that they would like to participate as a cooperating agency on this project.

1.6 Public Participation

Public participation is an integral part of the NEPA process. OSMRE issued a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* and announced the NOI through a news release and on their website on March 17, 2022, initiating the scoping period that ended April 15, 2022. OSMRE mailed letters to federal agencies, state agencies, tribes, counties, municipalities and conservation districts, non-government organizations, and individuals on March 17, 2022.

During the public scoping period, OSMRE hosted a virtual public scoping meeting on March 31, 2022, via Zoom. The public was provided the opportunity to comment on the project via mail, email, and/or during the virtual meeting.

OSMRE received a total of 6 comment submittals (i.e., emails) containing some 63 individual comments. Pursuant to NEPA regulations 40 C.F.R. § 1500.4(i), comments received during the scoping process were reviewed to identify additional significant environmental issues for the EIS. Many comment letters received during the scoping period addressed more than one topic. The topics that received the greatest number of comments during the scoping period were related to air quality and climate change, water resources, cumulative impacts, wildlife, socioeconomics, environmental justice, and alternatives. The public scoping process identified several issues, which are addressed in the EIS, as described below:

- The potential for adverse effects to air quality from combustion of mined coal (Section 4.4.4);
- The potential effects of the Project on climate change, and subsequent effects to other resource areas (Section 4.4.5, and as applicable, Sections 4.14, 4.15, and 4.16);
- The potential for the Project to adversely affect human health and safety (Section 4.16);
- The potential for the Project to adversely affect minority, low-income and indigenous communities (Section 4.18); and
- The potential for the Project to adversely affect the hydrologic balance of groundwater and surface water (Section 4.5).

1.7 Financial Assurance

NTEC has an adequate performance bond in place to ensure that reclamation of the LBA1 tracts disturbance area will be completed. As Federal lands are involved, the bond is payable jointly to MDEQ and OSMRE (30 C.F.R. § 926.30, Article IX). A complete description of MDEQ's performance bonding procedure, including bond release by reclamation phase, is provided in the Administrative Rules of Montana (ARM) 17.24.1101. SCM's current bond that includes the LBA1 tracts is summarized in Section 2.1.2. of this EIS.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the four alternatives evaluated in this EIS: Alternative 1 - the Proposed Action, Alternative 2 – the Partial Mining, Alternative 3 – the Accelerated Mining Rate, and Alternative 4 – the No Action. This chapter also describes one alternative that was considered but not analyzed in detail.

2.1 Existing Conditions (Conditions Common to all Alternatives)

2.1.1 Mining Plan and Mining Operations

The SCM is currently permitted to mine coal under the ASLM-approved Federal Mining Plan (OSMRE 2016), the MDEQ-approved SMP C1979012 (MDEQ 2014), and the BLM-approved resource recovery and protection plan (R2P2; BLM 2017). SCM is permitted to mine a maximum of 30 Mtpy under Montana Air Quality Permit (MAQP) #1120-12 (MDEQ/PCD 2014). Total saleable coal production since the 2016 EA and Federal mining plan modification were approved (2016-2023) is provided in Table 2.1-1.

Table 2.1-1. SCM Annual Saleable Coal Production

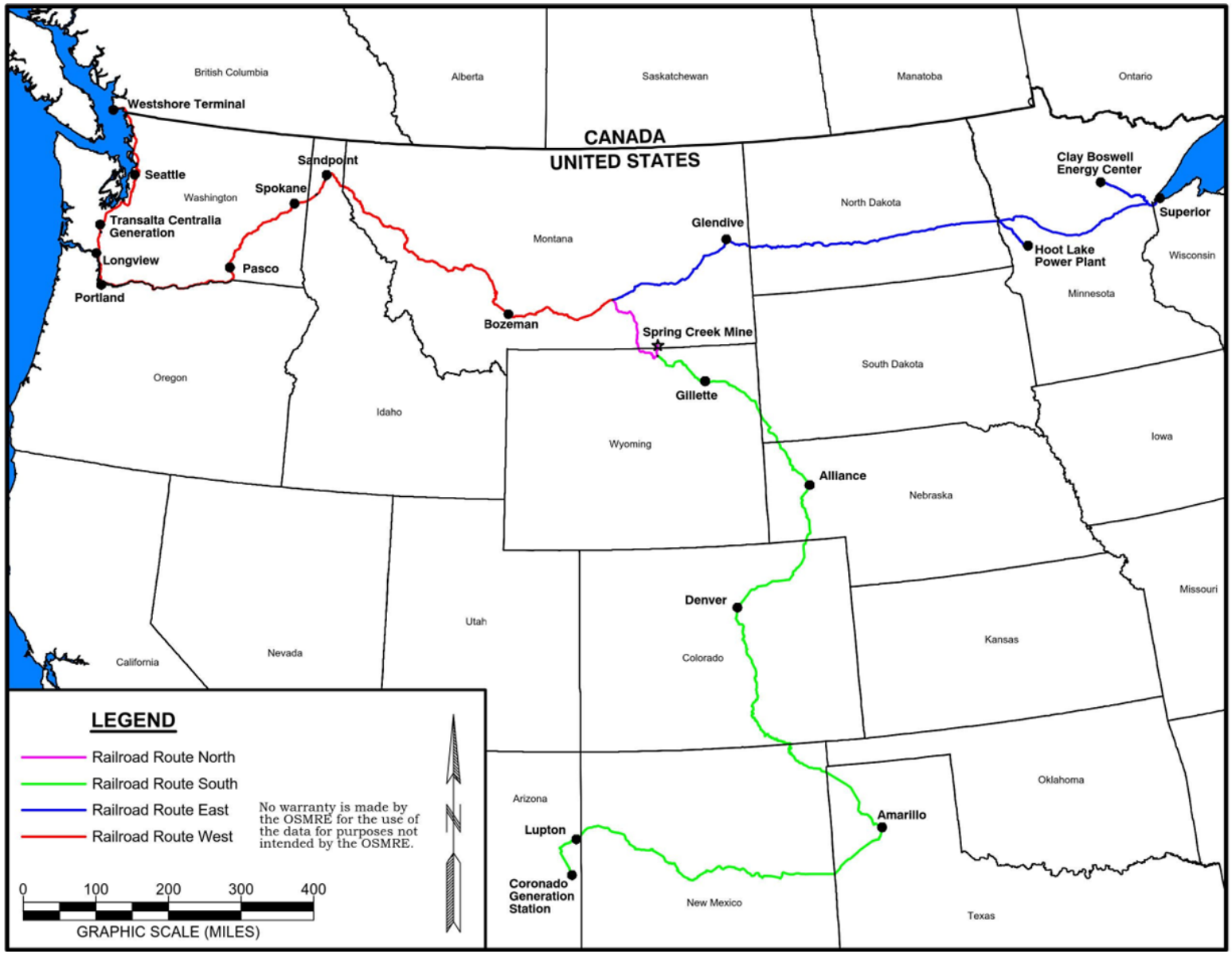
Year	2016	2017	2018	2019	2020	2021	2022	2023	Avg
Saleable Coal (Mt)	10.2	12.7	13.8	11.9	9.5	13.2	11.6	12.5	11.9

Source: U.S. Energy Information Administration (EIA) 2024, NTEC 2022a, 2024

Mining has been ongoing within the LBA1 tracts since the Federal mining plan modification was approved in 2012. For the purposes of this analysis, OSMRE used December 31, 2023, as the cutoff date for existing conditions at the mine because calculations and potential impacts are evaluated on an annual basis. As of December 31, 2023, approximately 63.3 million tons (Mt) of the 103.2 Mt of Federal coal have been recovered and 461.4 acres of the 627.9 acres have been disturbed in association with recovering the Federal coal within the four LBA1 tracts. All of the Federal coal has been removed from MTM 94378 Tract 4 and over 75% of the Federal coal in MTM 110693 Tract 1 has been removed. Approximately 39.9 Mt of Federal coal remains to be recovered and approximately 162.5 acres of approved disturbance associated with LBA1 tracts have yet to be disturbed. The 2012 Federal mining plan modification boundary and the Federal coal lease tracts in relation to the SCM, including the current disturbance, are shown on Map 1.2-2.

In addition to the LBA1 tracts coal, SCM also mines coal from other non-LBA1 tract Federal, state, and private leases within the permit boundary. According to NTEC (2024), there is approximately 63.4 Mt of non-LBA tract federal, state, and private coal that cover approximately 971 acres. Coal from the various leases is blended due to variability in quality to fulfill contracts. Under all alternatives, SCM would mine the recoverable non-LBA1 tract Federal, state, and private coal reserves.

Between 2016 and 2023, approximately 66 to 95 percent of the coal mined from the SCM was shipped to U.S. markets and the remaining coal was shipped to foreign markets (NTEC 2022, 2024a). In the U.S., the coal was transported by rail from the SCM to various power plants including, TransAlta Centralia Generation in Washington, Coronado Generating Station in Arizona, Boswell Energy Center and Hoot Lake Plant in Minnesota, and D.E. Karn Generating Plant and Belle River and St. Clair Power Plants in Michigan. Coal was also transported by rail to terminals in Superior, Wisconsin and British Columbia, Canada for vessel transport. The primary routes for BNSF Railway (BNSF) rail transport and vessel transport in North America are shown on Map 2.1-1.



Map 2.1-1. BNSF Railroad and Shipping Routes in North America Used to Transport SCM Coal

2.1.2 Current Bonding and Bond Release Status

SMCRA provides that, as a prerequisite for obtaining or modifying a coal mining permit, permittees must post a reclamation bond to ensure that the regulatory authority will have sufficient funds to reclaim the site if the permittee fails to complete obligations set forth in the approved reclamation plan. The current SCM bond amount is $160.3 million and was approved by MDEQ on January 3, 2023. The acres of reclamation at the SCM from 2016 through December 2023, by bond release phase are indicated in Table 2.1-2.

Table 2.1-2. Total Mine Disturbance/Reclamation/Bond Release Acres

Year	Total Disturbance	Facility Disturbance	Active Mining Area	Available for Seeding	Soiled & Seeded	Phase I	Phase II	Phase III	Phase IV
2016	4,753.0	1,057.0	2,383.0	1,313.0	1,257.0	1,200.0	980.0	407.0	0
% of Total	--	22%	50%	28%	26%	25%	21%	9%	0%
2017	4,879.0	1,086.0	2,455.0	1,338.0	1,319.0	1,284.0	1,017.0	407.0	0
% of Total	--	22%	50%	27%	27%	26%	21%	8%	0%
2018	4,947.3	995.8	2,573.3	1,408.3	1,340.3	1,310.8	1,017.0	407.0	0
% of Total	--	20%	52%	28%	27%	26%	21%	8%	0%
2019	5,147.8	1,016.9	2,688.9	1,442.1	1,359.0	1,310.8	1,017.0	407.0	0
% of Total	--	20%	52%	28%	26%	25%	20%	8%	0%
2020	5,367.8	1,016.9	2,903.9	1,447.1	1,426.0	1,322.8	983.0	407.0	0.0
% of Total	--	19%	54%	27%	27%	25%	18%	8%	0%
2021	5,669.4	891.3	3,348.2	1,429.9	1,428.8	1,428.8	1,026.0	595.0	19.0
% of Total	--	16%	59%	25%	25%	25%	18%	10%	0%
2022	5,863.8	891.3	3,348.2	1,429.9	1,457.5	1,459.8	1,147.0	595.0	19.0
% of Total	--	15%	57%	24%	25%	25%	20%	10%	0%
2023	5,993.7	1,191.0	3,153.3	1,519.5	1,535.3	1,507.8	1,241.0	595.0	19.0
% of Total	--	20%	53%	25%	26%	25%	21%	10%	0%

Source:2016 through 2023 Annual Mining Reports for the SCM for SMP C1979012.

2.1.3 Existing Stipulations

The mitigation measures and lease stipulations presented in BLM's Decision Record (DR) for the 2006 LBA EA remain in effect and would be carried forward if the Federal mining plan modification is approved by the ASLM. No other additional mitigation measures are proposed.

2.2 Description of the Alternatives

Table 2.2-1 provides a summary of the four alternatives evaluated in this EIS: Proposed Action, Partial Mining, Accelerated Mining Rate, and No Action. As previously described, and for the purpose of this analysis, OSMRE used December 31, 2023, as the cutoff date.

Table 2.2-1. Summary Comparison of Alternatives

Item	Alternative 1 Proposed Action	Alternative 2 Partial Mining	Alternative 3 Accelerated Mining Rate	Alternative 4 No Action
Remaining LBA1 Recoverable Federal Coal	39.9 Mt	19.3 Mt	39.9 Mt	0 Mt
Estimated Average Annual LBA1 Coal Production	Varies (see Table 2.2-2)	Varies (see Table 2.2-2)	18 Mt	0 Mt
Remaining Years from Recovering LBA1 Coal	16 years 2024-2039	5 years 2024-2028	2.2 years 2024-2026	0 year
Remaining LBA1 Area to be Disturbed	162.5 acres[1]	78.5 acres[2]	162.5 acres[1]	0 acres

[1] This number reflects the remaining acres of approved disturbance associated with the four LBA1 tracts as of December 31, 2023.
[2] This number reflects the remaining acres of approved disturbance associated with the four LBA1 tracts as of December 31, 2023, and only mining for the 5-year term (Table 2.2-2).

2.2.1 Alternative 1 - Proposed Action

Under the Proposed Action alternative, SCM would mine the remaining 39.9 Mt of coal within the LBA1 tracts in accordance with the life of mine (LOM) mining sequence outlined in the approved MDEQ SMP C1979012 (NTEC 2023a). Table 2.2-2 provides the annual estimated recoverable tons that would be mined from the LBA1 tracts as well as the annual estimated disturbance under the Proposed Action. Map 2.2-1 shows the LOM mining sequence within each tract and Map 2.2-2 depicts the reclamation that has been completed at SCM through February 28, 2023.

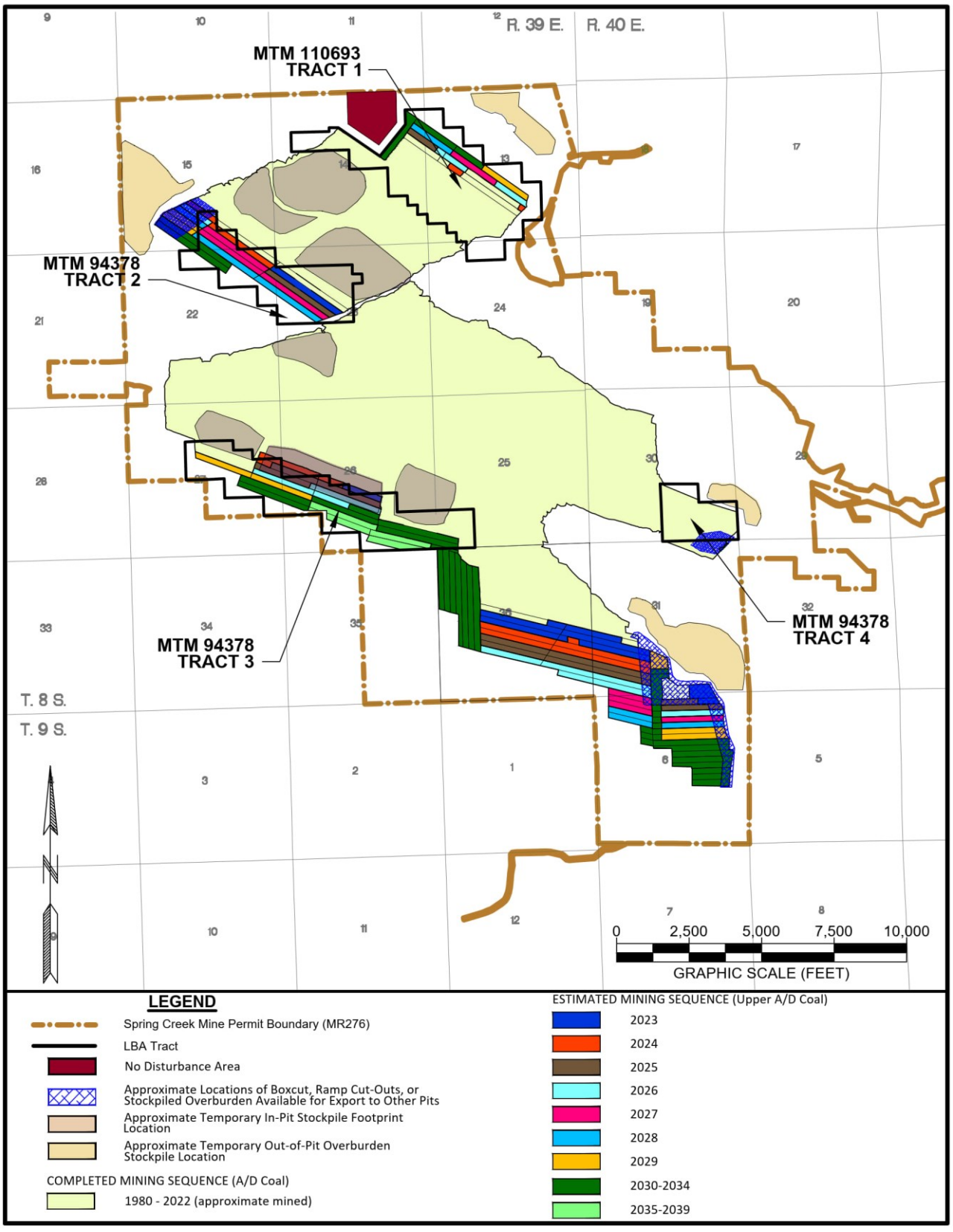
Table 2.2-2. Estimated Recoverable Tons Remaining in LBA1 Tracts by Year

Year	LBA1 Coal (Mt)	Disturbance (acres)
2024	2.20	8.9
2025	4.51	18.3
2026	4.14	16.8
2027	4.87	19.8
2028	3.59	14.6
2029	4.21	17.1
2030	2.51	10.2
2031	2.51	10.2
2032	2.51	10.2
2033	2.51	10.2
2034	2.51	10.2
2035	0.78	3.2
2036	0.78	3.2
2037	0.78	3.2
2038	0.78	3.2
2039	0.78	3.2
Total	**39.9**	**162.5**

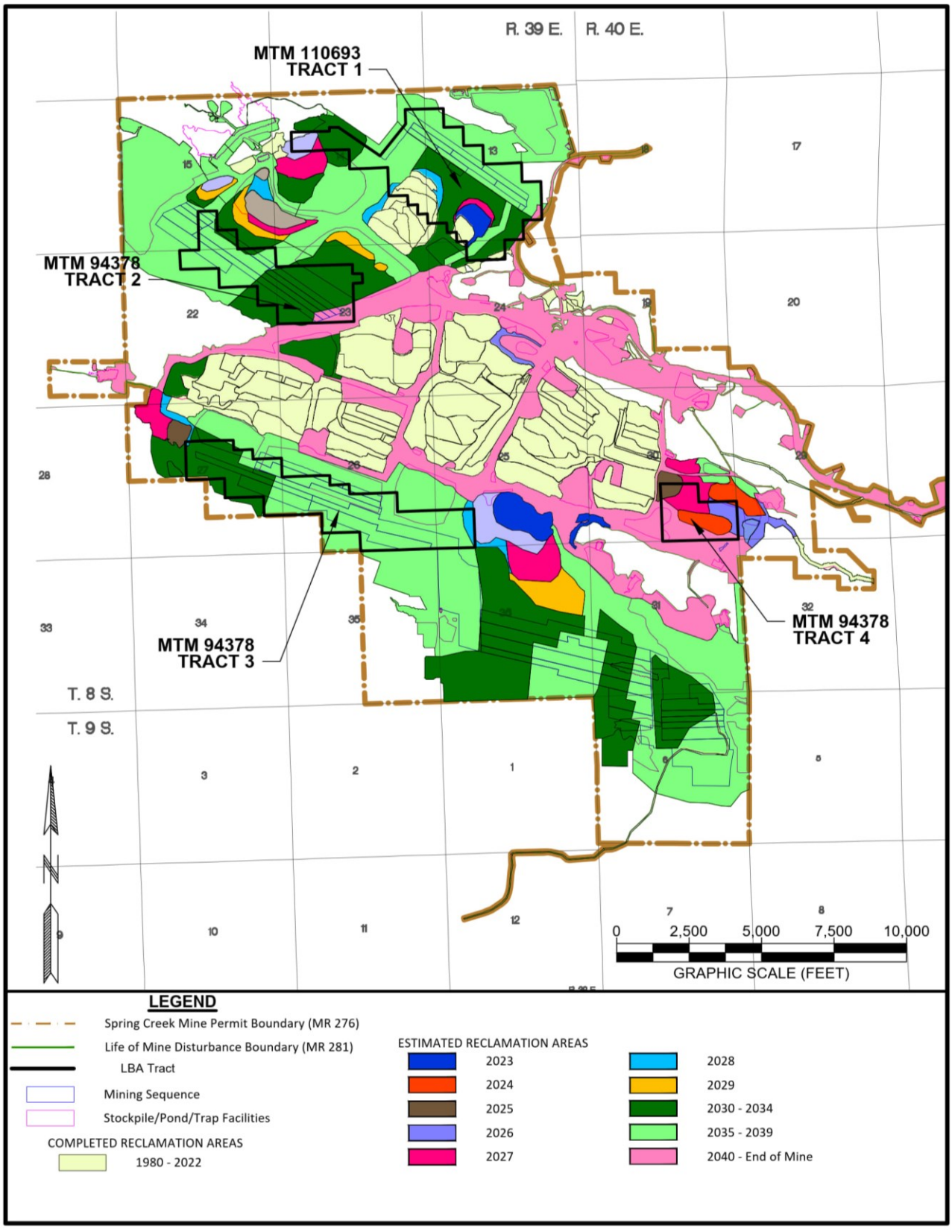
Under the Proposed Action alternative, it is assumed that the remaining 39.9 Mt of coal would be mined from the LBA1 tracts and approximately 162.5 acres would be disturbed over a 16-year mine life.

2.2.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, mining of coal in the LBA1 tracts would end after a five-year term, and any mining of the LBA1 tracts after this date would require a new recommendation from OSMRE to ASLM and a new mining plan modification approval from ASLM. Alternative 2 was developed to address recent NEPA caselaw highlighting the importance of identifying and evaluating a reasonable range of alternatives and acknowledging the volatility of the coal industry by evaluating an alternative that authorizes mining less than the full amount of leased federal coal. OSMRE has observed that the coal market has been in a state of flux in recent years, with production peaking in 2008 only to fall by almost half by 2020. The reasons for the volatility are varied and include, but are not limited to, competition from natural gas and renewable energy sources, the closure of coal fired power plants, and changes in international coal markets. As these trends are expected to continue into the foreseeable future, it has become difficult to predict what the landscape of coal demand will be over the life of a mine such as SCM, which is expected to operate until 2039. As a result, OSMRE determined that it would be prudent to analyze an alternative that limits the approved mining to a 5-year term from the date of ASLM mining plan approval. This timeframe is consistent with the approval periods under federal surface mining regulations.



Map 2.2-1. Spring Creek Mine Life of Mine Mining Sequence



Map 2.2-2. Spring Creek Mine Reclamation as of February 28, 2023

OSMRE used SCM's LOM mining sequence outlined in the approved SMP C1979012 (NTEC 2023a) to estimate how much of the Federal coal SCM expects to mine during the 5-year term that starts following ASLM approval of the Federal mining plan modification. Under Alternative 2, it is assumed that the 5-year term would coincide with years 2024 through 2028. During this time 19.3 Mt of coal would be mined from the LBA1 tracts and approximately 78.5 acres would be disturbed over the 5-year term (Table 2.2-1).

2.2.3 Alternative 3 - Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, it is assumed that the remaining 39.9 Mt of coal would be mined from the LBA1 tracts at a rate of 18 Mtpy. Using this annual production rate, mining would continue for another 2.2 years within the LBA1 tracts. Approximately 162.5 acres, the same as the Proposed Action, would be disturbed under this alternative.

The Accelerated Mining Rate alternative is the same alternative that was described and analyzed in the 2016 LBA1 EA as the Proposed Action, but the Accelerated Mining Rate alternative has been updated in this EIS to reflect the coal that has been mined from the LBA1 tracts through December 31, 2023. For consistency with the 2016 LBA1 EA, the annual production used for this alternative analysis is 18 Mt, which reflects a rate of mining that was anticipated to occur in 2016 but is unlikely to occur under current market conditions. Although this faster rate of mining is not likely to occur under current circumstances, SCM has authorization under its air permit to mine at 30 Mtpy, and OSMRE determined that it would be helpful to decisionmakers to understand the differing environmental impacts from the varying rates of mining.

2.2.4 Alternative 4 – No Action

Under the No Action alternative, the Federal mining plan modification for the LBA1 tracts would not be approved, and SCM would no longer be able to mine Federal coal in the LBA1 tracts. SCM would apply for and receive all appropriate approvals to fully reclaim any disturbed areas according to its current approved mining and reclamation permit.

Under the No Action Alternative, ASLM would not approve the Federal mining plan modification. The Federal coal remaining within the LBA1 tracts as of March 14, 2025 (U.S. District Court for the District of Montana Order CV 17-80-BLG-SPW) would not be recovered. If the mining plan is not reapproved but is instead vacated, SCM would be unable in the near-term to complete its required reclamation commitments within the boundaries of the LBA1 tracts. According to 30 C.F.R. §746.11, "[n]o person shall conduct surface coal mining and reclamation operations on lands containing Federal coal until the Secretary has approved the mining plan" (emphasis added) (GPO 2012). In addition, vacating the mining plan would require revisions to the MDEQ-approved SMP C1979012 and the BLM-approved R2P2 to modify the reclamation plan, maximum economic recovery conditions, and coal recovery plans for areas within boundaries of the SMP C1979012, but outside the LBA1 tracts.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

OSMRE considered alternative scenarios to the approval or denial of the Federal mining plan modification request. However, because ASLM's decision would be limited to approving, disapproving, or conditionally approving the mining plan modification, OSMRE concluded that there are no other reasonable action alternatives to the Proposed Action that would meet the agency's purpose and need. The following alternative was considered but eliminated from detailed analysis. The discussion includes reasons the alternative was eliminated from detailed analysis.

2.3.1 Limited Mining Based on Reclamation and Bonding

Comments were submitted during the public scoping period asking the agencies to consider an alternative that would limit mining based on reclamation scheduling and bonding amounts. This alternative would tie NTEC's ability to mine coal to reclamation success and bond release.

Currently, SCM blends coal from various leases within the permit boundary to meet the coal quality criteria for various coal customers. NTEC has indicated that limiting the mine's ability to mine at multiple locations throughout the permit area until reclamation and bonding levels have been met would negatively impact its ability to fulfill coal contracts that require blending coal from different areas of the mine. The blending scenario has been approved and in practice since the SCM was first permitted in 1979. This alternative was eliminated from detailed study because it would not be technically or economically feasible.

Chapter 3- Affected Environment

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing conditions of relevant resources that could reasonably be impacted by the alternatives described in Chapter 2 of this EIS. These resources are present within and surrounding the project area and provide the basis to address substantive issues of concern brought forward during internal and public scoping. The information presented in this chapter provides quantitative data and spatial information, where appropriate, to serve as a baseline for comparison of the direct and indirect of the Proposed Action and alternatives.

3.1 General Setting

The LBA1 tracts are located adjacent to the western boundary of the Great Plains physiographic province and in sight of the Bighorn Mountains in Montana and Wyoming near the Montana-Wyoming state border. The area exhibits a semi-arid climate characterized by cold winters, warm summers, and notable variations in annual and seasonal precipitation and temperature. According to the Western Regional Climate Center, during the period between 1981 to 2010, the area experienced an average maximum temperature of 62.6 degrees Fahrenheit (°F) and an average minimum temperature of 31.4 °F. Total average precipitation was 13.4 inches and most precipitation occurs during the spring. The LBA1 tracts are located in the southeast corner of Big Horn County, Montana, approximately 16 miles north of the Montana-Wyoming State line and about 32 miles northeast of Sheridan, Wyoming. The SCM, deriving its name from the Spring Creek drainage, is situated west of the Tongue River Reservoir and spans approximately 10.7 square miles. Comprised mainly of the flat valley floors of Spring Creek, South Fork Spring Creek, and North Fork Spring Creek, alongside adjacent steep slopes and near-vertical bluffs, the area's topography features slopes ranging from 5 to 90 degrees. Surface drainage is directed by three ephemeral streams—Spring Creek, South Fork Spring Creek, and North Fork Spring Creek—that ultimately discharge into the Tongue River Reservoir.

3.2 Topography and Physiography

The SCM is physiographically located near the western edge of the Great Plains province. This province can be characterized as a plateau like area that is interrupted in the western portion by mountainous uplifts separated from one another by structural basins, one of which is the Powder River Basin (PRB). The PRB is a large structural depression that is bounded on the west by the Bighorn Mountains, on the east by the Black Hills Uplift, and on the south by the Laramie Mountains, the Casper Arches and Hartville Uplift. The basin extends northward in Montana where it is separated from the Williston Basin by the Miles City Arch (Glass 1976).

The LBA1 area is comprised of four distinct tracts. Tract 1 is broken up by small, incised drainages that flow towards the North Fork of Spring Creek. Numerous near vertical cliff features are present in the tract. Tract 2 is incised by several small drainages that flow into the North Fork of Spring Creek. Tract 3 consists of steep, north-facing slopes that drain into the South Fork of Spring Creek. Tract 4 is characterized by two bluff features, in the central and east portion of the track, that rise out of a relatively flat landscape. The Tongue River Reservoir lies down gradient of the tracts. The elevations within the tracts range from 3,605 to 4,165 feet above mean sea level with a maximum relief of 435 feet within any one tract.

3.3 Geology, Minerals, and Paleontology

3.3.1 Geology

SCM coal deposits are in the Paleocene age Fort Union Formation. The Fort Union Formation is divided into three members including, in descending order, the Tongue River, Lebo Shale, and the Tullock Members. The thick coal beds occur in the upper 900 feet of the Tongue River Member. The clastic beds in the Tongue River Member were deposited on floodplains of large rivers, in river

and stream channels, or on deltas extending outward into swamps. The clastic beds tend to be lenticular in shape and limited in areal extent.

The Spring Creek and Carbone faults are the most important geologic features affecting the flow and interaction of surface water and groundwater. These northeast-trending normal faults offset the coal-bearing strata and influence the distribution of clinker at the surface, which impacts the migration of surface water into and through the subsurface.

3.3.2 Mineral Resources

The PRB contains large reserves of mineral resources, including coal, oil, natural gas, uranium, bentonite, and scoria.

3.3.2.1 Coal

Eight coal seams are generally found within the Fort Union Formation in the Tongue River area. Locally, these have been called (from youngest to oldest): Roland; Smith; Anderson; Dietz No. 1; Dietz No. 2; Canyon; D4: and D6. In the proposed lease areas, the Anderson, Dietz No. 1, and Dietz No. 2 are combined to form the Anderson-Dietz (A/D) seam. Only the A/D seam is considered economically recoverable within the LBA1 tracts. The A/D coal to be mined is a composite bed approximately 80 to 85 feet thick.

3.3.2.2 Oil and Gas

There are no known reserves of conventional oil and gas in the LBA1 tracts. Four oil and gas test holes were drilled in the vicinity of the SCM to depths of between 5,000 and 8200 feet and all four holes were dry.

Coal bed natural gas (CBNG) extraction from the Fort Union and Wasatch Formations began in 1989. Development expanded rapidly in the 1990s and early 2000s including areas adjacent to the SCM. The predominant CBNG production in the Montana portion of the PRB occurred from coal beds of the Wyodak-Anderson zone in seams, which are the same (or equivalent) seams being mined along the western margin of the basin, including the SCM. However, CBNG production has declined significantly since 2008. In Big Horn County, 1,560 CBNG wells are permitted (Montana BOGC 2024). Records indicate that the majority (55%) of these wells have been plugged and abandoned, 28% have permits that expired, 8% have been transferred to water wells, and 8% are shut in. The last production from any CBNG well in Big Horn County was in 2013.

3.3.2.3 Bentonite

No mineable bentonite reserves have been identified on the LBA1 tracts.

3.3.2.4 Uranium

No known uranium reserves have been identified on the LBA1 tracts.

3.3.2.5 Scoria

Several small pits have been excavated locally for use on roads in the SCM and local residences.

3.3.3 Paleontology

The sedimentary rocks exposed on the surface within the central portion of the PRB are the Eocene age Wasatch Formation and Paleocene age Fort Union Formation, both of which are known to contain fossil plant and animal remains. No significant or unique paleontological resource localities have been documented on federal lands in the tracts. The BLM recommended specific mitigation for paleontology or additional paleontological work if significant paleontological resources are encountered.

3.4 Air Quality

The following describes the air quality (including climate change and greenhouse gases [GHGs]) of the project area and region. Air quality regulations applicable to surface coal mining include the National Ambient Air Quality Standards (NAAQS), Montana Ambient Air Quality Standards (MAAQS), and Prevention of Significant Deterioration (PSD). Additional air quality regulations applicable to surface coal mining include the New Source Performance Standards (NSPS), Hazardous Air Pollutants (HAPs), Mercury and Air Toxics Standards (MATS), and the Federal Operating Permit Program (Title V).

3.4.1 Background

The Clean Air Act (CAA) of 1972, administered by the EPA, governs air emissions and establishes NAAQS to regulate acceptable levels of pollutants. Montana's air quality management adheres to the Environmental Quality Act, along with the Air Quality Rules and Regulations overseen by the Air Quality Bureau of the MDEQ, all approved by the EPA under the CAA. This regulatory framework includes MAAQS, required to be as stringent as NAAQS, and allowances for the PSD to maintain air quality. The EPA establishes NAAQS for six principal pollutants deemed harmful to public health and the environment (carbon monoxide [CO], lead [Pb], nitrogen dioxide [NO_2], ozone [O_3], particulate matter less than 2.5 micron [$PM_{2.5}$], particulate matter less than 10 micron (PM_{10}), and sulfur dioxide [SO_2]). Table 3.4-1 provides the NAAQS and MAAQS.

The PSD program regulates new major sources or major modifications at existing sources in areas meeting or in the process of meeting NAAQS. PSD increments, which specify allowable pollution increases, aim to maintain air quality below NAAQS levels. While NAAQS sets maximum concentration limits, PSD increments establish the maximum allowable concentration increase above baseline levels. The program curbs incremental pollutant rises from major sources, depending on the area's classification. Despite available PSD increments, air quality cannot surpass NAAQS thresholds (EPA 2024a). The SCM, along with nearby locations, falls under PSD Class II, where allowable increases are less stringent than in Class I areas. Notably, the Northern Cheyenne Indian Reservation, approximately 16 miles northeast of the project, is the closest PSD Class I area.

States designate areas within their borders as being in "attainment" or "non-attainment" with the Ambient Air Quality Standards (AAQS). Because the tracts are near the border of Montana and Wyoming, the attainment status of nearby areas in both states is considered. The LBA tracts are in an area that is designated an attainment area for all pollutants. The town of Lame Deer, Montana, located about 35 miles north, is a non-attainment area for PM_{10}. The town of Sheridan, Wyoming, located about 32 miles south of the project area was a non-attainment area for PM_{10}, but is currently in maintenance status. Similarly, Billings, Montana, situated approximately 90 miles northwest of the project area, was designated as a non-attainment area for SO_2 and CO, but is currently in maintenance for both pollutants. The prevailing wind in the vicinity of the SCM is from the north/northwest, so these non-attainment areas are not downwind of the SCM (Map 3.4-1 depicts the prevailing wind).

Table 3.4-1. Federal and Montana Ambient Air Quality Standards

Pollutant	Primary/Secondary	Averaging Time	NAAQS	MAAQS
CO	Primary	1 hour	35 ppm[a]	23 ppm[b]
	Primary	8 hours	9 ppm[a]	9 ppm[b]
Pb	Primary and secondary	Rolling 3 month average	0.15 µg/m^3 [c]	
	---	Quarterly		1.5 µg/m^3 [c]
NO_2	Primary	1 hour	100 ppb[d]	0.30 ppm[b]
	Primary and secondary	Annual	53 ppb[e]	0.05 ppm[f]
O_3	---	1 hour	---	0.10 ppm[b]
	Primary and secondary	8 hours	0.070 ppm[g]	---
$PM_{2.5}$	Primary	Annual	9.0 µg/m^3 [h]	---
	Secondary	Annual	15.0 µg/m^3 [h]	---
	Primary and secondary	24 hours	35 µg/m^3 [i]	---
PM_{10}	Primary and secondary	24 hours	150 µg/m^3 [j]	150 µg/m^3 [j]
	---	Annual	---	50 µg/m^3 [k]
SO_2	Primary	1 hour	75 ppb[l]	0.50 ppm[m]
	Secondary	3 hours	0.5 ppm	---
	---	24 hours	---	0.10 ppm[b]
	---	Annual	---	0.02 ppm[f]

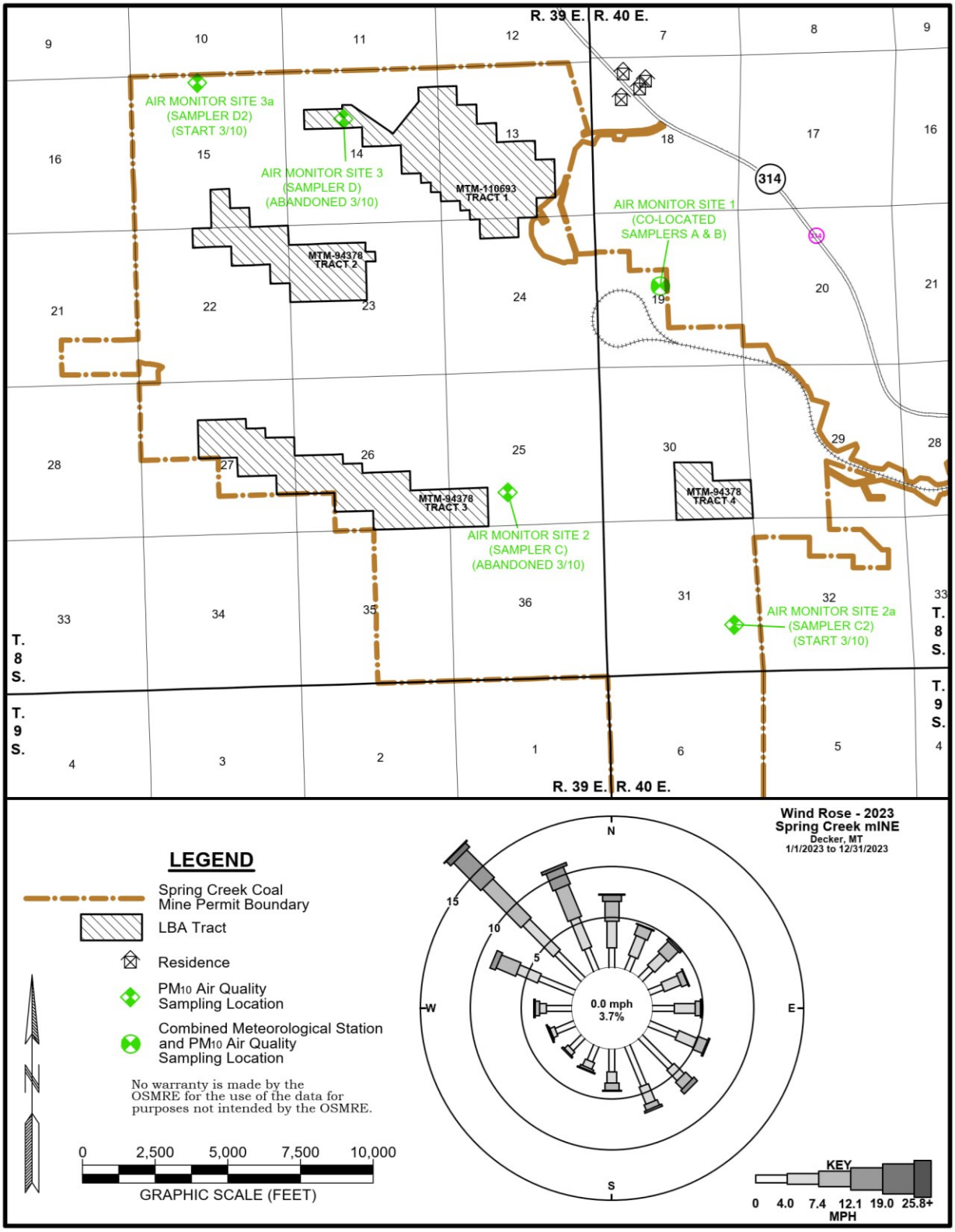
a Federal violation when exceeded more than once per calendar year.
b State violation when exceeded more than once over any 12 consecutive months.
c Not to be exceeded for the averaging time period as described in the state and/or federal regulation.
d Federal violation when 3-yr average of the 98th percentile of the daily maximum 1-hr average at each monitoring site exceeds the standard.
e Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard.
f State violation when the arithmetic average over any four consecutive quarters exceeds the standard.
g Federal violation when 3-year average of the annual 4th-highest daily max. 8-hour concentration exceeds standard.
h Federal violation when 3-year average of the annual mean at each monitoring site exceeds the standard.
i Federal violation when 3-year average of the 98th percentile 24-hour concentrations at each monitoring site exceed the standard.
j State and federal violation when more than one expected exceedance per calendar year, averaged over 3-years.
k State violation when the 3-year average of the arithmetic means over a calendar year at each monitoring site exceed the standard.
l Federal violation when 3-year average of the 99th percentile of the daily maximum 1-hr average at each monitoring site exceeds the standard
m State violation when exceeded more than eighteen times in any 12 consecutive months
Units: parts per million (ppm), parts per billion (ppb), micrograms per cubic meter (µg/m^3)

3.4.2 Existing SCM Air Quality

3.4.2.1 Particulate Matter

SCM has monitored particulate matter levels around the mine throughout the life of the operation. The mine expressed particulate matter using total suspended particulate (TSP) concentrations until 1987. This measurement included all particulates generally less than 100 microns in diameter. In 1987, the form of the standard was changed from TSP to PM_{10} to better reflect human health effects. MDEQ removed the requirement for SCM to sample for PM_{10} in September 2009, based on SCM's history of relatively low ambient monitoring readings and MDEQ's confidence in current permit conditions. SCM has voluntarily chosen to continue the PM_{10} sampling program. These data are used internally and not submitted to MDEQ, per MDEQ's request. $PM_{2.5}$ monitoring at the SCM is not required by MDEQ and is not conducted at this time.

Air quality monitoring at the SCM consists of four samplers at three sites that monitor concentrations of PM_{10} as depicted on Map 3.4-1. Tables 3.4-2 and 3.4-3 provide the annual mean and high PM_{10} concentrations at standard temperature and pressure (STP) for the years 2016 through 2023, respectively.



Map 3.4-1. Wind Rose and Air Quality and Meteorological Stations at the Spring Creek Coal Mine

Table 3.4-2. PM_{10} Concentrations (Annual Mean STP µg/m^3), 2016-2023

Site Name[1]	2016	2017	2018	2019	2020	2021	2022	2023
A	14.1	24.2	25.1	18.7	24.4	26.9	24.1	23.3
B	13.6	24.2	26.2	18.5	25.9	24.2	26.4	25.7
C2	16.3	27.3	23.5	22.7	26.6	24.3	34.4	20.6
D2	10.3	16.5	15.7	12.2	15.3	16.2	16.2	13.2

[1] See Map 3.4-1 for site locations
Source: IML Air Science 2017-2024

Table 3.4-3 PM_{10} Concentrations (Annual High [24-hr] STP µg/m^3), 2016-2023

Site Name[1]	2016	2017	2018	2019	2020	2021	2022	2023
A	31.9	60.3	60.8	88.9	69.0	72.9	61.9	99.3
B	33.2	54.0	78.4	88.9	78.5	71.8	71.1	119.8
C2	43.3	110.8	68.0	64.8	95.6	63.2	119.5	65.6
D2	24.6	50.0	44.2	29.4	56.1	57.6	60.3	59.3

[1] See Map 3.4-1 for site locations
Source: IML Air Science 2017-2024

The tables show that the average annual STP PM_{10} and the annual high STP PM_{10} were within established 24-hour (150 µg/m^3) and annual (35 µg/m^3) NAAQS and/or MAAQS between 2016 and 2023. These results are consistent with previous years.

Because $PM_{2.5}$ monitoring is not required by MDEQ, data were not gathered onsite. Therefore, data from one $PM_{2.5}$ monitor located in Sheridan, Wyoming, was used. Regional monitoring results presented in Table 3.4-5 demonstrate that ambient concentrations of $PM_{2.5}$, as determined by the 98th percentile 24-hour standard and annual average values, generally were within established 24-hour (35 µg/m^3) and annual (12 µg/m^3) standards.

Table 3.4-5. Measured $PM_{2.5}$ Concentrations in Sheridan, Wyoming

Site ID	Year	Monitor Number	24 hour (µg/m^3)[1]	Annual (µg/m^3)[1]
Police Station (560330002) Sheridan Wyoming	2016	1	17	6.6*
		2	19	5.9*
		11	23	6.4
	2017	1	21	6.9*
		2	24	7.7*
		11	17	6.4*
	2018	1	21	7.4
		2	18	6.9
		11	27	6.8*
	2019	1	27	6.7*
		2	18	6.0
		11	15	5.7
	2020	1	34	6.7
		2	17	6.1
		11	29	5.9
	2021	1	35	8.7*
		2	33	9.3*
		3	9	4.8*
		11	29	5.3*
	2022	3	21	7.7*
	2023	3	24	6.8

[1] The 24-hour standard is met when the 98th percentile 24-hour concentration, as determined by Appendix N of 40 C.F.R. Part 50 is less than or equal to 35 micrograms per cubic meter. The annual standard is met when the arithmetic mean concentration, as determined by Appendix N of 40 C.F.R. Part 50 is less than or equal to 12 µg/m^3. Data does not include exceptional events.

* The mean does not satisfy minimum data completeness criteria

Source: EPA 2024b

To further evaluate potential $PM_{2.5}$ emissions at the SCM, PM_{10} monitoring data from the SCM were used to estimate $PM_{2.5}$ ambient concentrations by applying a 0.2 factor, as determined by Pace (2005). The estimated annual mean and maximum 24-hour $PM_{2.5}$ values are presented in Tables 3.4-6 and 3.4-7, respectively. The estimated $PM_{2.5}$ concentrations were below the prescribed 24-hour NAAQS (35 µg/m^3) and the annual NAAQS (12 µg/m^3). These estimates are supported by the regional $PM_{2.5}$ data presented in Table 3.4-4.

Table 3.4-6. Estimated Annual Mean STP $PM_{2.5}$ Concentrations (µg/m^3)

Site Name[1]	2016	2017	2018	2019	2020	2021	2022	2023
A	2.8	4.8	5.0	3.7	4.9	5.4	4.8	4.7
B	2.7	4.8	5.2	3.7	5.2	4.8	5.3	5.1
C2	3.3	5.5	4.7	4.5	5.3	4.9	6.9	4.1
D2	2.1	3.3	3.1	2.4	3.1	3.2	3.2	2.6

[1] See **map 3-1** for site locations

Table 3.4-7. Estimated Annual High 24-Hour STP $PM_{2.5}$ Concentrations (µg/m^3)

Site Name[1]	2016	2017	2018	2019	2020	2021	2022	2023
A	6.4	12.1	12.2	17.8	13.8	14.6	12.4	19.9
B	6.6	10.8	15.7	17.8	15.7	14.4	14.2	24.0
C2	8.7	22.2	13.6	13.0	19.1	12.6	23.9	13.1
D2	4.9	10.0	8.8	5.9	11.2	11.5	12.1	11.9

[1] See **map 3-1** for site locations

3.4.2.2 Emissions of Nitrogen Dioxide (NO2), Ozone (O3), Sulfur Dioxide (SO2), Mercury (Hg), Lead (Pb), and Carbon Monoxide (CO)

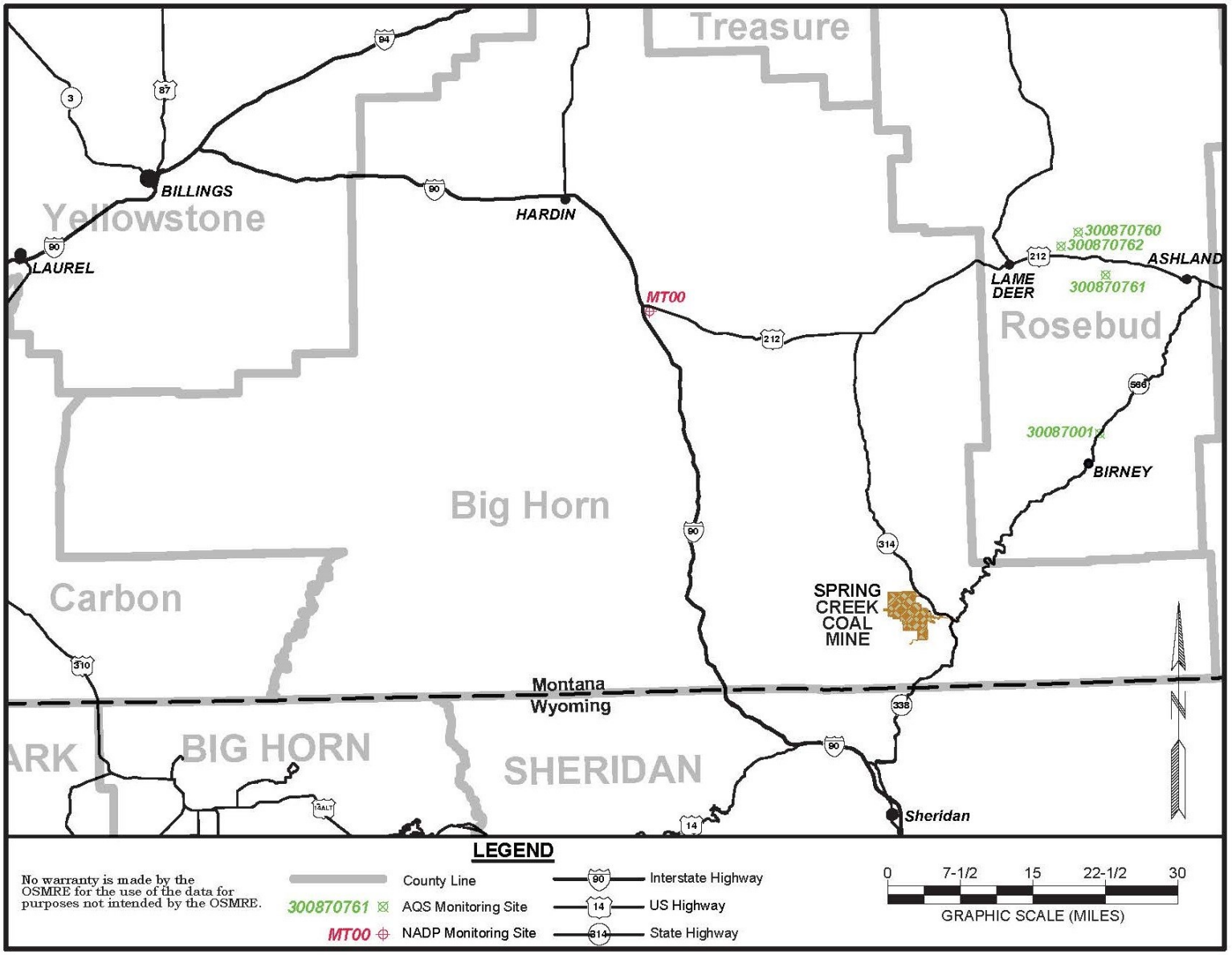
NO_2 concentrations (98th percentile, 1-hour) are currently being monitored at four sites in Rosebud County including one AQS monitoring site near Birney and three AQS monitoring sites near Lame Deer. NO_2 data from the AQS monitoring sites are presented in Table 3.4-8. The Birney, Montana site was deactivated at the end of 2021. These monitoring sites are the closest to the SCM with the distances from the LBA1 tracts ranging from approximately 28 to 44 miles (Map 3.4-2).

Table 3.4-8 NO_2 Concentrations at Rosebud County, Montana (98th Percentile 1-hr, ppb)

AQS Site ID	Sampler ID	2016	2017	2018	2019	2020	2021	2022	2023
300870001	3 Miles North of Birney	6	13	7	6	6	11	**	**
300870761	Garfield Peak	49	17	11	9	5	5	6	6
300870762	Badger Peak	13	9	8	9	6	5	No data	No data
300870760	Morningstar	11	12	12	12	6	8	No data	No data

** Site deactivated at the end of 2021.
Source:EPA 2024c

O_3 monitoring is not required at the SCM but levels were monitored at the AQS monitoring site near Birney, until the site was deactivated in 2021. Table 3.4-9 presents the O_3 data between 2016 and 2021. An exceedance of the O_3 8-hour standard occurs if the 4th-highest daily maximum value is above the level of the standard (0.075 ppm). Table 3.4-9 shows that no exceedances of the 8-hour or O_3 standard occurred between 2016 and 2021.



Map 3.4-2. Regional Air Quality Monitoring Sites

Table 3.4-9 O_3 Concentrations (4th Highest Daily Maximum 8-hr, ppm)

AQS Site ID	Sampler ID	2016	2017	2018	2019	2020	2021
300870001	3 Miles North of Birney	0.057	0.059	0.059	0.057	0.059	0.066

Source:EPA 2024c

SO_2 monitoring data were available from three sites in Rosebud County. As presented in Table 3.4-10, SO_2 data collected at the three sites were below the 1-hour NAAQS (75 ppb or 0.075 ppm) 99th percentile concentration and the 1-hour MAAQS (0.50 ppm) average concentration. Data collected in 2016 from the Garfield Peak site show that SO_2 1-hour concentrations exceeded the MAAQS (0.10 ppm) standard in 2016. Overall, the data shows that it is likely that ambient air quality within the vicinity of the SCM is currently in compliance with the SO_2 MAAQS and NAAQS.

Table 3.4-10. Measured SO_2 Concentrations in Rosebud County, Montana

AQS Site ID	Sampler ID	Statistic	2016	2017	2018	2019	2020	2021	2022	2023
300870760	Morningstar	1-hr 99th	0.008	0.009	0.008	0.004	0.005	0.005	No Data	No Data
		1-hr Avg	0.002	0.002	0.001	0.001	0.001	0.001	No Data	No Data
		1-hr Max	0.014	0.015	0.010	0.006	0.007	0.008	No Data	No Data
300870761	Garfield	1-hr 99th	0.007	0.008	0.011	0.006	0.004	0.003	0.006	0.006
		1-hr Avg	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.002
		1-hr Max	0.106	0.017	0.016	0.009	0.005	0.005	0.015	0.009
300870762	Badger Peak	1-hr 99th	0.006	0.006	0.006	0.005	0.004	0.003	No Data	No Data
		1-hr Avg	0.002	0.001	0.0003	0.001	0.001	0.001	No Data	No Data
		1-hr Max	0.011	0.010	0.009	0.011	0.007	0.005	No Data	No Data

Source: EPA 2024c

Annual Mercury (Hg; a HAP), Pb (a criteria pollutant), and CO (an indirect GHG) monitoring values are not collected specifically for the SCM. For a general discussion on Hg emissions, Hg air emissions (stack plus fugitive) for 2016 through 2022 (2023 data are not available) from three coal-fired power plants and one coal mine in Big Horn and Rosebud counties were evaluated (Table 3.4-11).

Similarly, annual Pb monitoring values are not collected at the SCM. Table 3.4-12 shows the Pb emissions from the three power stations and one coal mine in Big Horn and Rosebud counties for 2016 through 2022 (2023 data are not available). A direct comparison between the monitored values at the power plants/mines and NAAQS and MAAQS is not possible because the monitored values were presented in pounds, rather than the NAAQS and MAAQS units ($\mu g/m^3$).

Table 3.4-11. Measured Annual Hg Stack (Air) Emissions from Power Stations in Big Horn and Rosebud Counties (Pounds)

AQS Site ID	2016	2017	2018	2019	2020	2021	2022
Colstrip Energy LP Rosebud Power Plant							
Total emissions	1.4	0.9	1.14	1.56	0.61	0.94	1.29
Stack (air) emissions	1.4	0.9	1.14	1.56	0.61	0.94	1.29
Percent Emitted to air	100%	100%	100%	100%	100%	100%	100%
Colstrip Steam Electric Station							
Total emissions	1,316.7	1,433.4	1,034.6	1,053.8	700.8	762.4	807.3
Stack (air) emissions	130.0	140.0	110	110	60	70	80
Percent emitted to air	9.9%	9.8%	10.6%	10.4%	8.6%	9.2%	9.9
Hardin Generating Station							
Total emissions	24.4	18.0	4.1	4.7	1.21	13.2	14.2
Stack (air) emissions	5.7	3.7	0.9	2.2	0.3	0.45	1.5
Percent Emitted to air	23.4%	20.6%	22.0%	46.8%	2.5%	3.4%	10.2%
Decker Coal Company							
Total emissions	0.006	0.006	0.132	0.079	0.064	0.040	0.0015
Stack (air) emissions	0.002	0.002	0.002	0.002	0.002	0.002	0
Percent Emitted to air	33.3%	33.3%	1.7%	2.8%	3.4%	5.4%	0%
Total emissions from Four Sources							
Total emissions	1,342.5	1,452.3	1,040.0	1,060.1	702.7	776.6	822.8
Stack (air) emissions	137.1	144.6	112.0	113.8	60.9	71.4	82.8
Percent Emitted to air	10.2%	10.0%	10.8%	10.7%	8.7%	9.2%	10.1%

Source: EPA 2024d

Table 3.4-12. Measured Annual Pb Air Emissions from Power Stations in Big Horn and Rosebud Counties (Pounds)

AQS Site ID	2016	2017	2018	2019	2020	2021	2022
Colstrip Energy LP Rosebud Power Plant							
Total emissions	145.2	518.7	679.4	714	679.5	816.5	866.3
Stack (air) emissions	114.9	67.8	113.3	104.3	97.2	111.6	108.2
Percent Emitted to air	79.1%	13.1%	16.7%	14.6%	14.3%	13.7%	12.5%
Colstrip Steam Electric Station							
Total emissions	97,979.0	91,612.0	83,566	89,757	54,846	63,350.8	65,513.4
Stack (air) emissions	730.0	730.0	690	730	440	530	510.0
Percent emitted to air	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Hardin Generating Station							
Total emissions	1,550.0	1,281.5	516.4	436.9	159.4	2,035.8	1,774.0
Stack (air) emissions	103.0	39.5	50	52.2	25	155.8	172.2
Percent Emitted to air	6.6%	3.1%	9.7%	11.9%	15.7%	7.7%	9.7%
Decker Coal Company							
Total emissions	2.65	3.3	2.71	2.53	2.25	0.8827	0.0029
Stack (air) emissions	0.05	0.05	0.05	0.05	0.05	0.05	0
Percent Emitted to air	1.9%	1.5%	1.8%	2.0%	2.2%	5.6%	0%
Total emissions from Four Sources							
Total emissions	99,676.9	93,415.5	84,764.5	90,910.4	55,687.2	66,204.0	68,153.7
Stack (air) emissions	948.0	837.4	853.4	886.6	562.3	797.5	790.4
Percent Emitted to air	1.0%	0.9%	1.0%	1.0%	1.0%	1.2%	1.2%

Source:EPA 2024d

3.4.2.3 Air Quality Related Values

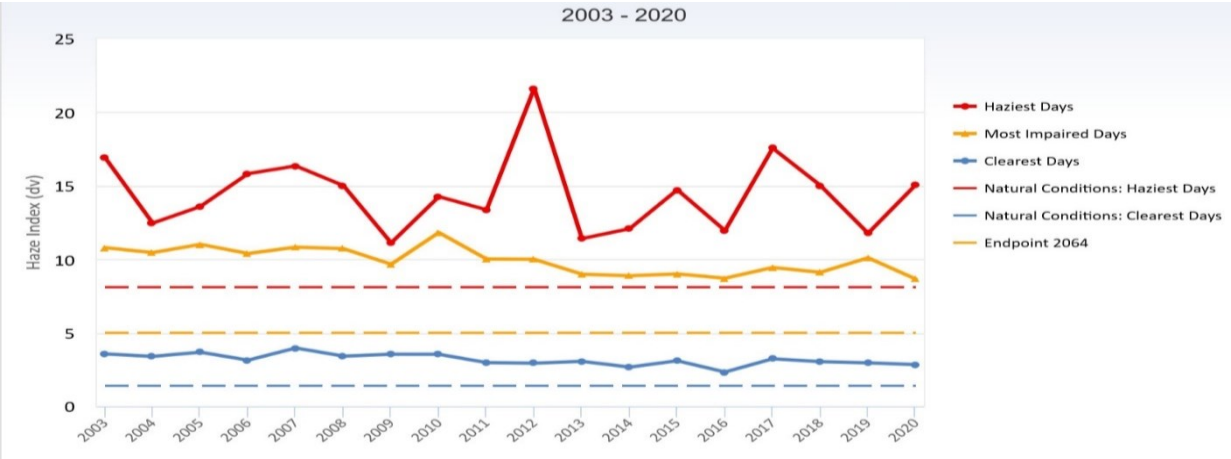
Air Quality Related Values (AQRVs) are environmental standards or benchmarks used to assess and manage air quality in specific locations, particularly in sensitive areas such as national parks, wilderness areas, and PSD Class I areas. These values are defined based on the potential impacts of air pollutants on ecological resources, human health, and visibility. Updated information regarding air quality related values is included below. AQRVs are evaluated by the land

management agency responsible for a Class I area, according to the agency's level of acceptable change (LAC). These AQRVs include potential air pollutant effects on visibility and the acidification of lakes and streams. The AQRVs, and the associated LAC, are applied to PSD Class I and sensitive Class II areas and are the land management agency's policy and are not legally enforceable as a standard. MDEQ MAAQS do include a standard for visibility. Class I areas are afforded specific AQRV protection under the Clean Air Act. The Class I designation allows very little deterioration of air quality. The AQRVs associated with this action include visibility and acidification of lakes. The nearest Class I area is located approximately 19 miles north of the proposed tracts at the Northern Cheyenne Indian Reservation.

3.4.2.3.1 Visibility

In accordance with ARM 17.8.818, the state of Montana does not require mines to evaluate visibility impacts on Class I areas (MDEQ/PCD 2014). Because MDEQ has determined that the SCM is not a major stationary source and because the SCM is not required by MDEQ to monitor visibility, a direct comparison to MAAQS standards is not possible. The current visibility discussions have been inferred from the currently permitted mining activities related to the existing coal leases at the SCM. Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. $PM_{2.5}$ are the main cause of visibility impairment. Visibility impairment is expressed in terms of deciview (dv). A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing deciview values represent proportionately larger perceived visibility impairment (BLM 2003). Figure 3.4-1 shows annual averages for the haziest, most impaired, and clearest visibility days at the Northern Cheyenne Indian Reservation monitoring site (the nearest PSD Class I area) for 2003 through 2020 (Interagency Monitoring of Protected Environments [IMPROVE] 2024). As indicated on Figure 3.4-1, the long-term trend in visibility at the Northern Cheyenne Indian Reservation appears to be relatively stable.

Figure 3.4-1. Visibility in the Northern Cheyenne Indian Reservation (Site MT00)



Source:IMPROVE 2024

3.4.2.3.2 Acidification of Lakes

Acid deposition causes acidification of lakes and streams, which can have direct impacts on aquatic habitats and contribute to the damage of trees at high elevations and many sensitive forest soils. Acid rain is measured as acidity and alkalinity using a pH for which 7.0 is neutral. The lower a substance's pH, the more acidic it is. Normal rain has a pH of about 5.6 (EPA 2024e). The National Atmospheric Deposition Program (NADP) monitors precipitation chemistry at various sites around the U.S. The nearest site to the tract is Site MT00 (see Map 3.4-2), located approximately 40 miles northwest of SCM. Table 3.4-13 provides the pH for the years 2014 through 2022.

Table 3.4-13. Measured pH at Site MT00

Parameter	2014	2015	2016	2017	2018	2019	2020	2021	2022
pH	5.4	5.6	5.5	5.5	5.7	N/A	5.6	6.0	5.8

Source: NADP 2024

3.4.3 Baseline Transportation Diesel Emissions

3.4.3.1 Non-Greenhouse Gas Emissions

Transportation diesel emissions associated with coal mined from SCM are based on the transportation segment (i.e., locomotive, seaport handling, ocean vessel). Coal mined at SCM is shipped to power plants in Minnesota, Washington, and Arizona and terminals in Superior, Wisconsin and British Columbia, Canada. At the Superior Midwest Energy Terminal in Superior, Wisconsin coal is blended and loaded on vessels for transport to three power plants in the Great Lakes region (NTEC 2021). At the Westshore Terminal in British Columbia, Canada, coal is loaded onto vessels for transport to power plants in the Republic of Korea (ROK) and Japan.

Diesel fuel, when burned in engines, results in emissions of CO, nitrogen oxides (NO_x), PM, SO_2, volatile organic compounds (VOCs), Hg, As, and Pb. Estimated baseline coal transportation diesel emissions related to SCM for the maximum production year over the last 8 years (2018) and the minimum production year of the last 8 years (2020) are summarized in Tables 3.4-14 and 3.4-15, respectively. Supporting information, including calculations, are provided in Appendix A of this EIS.

Table 3.4-14. 2018 Estimated Diesel Emissions (tons)

Transport Type	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	Hg	As	Pb
Locomotive	862	3,622	101	94	3	175	0.0013	0.102	--
Terminal Handling	5	20	12	3	1	1	--	--	--
Great Lakes Vessel Transport	16	183	24	23	173	7	9.4E-7	0.0006	0.003
Seaport Handling	6	24	15	3	1	1	--	--	--
Ocean Vessel Transport	335	3,713	495	456	3,503	143	1.9E-5	0.012	0.057
TOTAL	**1,224**	**7,562**	**647**	**579**	**3,681**	**327**	**0.0013**	**0.103**	**0.004**

-- Emissions could not be calculated

Table 3.4-15. 2020 Estimated Diesel Emissions (tons)

Transport Type	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	Hg	As	Pb
Locomotive	587	2,469	69	64	2	119	0.0009	0.069	--
Terminal Handling	3	10	6	1	0.5	1	--	--	--
Great Lakes Vessel Transport	8	92	12	11	86	4	4.7E-7	0.0003	0.001
Seaport Handling	5	17	11	2	1	1	--	--	--
Ocean Vessel Transport	241	2,672	356	328	3,503	143	1.4E-5	0.009	0.041
TOTAL	**844**	**5,260**	**454**	**406**	**3,593**	**268**			

-- Emissions could not be calculated

3.4.3.2 Greenhouse Gas Emissions

GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride). For consistency between projects, OSMRE describes GHG emissions in terms of "CO_2-equivalents" (CO_2e). For climate, climate change, and GHG analysis, there is no specific analysis area and project emissions are used as a proxy.

One source of CO_2 emissions is from the combustion of fossil fuels, including coal. CH_4 can be emitted during the production and transport of coal. N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases are synthetic, powerful GHGs that are emitted from a variety of industrial processes. CO_2 and other GHGs are naturally occurring gases in the atmosphere; their status as a pollutant is not related to their toxicity but instead is due to the added long-term impacts they have on climate because of their increased levels in the earth's atmosphere. Because they are non-toxic and nonhazardous at normal ambient concentrations, CO_2 and other naturally occurring GHGs do not have applicable ambient standards or emission limits under the major environmental regulatory programs. Each GHG has a different lifetime in the atmosphere and a different ability to trap heat in the atmosphere. To allow different gases to be compared and added together, emissions can be converted into CO_2e emissions using the global warming potential (GWP) concept developed by the Intergovernmental Panel on Climate Change (IPCC). The EPA uses a 100-year time horizon in its Inventory of Greenhouse Gas Emissions and Sinks: 1990-2020 (EPA 2022a) and Mandatory Greenhouse Gas Reporting rule. Therefore, project-related emissions are shown based on the 100-year GWP values for comparison to state and national GHG emissions. Additionally, total CO_2e from the project based on a 20-year time horizon is also shown for reference. The GWPs used to calculate CO_2e emissions presented in this section are based on the IPCC's Synthesis Report of the Sixth Assessment Report (AR6; IPCC 2021).

The estimated CO_2e emissions generated by transporting the coal via rail to final destinations at power plants and loading terminals and from overseas vessel transport for 2018 and 2020 are included in Table 3.4-16. Assumptions and calculations are provided in Appendix A of this EIS.

Table 3.4-16. Estimated CO_2e Transportation Emissions (tons) Related to Coal Mined at SCM

Source	2018		2020	
	100-yr Time Horizon	20-yr Time Horizon	100-yr Time Horizon	20-yr Time Horizon
Locomotive	334,628	336,047	228,103	229,070
Terminal Handling[1]	2,173	2,173	1,087	1,087
Great Lakes Vessel Transport	7,014	7,052	3,510	3,528
Seaport Handling[1]	2,604	2,604	1,862	1,862
Ocean Vessel Transport	142,228	142,983	102,342	102,886
Total CO_2e Emissions	**488,647**	**490,859**	**336,904**	**338,433**

[1] Terminal handling and seaport handling based on CO_2e from SNC-LAVAUN 2013, calculated using IPCC Sixth Assessment Report GWP values.

3.4.4 Baseline Coal Combustion Emissions

3.4.4.1 Domestic Combustion

Ambient air quality is influenced by local and upwind emissions including both natural sources (wildfires, biogenic) and anthropogenic sources including stationary point sources, area sources, and mobile sources. The EPA regulates emissions for the six criteria air pollutants. In addition to criteria pollutants, the EPA also regulates HAPs under Section 112 of the CAA, known as the National Emission Standards for Hazardous Air Pollutants (NESHAP). HAPs consist of 187 toxic air

pollutants that are known or suspected to cause cancer or other serious health effects. The EPA publishes a comprehensive summary of air emissions data, known as the National Emissions Inventory (NEI). The most recent NEI data that is available is from 2020. Table 3.4-17 provides the 2020 emissions for the six criteria air pollutants and HAPs for each of the U.S counties with power plants that burn coal from the SCM.

Table 3.4-17. National Emission Inventory 2020 Emissions Data

Facility	CO (tons)	NO_x (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	SO_2 (tons)	VOC (tons)	HAPs (lbs)
Lewis County, Washington (TransAlta Centralia Generation)	3,117	5,296	405	366	1,609	141	25.8
Apache County, Arizona (Coronado Generating Station)	1,976	2,634	547	547	60	49	11.1
Itasca County, Minnesota (Boswell Energy Center)	1,505	2,039	429	227	491	9.2	31.5
Otter Tail County, Minnesota (Hoot Lake Plant)	35	316	112	69	749	3.8	1.5
Bay County, Michigan (D.E. Karn Generating Plant)	285	663	421	414	629	33	6.4
St. Clair County, Michigan (Belle River and St. Clair Power Plants)	714	7,535	48	28	21,756	121	44.9

Source: EPA 2024f

In general, anthropogenic sources may be categorized as stationary sources or mobile sources. Stationary sources, which include both stack or vent sources and fugitive sources, may be further classified as major or minor sources based on whether they emit a regulated air pollutant above the CAA threshold. Generally, a major stationary source is defined as one that emits or has the potential to emit any air pollutant at more than 100 tons per year (CAA § 302(j), 42 U.S.C. § 7602(j)). Sources that do not emit any regulated pollutant in quantities above the CAA threshold may be classified as minor or area sources.

Major stationary sources are also required by the CAA to obtain Title V operating permits. The Title V permits require the power plants to comply with the CAA including sections of the NSPS, Maximum Available Control Technology (MACT), PSD, and NESHAPs among others, resulting in additional requirements including opacity limits, pollution controls, monitoring, recordkeeping, testing, and reporting.

- The TransAlta Centralia Generation, located in Lewis County, Washington, operates under Title V Permit No. SW98-8-R5. The facility consists of two 670 net megawatt (MW) units (Unit #1 and Unit #2). In 2020, Unit #1 was retired (TransAlta 2024). Unit 2 is set to retire at the end of 2025. TransAlta Centralia Generation is equipped with pollution control technology that meets or exceeds the level of emission reductions required under the Southwest Clean Air Agency (SWCAA) and EPA regulations (SWCAA 2021).
- The Coronado Generating Station, located in Apache County, Arizona operates under Title V Permit No. 64169. The facility capacity is 762 MW, from one 382 MW unit and one 380 MW unit (SRP 2024). The Coronado Generating Station is equipped with pollution control technology that meets or exceeds the level of emission reductions required under the Arizona Department of Environmental Quality (ADEQ) and EPA regulations (ADEQ 2016).
- The Boswell Energy Center, located in Itasca County, Minnesota, operates under Title V Permit No. 06100004. The facility is composed of two sub-bituminous coal-fired electric utility steam generation units (Units 3 and 4) for a combined capacity of 940 MW (Minnesota Power 2024). The Boswell Energy Center is equipped with pollution control technology that

meets or exceeds the level of emission reductions required under the Minnesota Pollution Control Agency (MPCA) and EPA regulations (MPCA 2022).

- The Hoot Lake Plant, located in Otter Tail County, Minnesota, operated under Title V Permit No. 11100002-005. The facility stopped receiving coal in 2019 and was retired on May 27, 2021 (Otter Tail Power Company 2024).
- The D.E. Karn Generating Plant, located in Bay County, Michigan, operated under Title V Permit No. MI-ROP-B2840-2014c. The facility was composed of two units (Units 1 and 2) for a combined capacity of 544 MW and was retired in June 2023 (Consumers Energy 2024).
- The St. Clair/Belle River Power Plant, located in St. Clair County, Michigan, operates under Title V Permit No. MI-ROP-B2796-2024 (EGLE 2024a). The St. Clair facility capacity was 1,400 MW from six units which have all been retired. The Belle River Power Plant is located across the river from the St. Clair Power Plant. The Belle River facility capacity is 1,260 MW from two units, which are scheduled to be retired by 2028. The Belle River facility is equipped with pollution control technology that meets or exceeds the level of emission reductions required under the EGLE and EPA regulations.

Power plants submit annual emission data to the state environmental agencies. Table 3.4-18 provides the annual air emissions from the power plants that burn coal mined from the SCM.

The 2020 NEI provides an inventory of HAPs for each of the power plants that burn SCM coal. Table 3.4-19 provides the total HAPs for each power plant, which includes Pb and Hg. All of the power plants are classified as major sources for HAPs and subject to the MATS. The MATS set MACT standards. The MACT standards set under the toxics program are federal air pollution limits that individual facilities must meet by a set date. The EPA requires power plants to report greenhouse gas emissions on an annual basis. Table 3.4-20 provides the carbon dioxide equivalent (CO_2e) emissions for each power plant for years 2018 to 2022.

Table 3.4-18. Annual Criteria Pollutant Power Plant Emissions Data (tons)

Power Plant	Year	CO (tons)	NO_x (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	SO_2 (tons)	VOC (tons)
TransAlta Centralia Generation Lewis County, Washington	2016	3,313	8,129	595	518	2,276	533
	2017	870	5,939	347	281	1,502	12
	2018	1,392	6,232	423	201	1,707	11
	2019	2,101	5,019	299	254	1,438	29
	2020	3,117	5,296	405	366	1,609	141
	2021	2,449	3,160	208	177	788	85
Coronado Generating Station Apache County, Arizona	2016	3,387	5,090	421	421	589	91
	2017	3,519	4,156	695	695	222	71
	2018	1,869	3,474	655	655	137	68
	2019	481	1,835	405	405	87	39
	2020	1,975	2,634	260	260	60	49
	2021	1,854	3,450	598	593	155	62
Boswell Energy Center Itasca County, Minnesota	2016	3,703	4,314	1,438	951	3,644	68
	2017	3,297	4,083	944	709	3,139	65
	2018	3,477	4,133	548	319	3,192	64
	2019	2,360	2,354	421	229	577	9
	2020	1,505	2,039	429	227	491	9
	2021	2,400	2,430	446	255	551	12
Hoot Lake Plant Otter Tail County, Minnesota	2016	63	332	131	76	941	4
	2017	67	380	132	85	941	5
	2018-2020	ND	ND	ND	ND	ND	ND
D.E. Karn Generating Plant Bay County, Michigan	2016	464	1,229	90/9.7	31/9	2,229	6
	2017	468	789	34/11	8.4/10	845	6
	2018	410	733	30/6.0	8.8/5.6	761	3
	2019	314	614	16/439	6.2/434	569	3
	2020	286	663	14/417	5.8/411	629	3
	2021	551	1,206	27/721	11/713	1,078	8
St. Clair/ Belle River Power Plant St. Clair County, Michigan	2016	1,668	13,294	16/38	4/37	37,165	32
	2017	1,656	13,186	44/15	11/15	36,919	7
	2018	1,946	14,469	55/24	13/23	41,384	10
	2019	2,752	10,212	60/82	15/82	30,752	9
	2020	714	7,536	29/7	6/7	21,757	15
	2021	1,177	12,238	-/108	6/26	35,494	8

Sources: Department of Ecology, State of Washington 2024; ADEQ 2022, 2024; MPCA 2024; EGLE 2024b
Michigan power plant PM_{10} and $PM_{2.5}$ data are reported as filterable/primary
ND – no data

Table 3.4-19. National Emission Inventory 2020 Power Plant Hazardous Air Pollutants Emissions Data (tons)

Power Plant	HAPs[1]	Pb	Hg
TransAlta Centralia Generation in Lewis County, Washington	25.8	0.011	0.027
Coronado Generating Station in Apache County, Arizona	11.1	0.013	0.010
Boswell Energy Center in Itasca County, Minnesota	31.8	0.350	0.003
Hoot Lake Plant in Otter Tail County, Minnesota	1.5	0.006	0.001
D.E. Karn Generating Plant in Bay County, Michigan	6.4	0.005	0.007
Belle River Power Plant in St. Clair County, Michigan			
St. Clair Power Plant in St. Clair County, Michigan	44.9	0.029	0.021

[1] HAPs include lead and mercury
Source: EPA 2024bf

Table 3.4-20. Power Plant CO_2e Emissions Data (tons)

Power Plant	2018	2019	2020	2021	2022
TransAlta Centralia Generation	6,096,503	7,999,849	5,843,328	3,482,246	3,951,409
Coronado Generating Station	4,191,820	2,557,341	3,164,633	3,941,898	3,541,448
Boswell Energy Center	7,812,909	5,078,529	4,582,680	5,302,287	5,343,621
Hoot Lake Plant	618,122	364,128	238,890	147,370	ND
D.E. Karn Generating Plant	2,655,627	1,978,243	1,869,285	3,249,240	3,136,922
Belle River Power Plant	7,647,725	5,532,781	4,329,616	7,216,713	6,730,048
St. Clair Power Plant	4,699,563	4,172,511	1,881,002	3,510,422	1,677,363

Note: Total Facility Emissions in metric tons CO_2 equivalent (mt CO_2e) (AR4 GWPs, excluding Biogenic CO_2)
ND – no data site decommissioned
Source: EPA 2024g

3.4.4.2 Overseas Combustion

As discussed in Section 2.2.1 of this EIS, a portion of the coal mined at the SCM is sold to power generators in the ROK and Japan. These countries therefore comprise the affected environment for analysis of overseas combustion effects on air quality. Both countries maintain a structure of regulations designed to maintain or improve air quality by limiting pollutant emissions from industrial and other emitting sources.

ROK

The ROK's Framework Act on Environmental Policy (ROK 2024a) describes fundamental environmental policy goals for preventing pollution and managing natural resources for sustainable use. Air quality is managed under the Clean Air Conservation Act (ROK 2024b). This act establishes examination and assessment of air pollutants, control on emissions of climate/ecosystem-changing substances, formulation of comprehensive plans to improve the atmospheric environment and permissible emission levels.

Japan

Japan's Air Pollution Control Act directs the control and monitoring of air pollution under the direction of the Japan Ministry of the Environment (JMOE). JMOE established the Air Pollution Control Act (JMOE 2024). JMOE established national standards limiting air pollutant emissions from stationary sources, and prefectural governors can set more stringent emissions standards within their jurisdiction as needed. Emission standards include: maximum permissible limits for each type and size of facility; special standards which are stricter for areas where air pollution has or is likely to exceed the limits; more stringent prefectural emission standard in areas where national emission standards might be insufficient to protect human health or living conditions; and standards for controlling total emissions that prescribe maximum limits for specific large-scale factories (UNEP n.d.).

Appendix A of this EIS provides estimated emissions of criteria pollutants and heavy metals HAPs (i.e., lead, mercury, and arsenic), generated from combusting 1.0 Mt of coal at utility-scale power plants in the ROK and Japan. Because specific power plants are not known, the range of estimates generated reflects the varying types of boilers and effectiveness of pollution control technologies that may be implemented at power plants in both countries. A low emission range assumes that a relatively effective pollution control technology is in place, while a high emission range assumes a relatively ineffective pollution control technology is in place. Estimated ranges of baseline pollutant emissions from combusting 3.2 Mt of coal in 2020 are presented in Table 3.4-21.

Table 3.4-21 Estimated Total Air Pollutant Emissions from Combusting 3.2 Mt of Coal in ROK and Japan in 2020

Emission Range	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
Low	481	465	312	1279	16	2	16	16	14
High	946	736	12478	6394	202	28	320	98	281

Assumptions and calculations provided in Appendix A of this EIS

3.4.5 Coal Dust Emissions

Coal dust, a form of particulate matter, originates from loaded coal trains during transit. Currently, there are no federal or state guidelines or standards for ambient dust deposition. BNSF enforces the Safe Harbor provision in the BNSF Coal Loading Rule (BNSF 2015) to limit deposition which has been in effect since October 1, 2011. Coal dust emissions, dispersion, and deposition have been studied in several recent NEPA analyses. The results of the reviews indicate that the majority of coal dust from rail cars is generated from the top surface of the loaded rail cars. The amount of dust emitted is dependent on the type and composition of coal, moisture content, ambient wind speed and direction, precipitation, use of topper agents, size of the rail car top opening, the shape of the coal surface, the position of the rail car, time and distance traveled, and train speed.

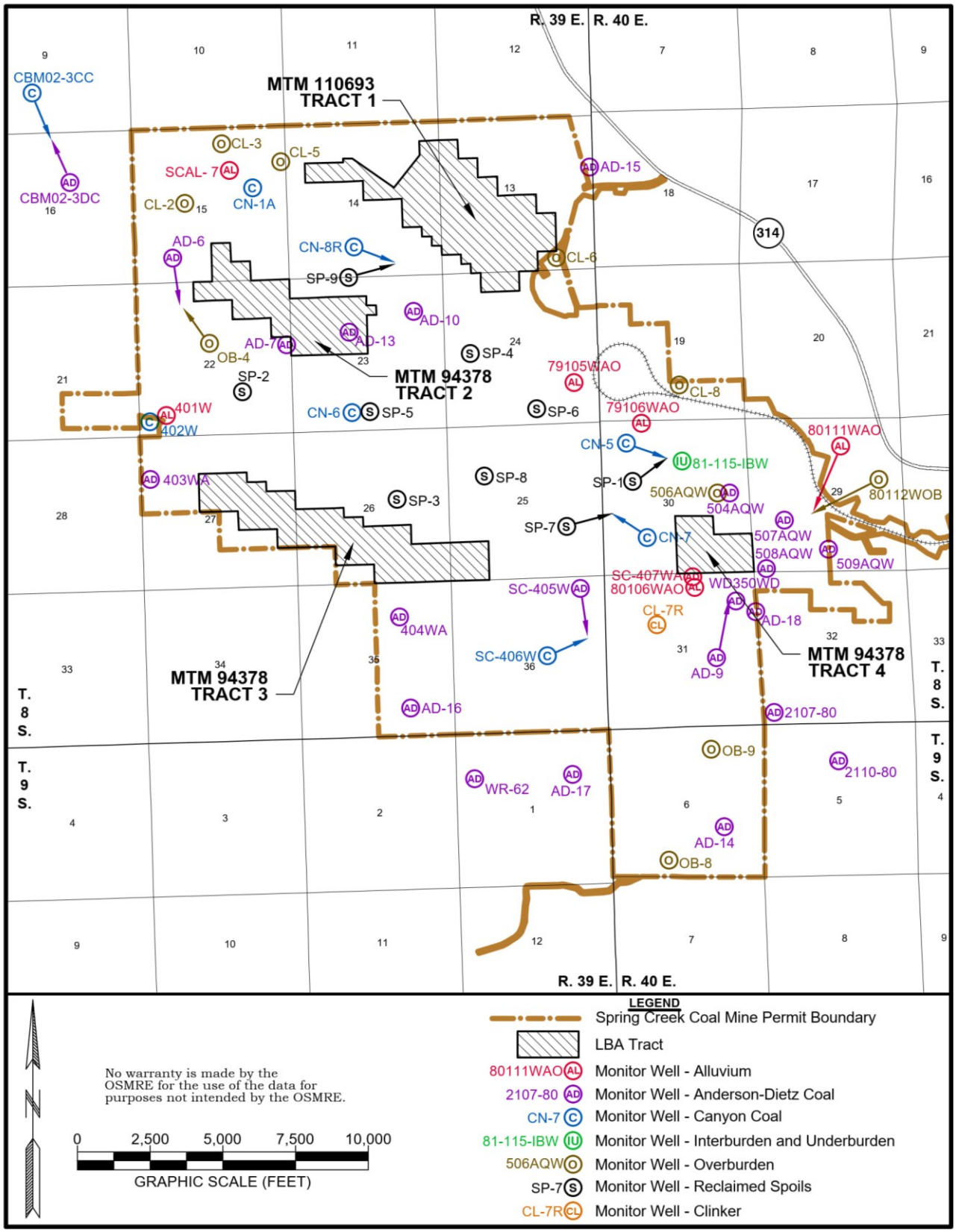
3.5 Hydrology

3.5.1 Groundwater

Groundwater recharge occurs typically to the west of the SCM in outcrops in the Wolf Mountains. Groundwater typically flows to the east and discharges to the Tongue River Reservoir east of SCM. Groundwater occurs in various aquifers within the SCM including the alluvium, overburden/clinker, A/D coal, interburden/underburden, underlying Canyon coal, and spoils. The current groundwater monitoring at SCM includes 50 wells, comprising 6 alluvium wells, 11 overburden/clinker wells, 1 interburden/underburden well, 23 coal wells, and 9 backfill/spoil wells. Current groundwater monitor well locations are indicated on Map 3.5-1. Monitor wells are identified by well number and completion aquifer.

According to groundwater quality monitoring results included in the SCM 2023 Annual Hydrology Report submitted to MDEQ, groundwater quality analyzed during the October 1, 2022, through September 30, 2023, reporting period were within historic ranges, with few water quality trends (NTEC 2023b). The following summarizes the 2023 Annual Hydrology Report water quality.

Measured total dissolved solids (TDS) in coal aquifers varies, with a mean of about 2,044 milligrams per liter (mg/L) in the A/D coal and a maximum of 7,800 mg/L. The Canyon Coal aquifer contains lower TDS with a mean of 965 mg/L and a maximum of 1,290 mg/L. Spoils, which have replaced the mined A/D coal and have become re-saturated, have variable TDS concentrations with a mean of 5,230 mg/L and a maximum of 9,000 mg/L. Until flushing, adsorption/desorption, precipitation/dissolution and other complex geochemical processes reduce TDS in the spoils ground water reconnected through the spoils will deliver higher TDS



Map 3.5-1. Active Groundwater Monitor Well Network at Spring Creek Mine

loads to downstream receiving waterways (namely Tongue River Reservoir). The quality of groundwater from the A/D coal seam is generally suitable for domestic and livestock purposes; however, due to the high sodium adsorption ratio (average 21.1), only crops with high salt tolerance can be irrigated with water directly from the A/D coal seam (Ayers and Westcot 1976).

Historic mining at the SCM has interrupted the flow of groundwater in the A/D coal due to mining activities and pit dewatering. In some portions of the SCM, spoils have already been used to backfill the excavation and a new spoils aquifer is beginning to form where the mined A/D coal aquifer was previously. Groundwater extracted from the mined A/D coal is typically collected and used for dust control or other process water.

Water quality is highly variable depending on the source aquifer. The dominant ionic constituents within the coal waters are sodium and bicarbonate. As the groundwater moves downward through the overburden and into the coalbed aquifers, the water becomes less mineralized, which is due mainly to cation exchange (softening and sulfate reduction) mechanisms.

Based on premining potentiometric maps (Van Voast and Hedges 1975), the flow direction of the pre-mine groundwater system was from recharge zones in highlands east and west of the mine toward the hydrologic discharge boundary formed by the Tongue River. Current groundwater flow is to the southeast in both the reclaimed spoil and A/D coal aquifers.

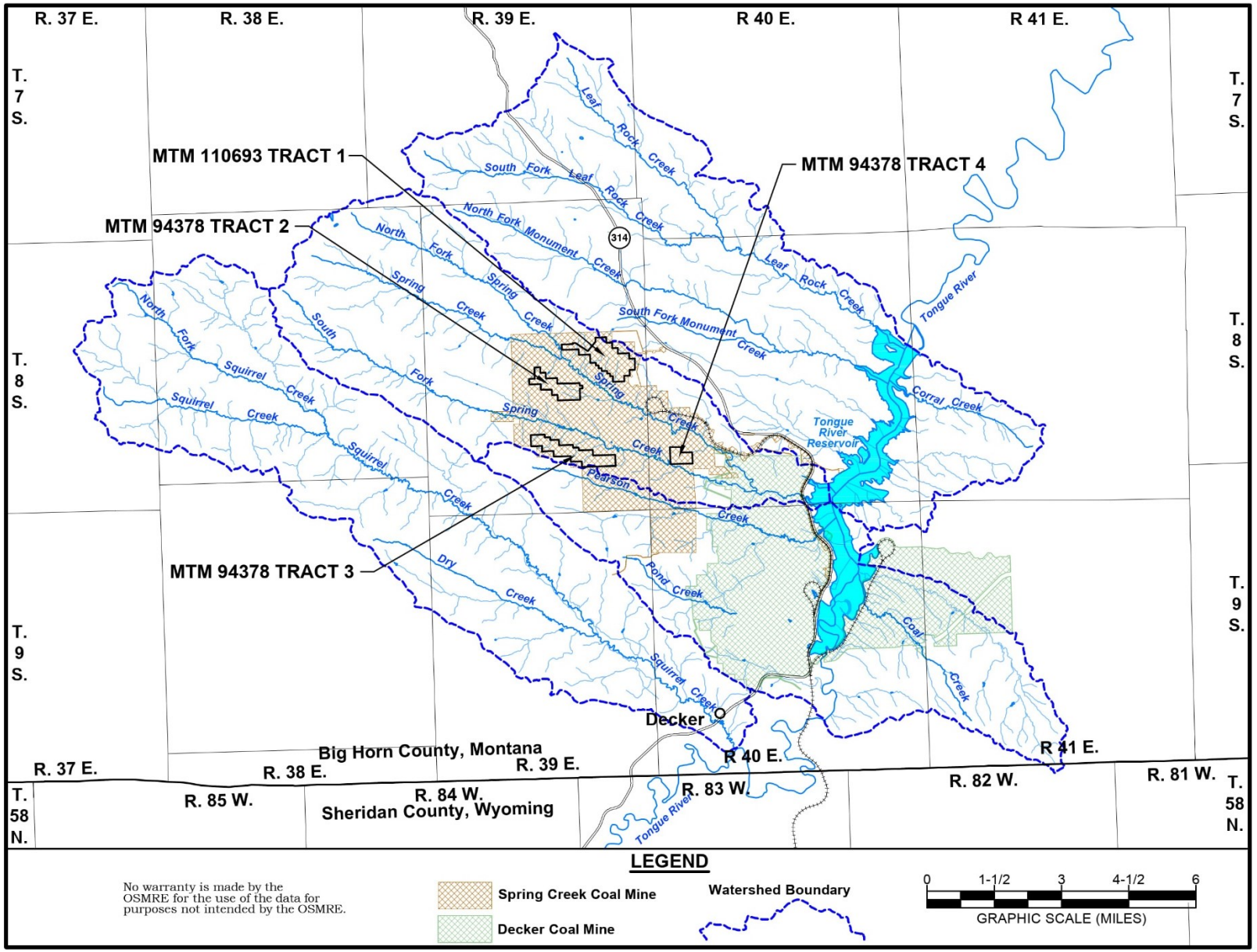
3.5.2 Surface Water

The LBA1 tracts are located within the Spring Creek drainage basin, an ephemeral tributary of the Tongue River watershed. The main surface water features within and adjacent to the LBA1 areas are depicted on Map 3.5-2 and include the Tongue River Reservoir, North Fork Spring Creek, South Fork Spring, and Spring Creek. The hydrologic function of the ephemeral stream channels within the Spring Creek Mine area is primarily to convey runoff and transport sediment loads based on the magnitude of the runoff event. The duration and frequency of surface flow events are typically not sufficient to build and maintain fluvial depositional features and maintain dominant bankfull channel characteristics.

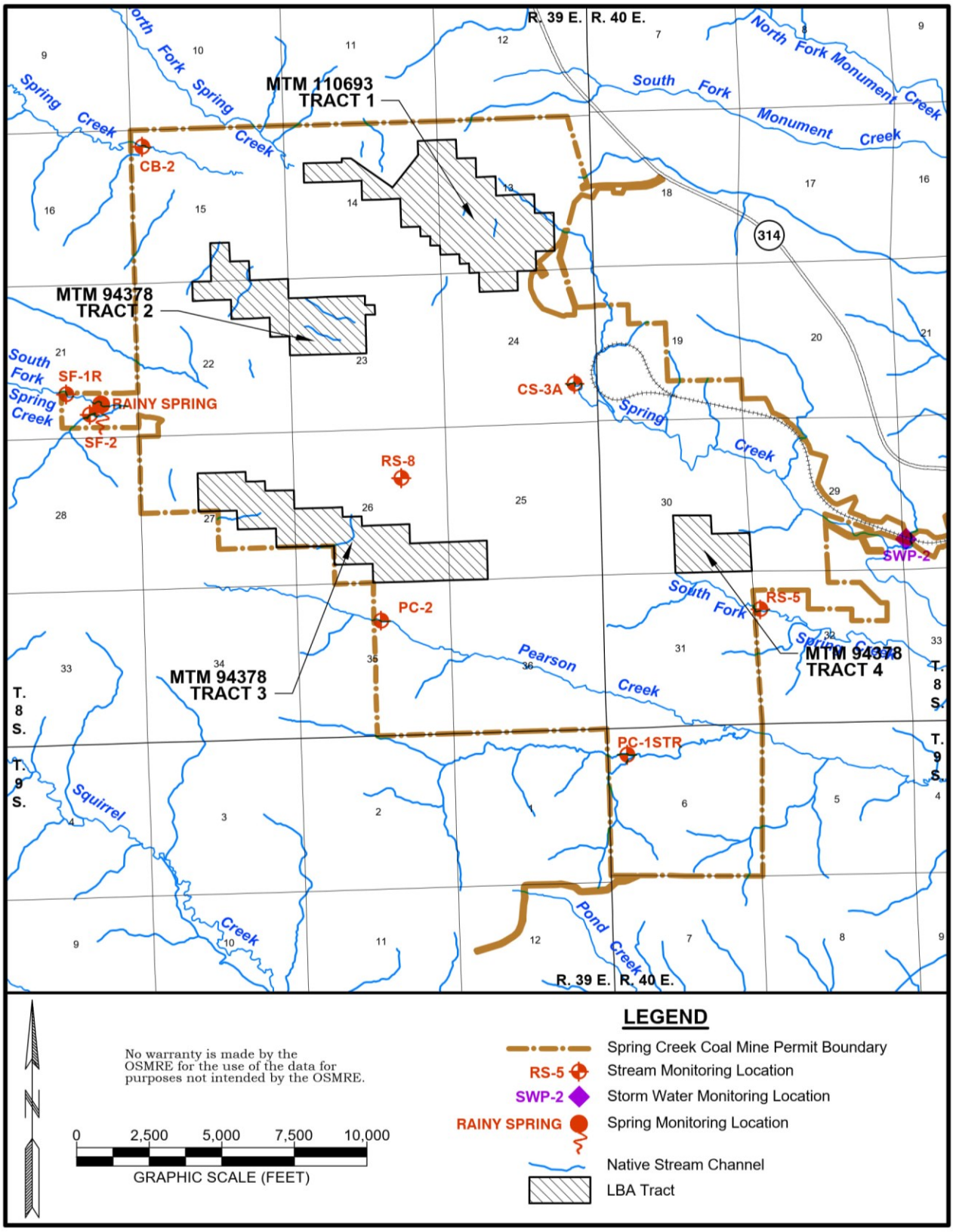
The tracts are located primarily within the Pearson Creek and Spring Creek watersheds. A very small portion of Tract 1 is within the Monument Creek watershed. Monument Creek, Pearson Creek, and Spring Creek are ephemeral tributaries of the Tongue River watershed and only flow in direct response to rainfall or snowmelt runoff events. Snowmelt runoff events can last for several days or more but rarely have large peak flows. Most of the peak annual flow events occur during the late spring and summer as a result of thunderstorms.

The flows of Spring Creek and its north and south forks are currently detained in flood control reservoirs located upstream from the mining operation to keep the runoff out of the SCM pits. Pearson Creek flow is not currently detained by the mine, but downstream flows have been substantially altered by a constructed diversion and impoundment associated with the West Pit of the nearby Decker Mine. These flood controls have been in place for many years, effectively cutting off Spring Creek and Pearson Creek flows upstream of the Tongue River during mining.

The surface-water quality varies with stream flow rate; the higher the flow rate, the lower the TDS concentration but the higher the suspended solids concentration. Due to the flow fluctuations in South Fork of Spring Creek and Pearson Creek, the surface water quality is usually unsuitable for domestic use but suitable for irrigation and livestock use (Ayers and Westcot 1976). There is one spring, Rainy Spring, locate within the permit boundary. Samples have generally not been collected at the spring due to either dry conditions or inundation from South Fork Spring Creek Flood Control Reservoir.



Map 3.5-2. Watershed and Surface Drainages Associated with the Spring Creek Mine



Map 3.5-3. Active Surface Water Monitoring Network at Spring Creek Mine

Streamflow and surface-water quality associated with the SCM are currently being monitored at eight monitoring sites (Map 3.5-3) on Spring Creek, South Fork Spring Creek, and Pearson Creek. The most recent stream monitoring results are provided in the SCM 2023 Annual Hydrology Report and summarized below.

Flow was measured at all of the sites during the 2023 water year (October 1, 2022, through September 30, 2023). Auto samplers collected samples at five of the sites and were analyzed for total suspended solids. Grab samples were collected at one site on Spring Creek (SF-1R), one site on South Fork Spring Creek (site RS-8), and one site on Pearson Creek (PC-2). The site on Pearson Creek (PC-2) exceeded the dissolved aluminum MDEQ DEQ-7 criteria (0.087 mg/L) (NTEC 2023b).

3.5.3 Water Rights

The Montana Department of Natural Resource Conservation (DNRC) oversees surface water and groundwater rights in Montana. Currently, mining companies hold the majority of the water rights in the vicinity of the project area. Records of the Montana DNRC (2024) were searched for surface water and groundwater rights within a 2-mile radius of each tract to update water-rights information.

Montana DNRC records indicate that as of January 2024, there were 118 surface water rights within the 2-mile search area, of which 72 were owned by NTEC and were related to industrial uses. Of the remaining permitted surface water rights, 31 were permitted for livestock, 5 were permitted for irrigation, 5 were permitted for wildlife/fishery, 4 were permitted for pollution abatement, and 1 was permitted for multiple domestic use.

Montana DNRC records indicate that, as of January 2024, there were 170 permitted water wells within 2 miles of the tracts, of which 82 are owned by NTEC. The remaining non-coal mine related are permitted for the following uses:

1. 55 livestock
2. 19 domestic
3. 4 lawn and garden
4. 4 commercial
5. 3 irrigation
6. 2 fishery
7. 1 recreation

3.6 Alluvial Valley Floors

The provisions of SMCRA (30 U.S.C. §1265(b)(10)(F)) include a specific prohibition on mining certain alluvial valley floors (AVFs), stringent reclamation standards for those AVFs not prohibited from mining, and requirements that mining operations not materially damage the hydrologic function of any AVFs that would otherwise be prohibited from mining. Two possible AVFs, Spring Creek and South Fork Spring Creek, were investigated in 1980 to determine their AVF status (Volume 1, Section 17.24.325, Spring Creek Coal Company 2001). Spring Creek was found not to be an AVF and South Fork Spring Creek was found to be an AVF that is insignificant to agriculture. Approximately 90 acres of AVF were delineated on South Fork Spring Creek. Hydrologic investigations of valley fill deposits of Spring Creek since 1979 and on North Fork Spring Creek since 1993 within the Pit 4 area were conducted by SCM to assess whether these ephemeral streams meet the definitions of an AVF (Volume 1, Section 17.24.325, SCCC 2001). Based on the results of these investigations, the previously unsurveyed portions of Spring Creek and North Fork Spring Creek were found not to be AVFs. There are no unconsolidated stream laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities within the LBA tracts therefore no AVFs have been delineated within the tracts.

3.7 Wetlands

No potential jurisdictional wetlands were identified during field surveys of the LBA1 tracts. Stock ponds and water impoundments with wetland soils, plants, and hydrology are present, but they are not considered jurisdictional because they either lack a continuous ordinary high-water mark or do not have a continuous nexus to other waters of the U.S.

3.8 Soils

Soils in the LBA1 tracts areas have been designated as "unique" farmland and have not been specified as land of "statewide importance."

Like the overburden, the topsoil is removed and replaced during mining and reclamation. The postmining topsoil is a composite of premining soils. However, there are important differences between premining and postmining soils. Premining soils occur in mappable units, or soil series, which are distinguishable by their physical and chemical characteristics, depths, locations in the landscape, and other factors. Before mining, the operator is required to map the soils, test them for physical and chemical suitability to support plant growth, and provide a plan for their salvage and replacement. Soil material determined to be unsuitable due to physical or chemical limitations is not salvaged or replaced.

3.9 Vegetation

Mapping indicated that there are 14 vegetation communities with the LBA1 tracts, all of which are representative of the Montana Mixed Prairie Association. Sites with sparse vegetative cover and impeded soil drainages exist within the tracts; thus, erosional problems do occur. Saline-alkali soils in the area can limit forage productivity and restrict vegetation to saline-tolerant species. These factors and others related to post-grazing use attribute to overall livestock carrying capacities of between 6 to10 acres per animal unit month, depending on the site. No crop lands are present within the LBA1 tracts.

Surveys for threatened and endangered (T&E) plant species were performed for the SCM area. No T&E plant species (including Ute Ladies' Tresses) were present within the LBA1 tracts.

The Montana Natural Heritage Program (MTNHP) provides information on the Species of Concern occurring in vicinity of SCM. Species of Concern includes plants that are rare, threatened, and/or have declining populations. The 2022 Plant Species of Concern list includes 5 species occurring and 13 species with the potential of occurring within and in the vicinity of the SCM (MTNHP 2024). Two species of concern have been documented within the SCM permit boundary during surveys: Barr's milkvetch (*Astragalus barrii*) and woolly twinpod (*Physaria didymocarpa var. lanata*). Barr's milkvetch has an S3 State rank (potentially at risk because of limited range, population and/or habitat) and woolly twinpod has a S2S3 State rank (at risk because of very limited and/or potentially declining population numbers, range, and/or habitat).

3.10 Wildlife

The initial wildlife baseline inventory for the SCM was conducted in 1974, with additional baseline inventories conducted periodically since that time to accommodate permit expansion. Annual monitoring was initiated in 1978 and continues at present. Information is derived from the baseline data, subsequent studies, which have been conducted in accordance with SCM's Wildlife Monitoring Plan (SCM 2017), and the MDEQ Annual Reports. No substantial changes to wildlife use areas for other mammals, upland game birds (excluding the Greater sage-grouse [GRSG] [*Centrocercus urophasianus*]), other birds, reptiles and amphibians, and aquatic species populations have been noted since 2006. Annual reports are submitted to MDEQ, which discuss species occurrences, potential mine-related impacts to those species, agency coordination, and specific measures taken to avoid, minimize, or compensate for mine-related impacts within that year. The wildlife monitoring analysis area for evaluating impacts on wildlife is the SCM permit

area plus an approximate 2-mile buffer (Map 3.10-1) in accordance with MDEQ's *Fish and Wildlife Guidelines for the Montana Strip and Underground Mine Reclamation Act* (as revised July 1994, updated March 2021).

3.10.1 Greater Sage-grouse

The Montana Sage Grouse Habitat Conservation Program (MSGHCP), as implemented under Montana EOs 12-2015 and 21-2015, typically manages land uses and activities that may affect key GRSG habitat within Montana. However, activities associated with the LBA1 tracts would not be managed according to the MSGHCP because the tracts are entirely within the SCM's currently approved SMP C1979012 permit boundary and are exempt because, as explained in EO 12-2015, the permit was received and deemed complete in 2013 before the EO effective date.

In lieu of the management requirements specified in the MSGHCP, NTEC has developed and implemented a detailed HRRP for the management of GRSG at the mine and is voluntarily participating in the Thunder Basin Grasslands Prairie Ecosystem Association to offset potential impacts to GRSG due to mine-related activities. SCM also voluntarily participates in the Candidate Conservation Agreement with Assurances program to help minimize impacts to GRSG in the area.

Based on the current classification system for grouse leks (Montana Fish, Wildlife and Parks [MFWP] 2017), the wildlife monitoring area includes two Confirmed Active lek sites, six Confirmed Inactive leks, and one Confirmed Extirpated (mined through) lek (Map 3.10-1). However, no GRSG have been recorded at either of the two Confirmed Active leks in the last 6 to 7 years, depending on the site.

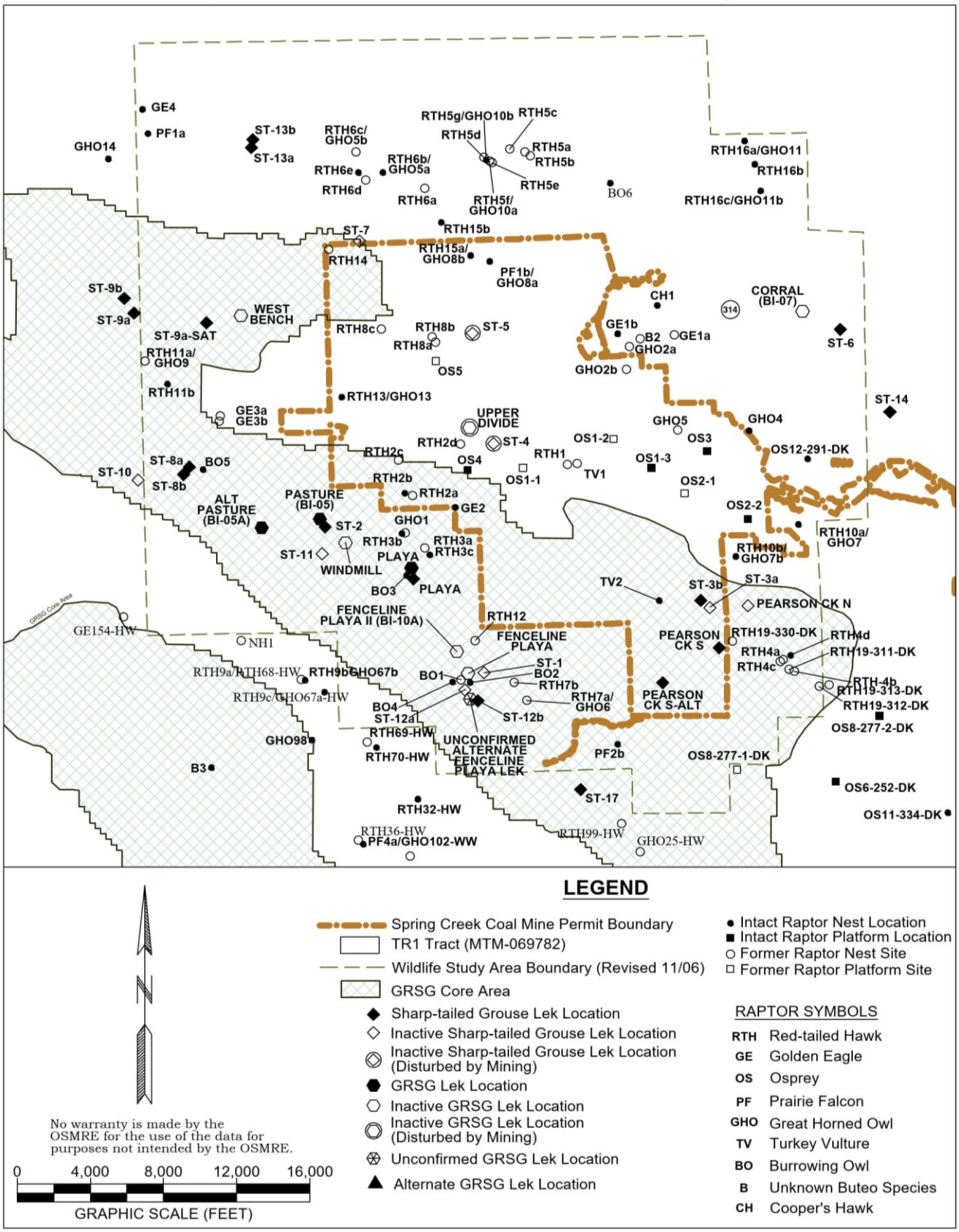
As discussed in the 2022 Wildlife Annual Monitoring Report, peak GRSG counts for leks within the wildlife monitoring area have been below the current long-term average of 3.4 males/lek/year during 34 of the last 43 years in which separate records are available (Great Plains Wildlife Consulting, Inc. 2023). Average peak male counts exceeded five birds per lek in only 8 of the 43 years with separate counts; an average of more than 10 males per lek was recorded in only 4 years. The last years for those exceedances were 1989 and 1980, respectively. The highest average peak male count recorded in any given year was 27 males per lek in 1978 and the highest male count at an individual lek was 37 in 1978.

No GRSG broods have ever been observed during annual targeted surveys along drainage routes and no broods have been observed from 2000 to 2022 (Great Plains Wildlife Consulting, Inc. 2023). No GRSG or their sign were encountered during at least 159 individual winter surveys conducted for wintering sage-grouse or other wintering species (e.g., big game, bald eagles) over the last 28 years (1995-2022) (Great Plains Wildlife Consulting, Inc. 2023).

3.10.2 Raptors

Map 3.10-1 shows the locations of historical and active raptor nests within the wildlife monitoring area, as of 2022. The nearest known human activity to the active nests observed during the 2022 breeding season (March 1 to July 31) is also shown on Map 3.10-1.

As discussed in the SCM 2022 Wildlife Annual Monitoring Report, a total of 77 known raptor nest sites had been identified within the annual monitoring area through 2022 (Great Plains Wildlife Consulting, Inc. 2023). Thirty-two nesting sites were intact through that breeding season, with one additional site temporarily barricaded from use during proximate mining operations. Ten of the 32 intact nests were in the SCM permit area and the rest were in the surrounding perimeter. The 32 intact nests included:



Map 3.10-1. 2022 Spring Creek Mine Wildlife Monitoring

9 red-tailed hawk (*Buteo jamaicensis*) nests,
5 osprey (*Pandion haliaetus*) nesting platforms,
5 burrowing owl (*Athene cunicularia*) nest sites,
5 red-tailed hawk/great horned owl (*Bubo virginianus*) nests,
3 golden eagle (*Aquila chrysaetos*) nests,
2 prairie falcon (*Falco mexicanus*) eyries,
1 Cooper's hawk (*Accipiter cooperii*) nest,
1 great horned owl nest,
1 turkey vulture (*Cathartes aura*) nest site (barricaded), and
1 prairie falcon/great horned owl nest.

3.10.3 Threatened and Endangered Species

No USFWS federally listed T&E species are known to occur in the project area (USFWS 2024). The USFWS has not designated critical habitat for any T&E species in the vicinity of the project area at this time. No current federally listed vertebrate species or other species associated with the ESA listing process were observed within the combined monitoring area during 2022 (Great Plains Wildlife Consulting, Inc. 2023).

3.10.4 Other Species of Special Interest

For the purposes of this discussion, other species of special interest (SOSI) include USFWS Birds of Conservation Concern (BCC), BLM Sensitive Species, and MTNHP and MFWP Species of Concern. The MTNHP Environmental Summary Report (ESR) was reviewed and compared to annual plant and wildlife monitoring data for the mine. The MTNHP ESR was requested to obtain a comprehensive list of SOSI within the wildlife monitoring area (MTNHP 2024). The USFWS list of BCC identifies the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the USFWS' highest conservation priorities (USFWS 2024). MTNHP Species of Concern are native taxa considered to be at-risk due to declining population trends, threats to their habitats, restricted distribution, and/or other factors. Each species is ranked based on various risk factors, with ranks ranging from 1 (highest risk, greatest concern) to 5 (demonstrably secure). According to the MTNHP there are a total of 27 species of concern present in the wildlife monitoring area, this includes eight mammals, 11 bird species, one amphibian species, five reptiles, and one fish species.

3.11 Ownership and Use of Land

Surface ownership in the area includes BLM and private. Map 1.2-2 depicts coal ownership and Federal coal leases on and adjacent to the tracts. The premining land use of the tracts is rangeland. The primary land use was for cattle grazing.

3.12 Cultural Resources

Cultural resources are defined as the physical remains of past human activity, generally inclusive of all manifestations more than 50 years old. Cultural resources can be classified as artifacts, features, sites, districts, or landscapes. The goal of cultural resource management is conservation of archaeological and historical remains and information for research, public interpretation and enjoyment, and for appreciation by future generations. Prehistoric resources are physical locations with remains that are the result of human activities occurring prior to written records. Historic resources are most commonly recorded as sites, clusters of artifacts, and/or features with definable boundaries.

Prehistoric site types common to the region and potentially occurring within the study area include: campsites, rock shelters, rock structures (i.e., eagle trapping pits, hunting blinds, vision

quests or fortification structures), lithic quarries, stone (tipi) rings, stone cairns, stone alignments, ceramic remains, rock art, bison processing areas, and lithic reduction areas. Historic cultural resources expected in the vicinity of the project area include homesteads, ranches, irrigation related structures, and refuse dumps.

Comprehensive investigations (BLM Class III inventory) of cultural resources within the LBA1 tracts and much of the surrounding area have been completed. As of 2018, 116 cultural sites have been identified within the permit boundary, of which 11 have been designated as eligible for listing on the National Register of Historic Places (NRHP). Only two of the 11 NRHP eligible sites within the permit boundary are within the LBA1 tracts.

Native American tribes were consulted during the preparation of the 2006 and 2016 LBA1 EAs. In response to the 2006 LBA EA consultation, the Northern Cheyenne Tribe Preservation Office requested additional information and participated in a discussion of the cultural resource issues related to the LBA1 tracts and accompanied mine personnel on tour of several of the sites on February 14, 2006. As a result of the discussions, it was agreed that the Northern Cheyenne Tribe would conduct a tribal cultural survey for SCC and surveys have been conducted on all tracts. On February 11, 2016, OSMRE requested continued consultation with Native American tribes for the stages of the proposal development and implementation of the final federal action. On May 23, 2016, the Cheyenne and Arapahoe Tribes provided a letter in response to OSMRE's consultation request, confirming no properties would be affected. No other Native American tribes responded to OSMRE's consultation request.

Site 24BH404 is the most culturally significant site within the LBA1 tracts because it was the only site stipulated in the lease requiring mitigation after the lease size was reduced. Since the 2006 LBA EA, the coal under site 24BH404 was removed from the lease and the associated disturbance was also removed. In 2015 mitigation was done for the purpose of recording the site for historical record because the sandstone rock art features will eventually either be destroyed by the weather or fall off. The original mitigation was to remove or plaster the panels; however, the panel was instead photographed with 3D imagery so it can be recreated if needed. No other sites within the LBA1 tracts require mitigation.

3.13 Visual Resources

Scenic quality classes are defined by a system that rates seven key factors: Landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification. Visual sensitivity levels are determined by peoples' concern for what they see and the frequency of travel through the area. For management purposes, the BLM conducts a Visual Resource Management (VRM) inventory that identifies, sets and meets objectives for the maintenance of scenic values and visual quality and is based on research designed to objectively assess aesthetic qualities of the landscape. The VRM classification ratings range from I to IV as follows:

Class I Objective - No Visible Change – The objective of this class is to preserve the existing character of the landscape. Only Congressionally authorized areas or areas approved through the Management Framework Plan (MFP)/RMP process where the goal is to provide a landscape setting that appears unaltered by man should be placed in this class. The level of change to the characteristic landscape should be extremely low because only very limited development such as hiking trails should occur in these areas.

Class II Objective - Change Visible but Does Not Attract Attention - The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III Objective - Change Attracts Attention but Is Not Dominant - The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV Objective - Change is Dominant but Mitigated - The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. The land included in the proposed tracts is classified as visual resource management Class III.

The LBA1 tracts are classified as visual resource management Class III. The Class III objective is to partially retain the existing character of the landscape but allows for a moderate level of change. SCM facilities and some mining activities are visible from Montana Federal-Aid Secondary Route (FAS) 314. The closest tract (Tract 1) is located over ½-mile from FAS 314. No tracts would be plainly visible from the transportation corridor. Most people traveling this road are commuting to work at the SCM and the nearby Decker Mine. However, during periods of peak recreational activity this highway generates higher traffic volume. Landscapes found within and adjacent to the SCM area, and visible from FAS 314, include gently rolling benches of sagebrush, and mid-short-grass prairie. Major man-made intrusions include ranching, farming, transportation facilities and electrical power lines.

3.14 Noise

An individual's judgment of the loudness of a noise correlate well with the A-weighted sound level system of measurement. The A-weighted sound level, or A-scale, has been used extensively in the US for the measurement of community and transportation noises. A weighted decibels (dBA) readings for some typical sounds commonly heard in daily life are as follows:

- 10 dB: Normal breathing
- 20 dB: Whispering from five feet away
- 30 dB: Whispering nearby
- 40 dB: Quiet library sounds
- 50 dB: Refrigerator
- 60 dB: Electric toothbrush
- 70 dB: Washing machine
- 80 dB: Alarm clock
- 90 dB: Subway train
- 100 dB: Factory machine
- 110 dB: Car horn
- 120 dB: Ambulance siren

Existing noises in the LBA1 tracts, include coal mining activities, agricultural and recreational activities, and traffic on FAS 314. These noise sources have not changed since 2006. Modeling performed for SCM indicates the internal criterion for maximum off-site noise 65 dBA would not be exceeded at point less than 4,800 feet from the pit boundary. The closest residence is located approximately 3,250 feet from Tract 1 and Route FAS 314 is within 3,870 ft of Tract 1. The nearest recreationist on the Tongue River Reservoir could be within approximately 15,000 ft from the proposed tracts. Traffic on FAS 314 is heaviest during the daylight hours and at shift changes. SCM

has developed internal criteria on noise performance to ensure the protection of local community health and the environment.

3.14.1 Rail Transport Corridor

Noise and vibration are linked in this EIS for rail because the two disciplines are perceived to have many physical characteristics in common. Railroad operation noise can result from diesel locomotive engine and wheel/rail noise and horn noise, which includes locomotive warning horns sounding at grade rail/roadway crossings (Surface Transportation Board [STB] 2015). Noise from trains is primarily a function of train speed, train length, track construction, and number and type of locomotives. Vibration caused by trains radiates energy into the adjacent soil in the form of different types of waves that propagate through the various soil and rock strata to nearby structures and other receptors.

Existing Regulations and Guidelines

A number of federal noise and vibration statutes, regulations, and guidelines are applicable to rail transport, including the Noise Control Act of 1972 (42 U.S.C. §4910), STB and Federal Railroad Administration (FRA) regulations and guidance, EPA's Railroad Noise Emission Standards (40 C.F.R. Part 201), Federal Transit Administration (FTA) assessment methods, and noise limits related to occupational safety.

Thresholds and Basis for Analysis

Because OSMRE does not regulate rail traffic, this EIS relies upon STB regulations, which only require analysis of noise where rail traffic increases at least 100 percent (i.e., doubles) or increases by at least eight trains per day on any segment (49 C.F.R. §1105.7(e)(6)). Where such thresholds are exceeded, noise effects are compared to two additional thresholds: (a) an increase in noise exposure as measured by a day-night noise level (L_{dn}) of 3 dBA or more; or (b) an increase to a noise level of 65 L_{dn} or more.

L_{dn} is defined as a receiver's cumulative noise exposure from all events over a full 24 hours and generally recognized as the standard by which to assess transit noise associated with residential land uses (FTA 2006). FTA also specifies human annoyance criteria for residences related to the frequency of events (e.g., frequency of train passage), whereby doubling the number of events is required for a significant increase for heavily used rail corridors (more than 12 trains per day).

Baseline noise and vibration conditions associated with existing rail traffic along the rail lines would vary depending upon the day and the location. Existing conditions are assumed to be in conformance with Federal regulations for the purposes of this EIS.

3.15 Transportation

There are no primary transportation systems in the LBA1 tracts. Nearby transportation facilities include the FAS 314 (which is a continuation of Wyoming Secondary Route 87), a railroad spur owned by NTEC and used by BNSF Railroad, and local access roads.

3.15.1 Rail Transportation

Regulatory Environment

Railroads are regulated by two separate Federal agencies, each with their own responsibilities.

- STB is an independent adjudicatory and economic-regulatory agency charged by Congress with resolving railroad rate and service disputes and reviewing proposed railroad mergers. STB has jurisdiction over railroad rate and service issues and rail restructuring transactions (e.g., mergers, line sales, line construction, and line abandonments) and also has authority to investigate rail service matters of regional and national significance. STB regulations

preempt State and local laws (e.g., noise ordinances) that would otherwise manage or govern rail transportation.

- As part of the US Department of Transportation (USDOT), FRA formulates and enforces rail safety regulations, administers rail funding, and researches rail improvement strategies and technologies. FRA also facilitates national and regional rail planning to maintain current services and infrastructure and also expand and improve the rail network. For the most part, all railroad operational procedures are subject to FRA regulations, including highway-railroad crossing signals, train speeds, train horn use, and track condition.

STB and FRA conduct reviews required by NEPA and consider environmental impacts before making final decisions pertaining to actions under their jurisdiction. STB's Office of Environmental Analysis is responsible for directing the environmental review process, conducting independent analysis of all environmental data, and making environmental recommendations to the STB. STB's environmental rules are found at 49 C.F.R. Part 1105. FRA conducts environmental reviews according to FRA's Environmental Procedures (FRA 1999).

Coal Transport Routes and Rail Traffic

Coal mined at the SCM is shipped to various destinations using a railroad spur owned by NTEC and used by BNSF and BNSF-owned/maintained mainline railroad tracks. Trains departing from SCM use four routes, as depicted on Map 2.1-1 of this EIS. None of the transportation routes pass through any Class I areas. Class 1 areas, as designated in the CAA, have special air quality and visibility protection. Class I areas include international parks, national wilderness areas larger than 5,000 acres, national memorial parks larger than 5,000 acres and national parks larger than 6,000 acres.

Destinations of the SCM coal for the maximum production year over the last 8 years (2018) and the minimum production year of the last 8 years (2020) are summarized in Tables 3.15-1 and 3.15-2, respectively. The information provided in the tables is based on data provided by the EIA and SCM. Based on U.S. Energy Information Administration (EIA) information, in 2018 coal shipments utilized approximately 2,170,000 miles of rail lines for 883 round trips. In 2020, coal shipments utilized approximately 1,517,000 miles of rail lines for 610 round trips. For comparison purposes, in 2018 rail freight was hauled by rail in the U.S. over 476,500,000 miles (USDOT 2021). Therefore, the annual rail transport of coal resulting from the 2018 and 2020 SCM coal shipments represent approximately 0.45 and 0.32 percent of the total 2018 U.S. rail freight traffic, respectively.

SCM does not maintain records of train accidents involving domestic coal shipments of SCM coal. Once the coal is loaded it transfers ownership from SCM to the customer. SCM does maintain train accident records for exported coal (coal sent by train to the Westshore Port in British Columbia, Canada). Since 2016, there have been no train derailments involving coal from the LBA1 tracts on the rail lines from SCM to the Westshore Port (SCM 2024).

3.15.2 Vessel Transportation

Coal from the SCM is shipped to two coal terminals, the DTE-BRSC Shared Storage terminal in Superior, Wisconsin and the Westshore terminal in British Columbia, Canada. At the DTE-BRSC terminal, coal is loaded onto vessels for transport to three power plants located on the Great Lakes. The average lake transport distance is 588 miles (SeaRoutes 2021). At the Westshore Port, coal is loaded onto ocean-going vessels for overseas transport to ports in the ROK and Japan. The average ocean transport distance between Westshore and possible coal ports in the ROK and Japan is estimated to be approximately 4,300 and 4,600 nautical miles one-way, respectively (SeaRoutes 2021).

Table 3.15-1. Destinations, Tonnages, and Distances for SCM Coal Mined in 2018

Destination	Tons Shipped	Percent of Shipments	Number of Trips[2]	Round-trip Rail Miles[1]	Total Rail Miles
DTE-BRSC Shared Storage (Wisconsin)	3,756,426	27%	241	2,064	497,004
TransAlta Centralia Generation (Washington)	2,361,244	17%	151	2,400	363,268
Clay Boswell (Minnesota)	659,895	5%	42	1,954	82,656
Coronado Generating Station (Arizona)	563,243	4%	36	2,876	103,839
Hoot Lake (Minnesota)	326,360	2%	21	1,660	34,728
Presque Isle (Wisconsin)	260,860	2%	17	2,064	34,514
Sub-total (from EIA)	*7,928,028*	*58%*	*508*	*13,018*	*1,116,009*
Asia (Westshore Port, British Columbia)	4,503,000	33%	289	3,000	865,962
Additional Shipments (Information not publicly available)	1,337,027	10%	86[3]	2,196[3]	188,210
Total	**13,768,055**	**100%**	**883**	**18,214**	**2,170,181**

1. Approximate miles
2. Round trip, based on an estimated 15,600 tons of coal per train
3. Estimated value

-- Data are not publicly available

Source: EIA 2024

Table 3-15-2. Destinations, Tonnages, and Distances for SCM Coal Mined in 2020

Destination	Tons Shipped	Percent of Shipments	Number of Trips[2]	Round-trip Rail Miles[1]	Total Rail Miles
DTE-BRSC Shared Storage (Wisconsin)	1,879,560	20%	120	2,064	248,680
TransAlta Centralia Generation (Washington)	1,959,814	21%	126	2,400	301,510
Clay Boswell (Minnesota)	908,001	10%	58	1,954	113733
Coronado Generating Station (Arizona)	313,995	3%	20	2,876	57,888
Sub-total (from EIA)	*5,061,370*	*53%*	*324*	*9,294*	*721,811*
Japan (Westshore Port, British Columbia)	531,862	6%	34	3,000	102,281
Korea (Westshore Port, British Columbia)	2,687,618	28%	172	3,000	516,850
Additional Shipments (Information not publicly available)	1,232,406	13%	79[3]	2,225[3]	175,756
Total	**9,513,255**	**100%**	**610**	**17,519**	**1,516,697**

1. Approximate miles
2. Round trip, based on an estimated 15,600 tons of coal per train
3. Estimated value

-- Data are not publicly available

Source: EIA 2024

3.16 Hazardous and Solid Waste

Non-hazardous waste, which is similar to domestic or municipal solid waste, is currently disposed of onsite. Most of the wastes generated at the Spring Creek Mine that are not recycled are disposed of in a designated sanitary landfill located on a portion of the Spring Creek Mine area. Disposal of these non-hazardous wastes, which include abandoned mining machinery, scrap iron, scrap lumber, packing material, and other items is permitted under the mine's existing MDEQ permit to mine. No solid wastes will be deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites. At the Spring Creek Mine, materials that may be classified as hazardous or are handled as hazardous include some greases, solvents, paints, flammable liquids, and other combustible materials determined to be hazardous by the EPA under the Resource Conservation and Recovery Act (RCRA). These types of wastes are disposed of at an off-site EPA-permitted hazardous waste facility. No noteworthy impacts are anticipated as a result of any of the alternatives.

3.17 Socioeconomics

The social and economic study area for the project involves primarily the Federal and Montana state governments (tax revenues) and Sheridan County, Wyoming, and the City of Sheridan. Sheridan and Sheridan County were included in the study area because a majority of SCM employees commute from the Sheridan Area.

3.17.1 Local Economy

Montana relies on its natural resources as a primary source of tax revenue. Generally, natural resource taxes are categorized as either severance/license taxes or some form of ad valorem (property) taxes. Total natural resource tax collection for the State of Montana in 2022 was $314,384,399. Montana coal severance taxes accounted for approximately 21 percent of the total 2020 revenues (Montana Department of Revenue 2022).

Coal production, as reported by the EIA (2024), showed Montana's coal production was 28.2 Mt in 2022. This was a decrease of approximately 1.4 percent over the 28.6 Mt produced in 2021 and a decrease of approximately 13 percent over the 32.4 Mt produced in 2016. The 2022 production was less than the record 44.9 Mt produced in 2008. Coal production figures for Montana between 2016 and 2022 are shown on Table 3.17-1.

Table 3.17-1. Historic Coal Production for Montana and Big Horn and Rosebud Counties

Year	2016	2017	2018	2019	2020	2021	2022
Montana	32.4	35.3	38.5	34.8	26.5	28.6	28.2
Percent Change	-23.2%	9.0%	9.3%	-9.8%	-23.9%	7.9%	-1.4%

Source: Montana Coal Council 2024, EIA 2024

Table 3.17-2 provides total cumulative royalties from the SCM. The table shows that the state and federal governments are the major beneficiaries of these payments, whereas private owners of premining land leases are minor beneficiaries of these payments. Mineral royalties are collected on the amount of production and the value of that production. The current royalty rate for Federal coal leases at surface mines is 12.5 percent, with half of this revenue returned to the state. Coal severance taxes are collected by the state of Montana. Currently, Montana collects 15 percent of the price of the coal as severance tax.

Table 3.17-2. Royalty Payments from Coal Production at the SCM

Year	2016	2017	2018	2019	2020	2021	2022
Federal Collections	$10,877,622	$16,826,193	$14,277,892	$12,293,469	$8,679,110	$14,074,577	$15,155,698
State Collections	$6,868,968	$3,592,071	$7,851,047	$7,096,519	$7,148,611	$13,729,215	$11,569,054
Private Collections	$525,128	$563,911	$699,490	$445,502	$1,952,833	$2,384,873	$2,952,543
Total Royalty Collections	$18,271,718	$20,982,175	$22,828,429	$19,835,489	$17,780,554	$30,188,665	$29,677,295

Source: NTEC 2022a

3.17.2 Population

According to U.S. census data, in 2020 Sheridan County had a population of 30,921 (U.S. Census Bureau 2024). The 2010 population of Sheridan County was 29,116. Therefore, there was an increase of 1,805 persons or 6.2 percent.

Population in Big Horn County, Montana continues to be sparse. According to the U.S. Census Bureau, Big Horn County had a population of 13,124 in 2020. The 2010 population of Big Horn County was 12,865. Between 2010 and 2020, the population of Big Horn County grew by approximately 2.0 percent (U.S. Census Bureau 2024).

3.17.3 Employment

A majority of the employees at the SCM reside in Sheridan County, Wyoming. The labor force in Sheridan County in October 2023 stood at 16,424 with an unemployment rate of 2.3 percent, compared to 3.2 percent in October 2022 (Wyoming Department of Workforce Services 2024). In June 2023, 336 people in Sheridan County were employed in natural resources and mining (U.S. Bureau of Labor Statistics 2024). In June 2023, the largest employment sector in Sheridan County was goods-producing.

SCM is the primary mining employer in Big Horn County. Montana receives payroll taxes, royalties, and production taxes, but most of the employees reside in Sheridan County.

3.17.4 Housing

In 2020, Sheridan County contained 14,884 housing units with 9,006 housing units located in the City of Sheridan and 5,878 housing units in other towns and unincorporated area. Of the 14,884 housing units, 13,349 were occupied and 1,535 were vacant (U.S. Census Bureau 2024). Nearly 69 percent of occupied housing units are owner-occupied, and 31 percent are renter-occupied (Gruen Gruen+Associates 2021). The countywide vacancy rate has declined since 2010 (11.3% in 2010 and 10.3% in 2020), but higher for areas outside of the City of Sheridan. The number of residential housing permits peaked in 2006 with most permits for detached single-family units. New permits reached a low in 2009 of less than 100 units. Residential permit activity has increased steadily since 2014 but remains far below pre-recession levels of the mid-2000s. Nearly 900 units have been permitted in the county between 2016 and 2020. The trend of increasing permit activity is expected to continue in 2021 and persist into 2022. The recent housing study for Sheridan County states that over the next 10 years the area will need about 1,000 units to support the total workforce and senior housing needs.

3.18 Environmental Justice

In 1994, President Clinton issued EO 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The purpose of the EO is to:

- identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law.
- develop a strategy for implementing environmental justice.
- promote nondiscrimination in federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation.

The following presents the analysis of the environmental justice minority and low-income populations in the vicinity of the SCM for year 2022 (most recent year with data).

As shown in Table 3.18-1, the percentage of the population classified as low income in one of the three counties analyzed is more than 10 percentage points higher than that of the State of Montana, which serves as the reference population for this analysis. A low-income environmental justice population, therefore, is present for the purposes of this analysis.

The percentage of the population identified as belonging to a minority group in one of the counties analyzed is greater than 50 percent (Table 3.18-1). A minority environmental justice population, therefore, is present for the purposes of this analysis.

Table 3.17-3 shows that there are concentrated populations of American Indians living within multiple counties included in the analysis. An American Indian environmental justice population; therefore, is present for the purposes of this analysis.

Table 3.18-1. Environmental Justice Summary

Population	Low Income	Minority	American Indian
Big Horn County, MT	54.4%	73.8%	65.1%
Rosebud County, MT	43.9%	48.5%	38.2%
Sheridan County, WY	22.4%	9.4%	1.2%
State of Montana (reference population)	30.6%	15.4%	5.8%

Source: Headwaters Economics 2024

Chapter 4 – Environmental Consequences

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter discusses the potential direct and indirect effects of the Proposed Action (Alternative 1), Partial Mining alternative (Alternative 2), Accelerated Mining Rate alternative (Alternative 3), and the No Action alternative (Alternative 4), as described in Chapter 2. The discussion is organized by affected resource in the same order as they are described in Chapter 3, and then by alternative.

An impact, or effect, is defined as a modification to the environment brought about by an outside action. Impacts vary in significance from no change, or only slightly discernible change, to a full modification or elimination of the resource. Impacts can be beneficial (positive) or adverse (negative). Impacts are described by their level of significance (i.e., significant, moderate, minor, negligible, or no impact). For purposes of discussion and to enable use of a common scale for all resources, resource specialists considered the following impact levels in qualitative terms.

Significant Impact: Impacts that potentially could cause irretrievable loss of a resource; significant depletion, change, or stress to resources; or stress within the social, cultural, and economic realm.

Moderate Impact: Impacts that potentially could cause some change or stress to an environmental resource but the impact levels are not considered significant.

Minor Impact: Impacts that potentially could be detectable but slight.

Negligible Impact: Impacts in the lower limit of detection that potentially could cause an insignificant change or stress to an environmental resource or use.

No Impact: No discernible or measurable impacts.

Direct impacts are defined as those impacts which are caused by the action and occur at the same time and place (40 C.F.R. § 1508.8(a)). Indirect impacts are those that are caused by the action and occur later in time or are farther removed in distance but are still reasonably foreseeable (40 C.F.R. § 1508.8(b)).

Impacts can be short-term meaning these impacts generally occur over a short period during a specific point in the mining process and these changes generally revert to pre-disturbance conditions at or within a few years after the ground disturbance has taken place. Long-term impacts are defined as those that substantially would remain beyond short-term ground-disturbing activities. Long-term impacts would generally last the life of the federal mining plan modification approval and beyond. Permanent impacts are defined as those that would remain indefinitely. Permanent impacts would permanently alter a resource and/or result in permanent loss of a resource.

4.2 Topography and Physiography

4.2.1 Direct and Indirect Effects

4.2.1.1 Alternative 1 - Proposed Action

The Proposed Action would permanently impact the topography and physiography of the remaining 162.5 acres within the LBA1 tracts. The impacts would be similar to those currently occurring on the existing SCM coal leases as coal is mined and mined-out areas are reclaimed. Topsoil would be removed from the land and stockpiled or placed directly on recontoured areas. Overburden would be blasted and stockpiled or directly placed into the already mined pit, and coal would be removed. Highwalls with vertical heights equal to overburden plus coal thickness would exist in active pits.

The direct effects on topography and physiography resulting from the Proposed Action are expected to be moderate and permanent on all tracts. Typically, a direct permanent impact of coal mining and reclamation is topographic moderation. After reclamation, the restored land surfaces are generally gentler, with more uniform slopes and restored basic drainage networks. Portions of the original topography of the tracts are somewhat rugged. As a result, the expected postmining topography would be more subdued but would blend with the undisturbed surroundings.

Following reclamation, the average postmining topography would be slightly lower in elevation than the premining topography due to removal of the coal. The removal of the coal would be partially offset by the swelling that occurs when the overburden and interburden are blasted, excavated, and backfilled. The MDEQ, through the PAP process, considered and approved the impacts of mining coal related to the LBA1 tracts, including effects to topography and physiography and reclaiming the area to approximate original contour as required by provisions included in SMP C1979012. Table 2.1-2 provides comparisons between the acres of disturbance versus the acres of reclamation, by bond release phase for the years 2016 through 2023. The reclamation acres have increased since 2016 as has the percentage of advanced stages of reclamation. The SCM is bound by reclamation responsibilities included in the MDEQ-approved SMP C1979012 and the BLM-approved R2P2.

Direct adverse impacts resulting from topographic moderation include a reduction in microhabitats (e.g., cutbank slopes and bedrock bluffs) for some wildlife species and a reduction in habitat diversity, particularly a reduction in slope dependent shrub communities and associated habitat. A potential indirect impact may be a long-term reduction in big game carrying capacity.

The approximate original drainage pattern would be restored. Any topographic changes would not conflict with regional land use and the postmining topography would adequately support anticipated land use of the tracts. These measures are required by state regulations and are therefore considered part of the Proposed Action.

4.2.1.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, SCM will continue to mine the remaining LBA1 tracts but would be limited to a 5-year term. The topography and physiography impacts would be the same as described for the Proposed Action but be reduced to approximately 78.5 acres of disturbance. Any mining of federal coal within the LBA1 tracts beyond this 5-year term would require reevaluation of the mining operations by OSMRE before any further disturbance could occur. Reclamation would occur as required by MEQ-approved SMP C1979012. The impacts would be moderate and permanent on the 78.5 acres disturbed under this alternative within the remaining LBA1 tracts area undisturbed unless future authorization applied for and granted.

4.2.1.3 Alternative 3 – Accelerated Mining Rate

Under this alternative, the potential impacts to topography and physiography would be the same as the Proposed Action but impacts would occur at a faster rate. Instead of occurring over a longer time period, under this alternative the remaining LBA1 tracts coal would be mined in 2.2 years. Under this alternative, the potential impacts to topography and physiography would be moderate and permanent. Reclamation would occur as required by MEQ-approved SMP C1979012.

4.2.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. SCM would proceed with reclamation of lands within the boundaries of the LBA1 tracts. The topography impacts would be less than the Proposed Action since the remaining 162.5 acres within the LBA1 tracts would not be disturbed.

4.3 Geology, Mineral Resources, and Paleontology

4.3.1 Direct and Indirect Effects

4.3.1.1 Alternative 1 - Proposed Action

The geology from the base of the A/D coal seam to the land surface would be permanently changed within the LBA1 tracts. Mining would substantially alter the resulting subsurface physical characteristics of the lands associated with the LBA1 tracts. The replaced overburden (backfill) would be relatively homogenous (compared to the premining layers of shale, siltstone, and sandstone overburden) and partly recompacted mixture. The replaced backfill would range from 180 to 300 feet thick. These impacts are occurring on the existing SCM coal leases as coal is mined and the mined-out areas are reclaimed.

Drilling and sampling programs are conducted by all mine operators to identify overburden material that may be unsuitable for reclamation (i.e., material that is not suitable for use in reestablishing vegetation or that may affect groundwater quality due to high concentrations of certain constituents such as selenium or adverse pH levels). As part of the mine permitting process, each mine operator is required to develop a management plan to ensure that this unsuitable material is not placed in areas where it may affect groundwater quality or revegetation success. Each mine operator must also develop backfill monitoring plans as part of the mine permitting process to evaluate the quality of the replaced overburden. These plans are currently in place on the SCM permit.

Overall, direct and indirect effects on geology would be moderate and permanent. The geology within the LBA1 tracts would be permanently changed as they are replaced with backfill material during reclamation.

Mineral resources within the vicinity of the LBA1 tracts have changed since publication of the 2006 LBA EA and 2016 LBA1 EA. Since these documents were published, CBNG development has ceased. As described in Section 3.3.2.2 of this EIS, there has not been any CBNG production in Big Horn County since 2013. There are no CBNG, oil, or natural gas wells in the SCM permit area. Based on this, direct and indirect effects on mineral resources would be negligible on the LBA1 tracts.

No unique or significant paleontological resources have been identified or are suspected to exist on the tracts. The likelihood of encountering significant paleontological resources is very small. Lease and permit conditions require that should previously unknown, potentially significant paleontological sites be discovered, work in that area must stop and measures must be taken to assess and protect the site. The direct and indirect effects on paleontology would be negligible on the LBA1 tracts.

4.3.1.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, SCM will continue to mine the remaining LBA1 tracts coal but would be limited to a 5-year term. The geology, mineral resource, and paleontological impacts would be the same as described for the Proposed Action but the impacted area would be reduced because only a portion of the remaining coal within the LBA1 tracts would be mined. Any mining of Federal coal within the LBA1 tracts beyond this 5-year term would require reevaluation of the mining operations by OSMRE and reauthorization from the ASLM. SCM would adhere to the backfill monitoring plans as required by MEQ-approved SMP C1979012. Under this alternative, the direct and indirect effects on mineral resources and paleontology would be negligible on the LBA1 tracts because there is no CBNG, oil, or natural gas wells in the SCM permit area or vicinity and no unique or significant paleontological resources have been identified or are suspected to exist on the tracts.

4.3.1.3 Alternative 3 – Accelerated Mining Rate

Under this alternative, the potential impacts to geology, mineral resource, and paleontological would be the same as the Proposed Action but would occur at a faster rate (2.2 years). SCM would adhere to the backfill monitoring plans as required by MEQ-approved SMP C1979012. Direct and indirect effects on mineral resources and paleontology would be negligible on the LBA1 tracts under this alternative because there is no CBNG, oil, or natural gas wells in the SCM permit area or vicinity and no unique or significant paleontological resources have been identified or are suspected to exist on the tracts.

4.3.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. Impacts to the geological resources that have resulted from current mining activities within the LBA1 tracts has been permanently removed; however, geology, mineral resources, and potential paleontological resources within the 162.5 acres that have not been mined would not be impacted. Based on this direct and indirect effect to geology, mineral resources, and paleontology under the No Action alternative would be negligible.

4.4 Air Quality

4.4.1 Particulate Matter

4.4.1.1 Direct and Indirect Effects

4.4.1.1.1 Alternative 1 - Proposed Action

Direct effects from particulate matter from the Proposed Action would include fugitive emissions generated from coal excavation and reclamation activities and tailpipe emissions from equipment. Fugitive particulate emissions would also result from dust being generated during dragline operation, coal haulage, bulldozers, scrapers, loaders, baghouse, and other equipment operating at SCM. Public exposure to particulate emissions from the Proposed Action is most likely to occur along publicly accessible roads and highways that pass near the area of the mining operations. Occupants of residences in the area could also be affected. The closest residence is located approximately 3,000 feet from Tract 1 disturbance and the closest public transportation route is FAS 314, approximately 3,271 feet from disturbance associated with Tract 1. The nearest recreational opportunities are at the Tongue River Reservoir, approximately 15,000 feet from the LBA1 tracts.

Indirect effects from particulate matter include the potential for cardiovascular and respiratory problems for exposed individuals. As described in Section 3.14, the nearest residence is located approximately 3,250 feet from Tract 1 and the nearest recreationist on the Tongue River Reservoir could be within approximately 15,000 ft from the LBA1 tracts.

Dispersion modeling was conducted for a revision to air quality permit MAQP #1120-12 in 2014 using AMS/EPA Regulatory Model (AERMOD). For the model, PM_{10} and $PM_{2.5}$ inventories for the mining activities at SCM were prepared and two years were then selected for worst-case dispersion modeling of PM_{10} and $PM_{2.5}$ based on mining plan parameters and emission inventories (Years 2016 and 2018). The modeling was completed for a production rate of 30 Mtpy, which is nearly 6 times greater than the anticipated production for the LBA1 tracts. The results of 24-hour and annual dispersion modeling are included in Table 4.4-1.

Table 4.4-1. SCM Particulate Matter Dispersion Modeling Results

Pollutant	Averaging Period	Modeled Concentration (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	NAAQS/MAAQS (µg/m³)
		2016	Mine	Year	
PM_{10}	24 hour	76.55[a]	33.0	109.55	150[c]
	Annual	20.22[b]	17.5	37.72	50[d]
$PM_{2.5}$	24 hour	11.15[b]	15.0	26.15	35[e]
	Annual	4.13[b]	5.5	9.63	12[f]
		2018	Mine	Year	
PM_{10}	24 hour	90.82[a]	33.0	123.82	150[c]
	Annual	23.98[b]	17.5	41.48	50[d]
$PM_{2.5}$	24 hour	14.53[b]	15.0	29.53	35[e]
	Annual	4.14[b]	5.5	9.64	12[f]

[a] Highest, second-high modeled value
[b] Highest modeled value
[c] Violation occurs with more than one expected exceedance per calendar year, averaged over 3-years
[d] Violation occurs when the 3-year average of the arithmetic means over a calendar year exceeds the value. EPA revoked the annual PM_{10} standard effective December 17, 2006.
[e] Violation occurs when the 3-year average of the 98th percentile values exceed the standard. Per EPA policy, use the maximum modeled concentration for comparison to the standard.
[f] Violation occurs when the 3-year average of the spatially averaged calendar year means exceed the standard

The modeling indicated that mine activities to remove 30 Mtpy of coal would comply with the 24-hour and annual PM_{10} and $PM_{2.5}$ ambient air standard for the life of the SCM.

Since 2008, there have been no recorded exceedances of the 24-hour or annual PM_{10} NAAQS or MAAQS at the SCM, and, based on estimated PM2.5 values, there were no exceedances of the 24-hour or annual $PM_{2.5}$ NAAQS at the mine. The 2014 AERMOD modeling predicted no future exceedances of the 24-hour and annual PM_{10} NAAQS/MAAQS at a 30 Mtpy production rate. The 2014 AERMOD modeling also predicted no future exceedances of the 24-hour or annual $PM_{2.5}$ NAAQS at a 30-Mtpy production rate (Cloud Peak Energy (CPE)/Redhorse 2014).

An inventory of all point sources, controls, and emissions for the MAQP #1120-12 air quality permit showed a maximum potential to emit 21 tons per year (tpy); therefore, a PSD increment consumption analysis was not necessary (a value below the 100 tpy major source threshold limit specified in ARM 17.8, Subchapter 8 – PSD and Subchapter 12 – Operating Permit Program means that SCM would not be subject to the Title V operating permit program).

Under the Proposed Action, mining in the LBA1 tracts would continue for 15 to 16 years. Activities during mining would likely increase fugitive dust emissions; however, fugitive dust emissions are projected to remain within daily and annual NAAQS and MAAQS limits. The direct and indirect effects from particulate matter emissions resulting from the Proposed Action are expected to be moderate and short-term.

4.4.1.1.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, SCM will continue to mine the LBA1 tracts coal but would be limited to a 5-year term. The particulate matter emission impacts would be the same intensity as described for the Proposed Action, but the duration would be reduced by 10 to 11 years. Any mining of Federal coal within the LBA1 tracts beyond this 5-year term would require reevaluation of the mining operations by OSMRE and reauthorization by the ASLM. The direct and indirect effects from particulate matter emissions resulting from the Partial Mining alternative are expected to be moderate and shorter-term than the Proposed Action.

4.4.1.1.3 Alternative 3 – Accelerated Mining Rate

Under this alternative, the potential impacts would be the similar as the Proposed Action, but the faster rate of mining would increase the intensity of fugitive dust emissions compared to the Proposed Action. As described above, dispersion modeling at 30 Mtpy indicated that mine activities would be in compliance with the 24-hour and annual PM_{10} and $PM_{2.5}$ ambient air standard for the life of the SCM. The direct and indirect effects from particulate matter emissions resulting from this alternative are expected to be moderate, but slightly greater in intensity than the Proposed Action, and short-term.

4.4.1.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. SCM would proceed with reclamation of lands within the boundaries of the LBA1 tracts. The direct and indirect effects from particulate matter emissions resulting from the No Action alternative would be minor and limited to reclamation of the currently disturbed areas within the LBA1 tracts. Effects would be short-term only lasting the duration of active reclamation.

4.4.1.2 Mitigation Measures

Mitigation measures required by the SCM air quality permit are sufficient to reduce potential effects associated with emissions of particulate matter and are enforceable under the air quality permit. No other mitigation measures outside of those required by the air permit are proposed.

4.4.2 Emissions of Nitrogen Oxides and Ozone

4.4.2.1 Direct and Indirect Effects

4.4.2.1.1 Alternative 1 – Proposed Action

NO_x may be emitted directly during blasting operations and from diesel fueled mining equipment operating within the LBA1 tracts and indirectly from mobile emissions transporting the LBA1 tracts coal and the power plants burning the LBA1 tracts coal. Once the NO_x is emitted into the atmosphere it has the potential to react with air and ultraviolet light in sunlight to form O_3 which in turn can cause smog. Direct effects of NO_x and O_3 are similar to PM_{10} and can cause respiratory infections and asthma in nearby residents and recreationists. Indirect effects of NO_x and O_3 include smog and their contribution to global warming.

As described in Section 3.4.1.2 of this EIS, SCM is not required to monitor NO_x or O_3 and the nearest monitoring station was located near Birney, Montana. The Birney monitoring station was deactivated at the end of 2021. However, while the monitoring station was in place between 2010 and 2021, none of the NO_2 and O_3 concentrations exceeded the NAAQS or MAAQS.

NO_x modeling at SCM was completed in conjunction with the dispersion modeling in 2014. The model predicted that the maximum total annual NO_x emission rate would be 558.9 tons. This value was included in the SCM air quality permit application that was submitted to MDEQ Air Quality Bureau for revision to MAQP #1120-12 (CPE/Redhorse 2014). MDEQ determined that, based on the modeling analysis and past monitoring, the permit modification request would not likely substantially degrade air quality (MDEQ/PCD 2014).

Public exposure to NO_x and O_3 emissions caused by the Proposed Action is most likely to occur along publicly accessible roads and highways that pass through the area of the mining operations. Occupants of residences in the area could also be affected. Overall, the direct and indirect effects from NO_x and O_3 emissions resulting from the Proposed Action are expected to be minor to moderate and short-term.

4.4.2.1.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, SCM will continue to mine the LBA1 tracts coal but would be limited to a 5-year term. The impacts would be the same intensity as described for the Proposed Action, but the duration of the impacts would be limited to 5 years. Any mining of Federal coal within the LBA1 tracts beyond this 5-year term would require reevaluation of the mining operations by OSMRE. The direct and indirect effects from NO_x and O_3 emissions resulting from the Partial Mining alternative are expected to be minor and short-term.

4.4.2.1.3 Alternative 3 – Accelerated Mining Rate

Under this alternative, the potential impacts from NO_x emissions would be greater than the Proposed Action because more blasting would occur on an annual basis under this alternative to mine the remaining LBA1 tracts coal within 2.2 years. These impacts would most likely affect those traveling along publicly accessible roads and highways that pass through the area of the mining operations and nearby residences. The potential impacts from O_3 emissions from the Accelerated Mining Rate alternative would be similar to the Proposed Action and would be minor to moderate and short-term.

4.4.2.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. SCM would proceed with reclamation of lands within the boundaries of the LBA1 tracts. Impacts from NO_x and O_3 emissions under the No Action alternative would be limited to the equipment used during active reclamation and would be minor and short-term.

4.4.2.2 Mitigation Measures

No mitigation measures beyond those required by the SCM air quality permit would be required.

4.4.3 Transportation Diesel Emissions

4.4.3.1 Direct and Indirect Effects

4.4.3.1.1 Alternative 1 – Proposed Action

Under the Proposed Action, SCM will continue to mine the LBA1 tracts at the annual production rate listed in Table 2.2-2. Estimated average annual non-GHG pollutant emissions for each transportation segment are provided in Table 4.4-2. The table assumes that 44% percent of the annual coal production will be transported to power plants in the U.S., 32% will be transported to the seaport terminal in British Columbia, Canada, for vessel transport to Asia, and 24% will be transported to the terminal in Superior, Wisconsin, for vessel transport to power plants located along the Great Lakes. The calculations are provided in Appendix A of this EIS.

Table 4.4-2. Estimated Average Annual Non-GHG Emissions (tons) from Transportation for the Proposed Action

Transport Type	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	Hg	As	Pb
Worker Commute	14.4	0.9	0.03	0.01	0.02	0.5	8E-9	1E-5	--
Locomotive	143.3	602.4	16.8	15.7	0.6	29.1	0.0002	0.017	--
Terminal Handling	1.2	3.9	1.5	0.8	0.9	0.4	--	--	--
Great Lakes Vessel Transport	2.6	29.2	3.9	3.6	27.6	1.1	2E-7	9E-5	5E-4
Seaport Handling	1.7	5.2	2.0	1.0	1.2	0.5	--	--	--
Ocean Vessel Transport	59.6	661.3	88.1	81.3	623.8	25.5	3E-6	0.002	0.01
Total Emissions	**222.8**	**1,303**	**112.3**	**102.4**	**654.1**	**57.1**	**0.0002**	**0.019**	**0.01**

--Could not be calculated based on publicly available data

For comparison, Table 4.4-3 includes the national and Montana emissions from the 2020 NEI for mobile sources, including commercial marine vessels, non-road diesel equipment, and locomotives. The 2020 NEI data is the most recent NEI data that is currently available. The next NEI dataset for 2023 data will not be available until 2026.

Table 4.4-3. National Emissions Inventory 2020 Non-GHG Emissions (tons) from Transportation

Transport Type	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	Hg	As	Pb
National									
Locomotives	97,689	462,507	11,824	11,403	173	20,046	0.03	11	--
Non-Road Equipment – Diesel	300,416	654,389	45,176	43,628	277	57,320	8.0	0.05	--
Commercial Marine Vessels	31,518	240,086	5,574	5,314	4,713	9,522	--	2.5	0.55
Montana									
Locomotives	2,370	11,035	283	275	8	452	0.002	0.3	--
Non-Road Equipment – Diesel	3,694	7,831	616	598	4	675	0.03	--	--
Commercial Marine Vessels	0	0	0	0	0	0	0	0	0

--No data available
Source: EPA 2024f

A comparison of the Proposed Action transportation emissions to the 2020 national transportation emissions shows that the Proposed Action would contribute a small percentage of emissions to each transportation segment. Similarly, a comparison of the Proposed Action to the 2020 Montana transportation emissions shows that the Proposed Action would contribute a small percentage. Note that Montana does not include any commercial marine vessel emissions.

OSMRE has elected to quantify direct and indirect GHG emissions and evaluate these emissions, in part, in the context of national GHG emission inventories based on 100-year and 20-year time horizons, as described in Section 3.4.2 of this EIS. The estimated CO_2e emissions generated by transporting the coal via rail to final destinations at power plants and loading terminals and from overseas vessel transport for 2018 and 2020 were estimated in Section 3.4.2 of this EIS. The same variables were used to calculate annual average CO_2e emissions for the Proposed Action (Table 4.4-4). The estimated average annual CO_2e emissions for the Proposed Action were calculated using the estimated recoverable tons remaining in LBA1 tracts by year in Table 2.2-2. Calculations for each year are provided in Appendix A of this EIS and effects from GHG emissions are discussed in greater detail in section 4.4.5.

Table 4.4-4. Estimated Average Annual CO_2e Emissions from Transportation for the Proposed Action

Source	CO_2e (tons) 100-year Time Horizon	CO_2e (tons) 20-year Time Horizon
Worker Commute	2,498	2,513
Locomotive	55,654	55,890
Terminal Handling[1]	204	204
Great Lakes Vessel Transport	1,328	1,368
Seaport Handling[1]	272	272
Ocean Vessel Transport	30,055	30,960
Total CO_2e Emissions	**90,012**	**91,207**

[1] Terminal handling and seaport handling based on CO_2e from SNC-LAVAUN 2013, calculated using IPCC Sixth Assessment Report GWP values.

Indirect effects related to transportation diesel emissions include impacts to human health and the environment. Exposure to diesel exhaust can cause health conditions in humans such as asthma and respiratory illnesses. Diesel engine emissions can also contribute to ground-level ozone, which has the potential to cause breathing problems, especially in people with asthma, children, and older adults, impair visibility, and damage vegetation, including crops.

EPA has various standards to reduce emissions from heavy duty diesel vehicles and engines. EPA regulates emissions from heavy equipment with diesel engines by adopting multiple tier emission standards. The program aims to reduce emissions by requiring emission control technologies on new engines. EPA has established tiered emissions standards that apply to locomotive engines based on the year of manufacture or remanufacture (40 C.F.R. Part 1033). The standards, which limit emissions of NO_x, particulate matter, hydrocarbons, and CO_2, establish four tiers of increasingly stringent limits for newer engines. The most stringent limits apply to engines manufactured in 2015 or later. Overall air pollutant emissions from locomotive fleets should decrease over time as older engines are retired and replaced with newer models.

Under current regulations (40 C.F.R. Part 1042) EPA has established domestic regulations for emissions from marine diesel engines. The emission standards vary by engine category and model year. The standards limit emissions of CO, particulate matter, NO_x, and hydrocarbons. In addition, MARPOL, the International Convention for the Prevention of Pollution from Ships, is concerned with preventing marine pollution from ships. Specifically, Annex VI of Marine Pollution (MARPOL) addresses air pollution from ocean-going ships. The international air pollution requirements of Annex VI establish limits on NO_x emissions and require the use of fuel with lower sulfur content (EPA 2022b).

Overall impacts to air quality from diesel emissions associated with transportation of SCM coal are expected to be minor and short-term, lasting 15 to 16 years. In addition, emissions would be distributed over long distances and are transitory in nature. As discussed in Section 3.15.1 of this EIS, none of the rail routes pass through any Class I areas.

4.4.3.1.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, SCM will continue to mine the remaining LBA1 tracts coal but would be limited to a 5-year term. For the purposes of this analysis, the average for years 2024 through 2028 are used; however, the actual start of the 5-year term will be dependent on the ASLM decision. Table 4.4-5 provides the estimated average annual non-GHG pollutant emissions for each transportation segment for the 5-year term. The calculations are provided in Appendix A of this EIS.

Table 4.4-5. Estimated Average Annual Non-GHG Emissions (tons) from Transportation for the Partial Mining Alternative

Transport Type	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	Hg	As	Pb
Worker Commute	14.4	0.9	0.03	0.01	0.02	0.5	8E-9	1E-5	--
Locomotive	222	931	26.0	24.2	0.9	45.0	0.0003	0.026	--
Terminal Handling	1.9	6.0	2.3	1.2	1.4	0.5	--	--	--
Great Lakes Vessel Transport	4.1	45.2	6.0	5.6	42.6	1.7	2E-7	2E-4	7E-4
Seaport Handling	2.6	8.0	3.1	1.6	1.9	0.7	--	--	--
Ocean Vessel Transport	92.1	1,022	136.2	125.7	964.4	39.5	5E-6	0.003	0.02
Total Emissions	**337.1**	**2,013**	**173.6**	**158.3**	**1,011**	**87.9**	**0.0003**	**0.029**	**0.02**

--Could not be calculated based on publicly available data

The non-GHG transportation emissions are higher for this alternative because SCM plans to mine coal at a higher rate between years 2024 through 2028 (see Table 2.2-2). Overall, the transportation emissions from the partial mining alternative would contribute a small percentage of 2020 national and Montana transportation emissions.

The estimated average annual CO_2e emissions for the Partial Mining alternative are provided in Table 4.4-6 and were calculated using the estimated recoverable tons remaining in LBA1 tracts by year in Table 2.2-2. Calculations for each year are provided in Appendix A of this EIS.

Table 4.4-6. Estimated Average Annual CO_2e Emissions from Transportation for the Partial Mining Alternative

Source	CO_2e (tons) 100-year Time Horizon	CO_2e (tons) 20-year Time Horizon
Worker Commute	2,498	2,513
Locomotive	86,039	86,404
Terminal Handling[1]	315	315
Great Lakes Vessel Transport	2,054	2,115
Seaport Handling[1]	420	420
Ocean Vessel Transport	46,465	47,863
Total CO_2e Emissions	**137,791**	**139,603**

[1] Terminal handling and seaport handling based on CO_2e from SNC-LAVAUN 2013, calculated using IPCC Sixth Assessment Report GWP values.

Indirect effects would be the same as the Proposed Action but would be limited to the 5-year term.

4.4.3.1.3 Alternative 3 – Accelerated Mining Rate

Under this alternative, SCM would produce and ship up to 18 Mt of LBA1 Federal coal annually. Estimated annual non-GHG pollutant emissions for each transportation segment is provided in Table 4.4-7. The calculations are provided in Appendix A of this EIS.

Table 4.4-7. Estimated Average Annual Non-GHG Emissions from Transportation (tons) for the Accelerated Mining Rate Alternative

Transport Type	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	Hg	As	Pb
Worker Commute	14.4	0.9	0.03	0.01	0.02	0.5	8E-9	1E-5	--
Locomotive	1,033	4,340	121	113	4.0	210	0.0016	0.122	--
Terminal Handling	6.0	21.5	10.7	2.3	1.0	1.2	--	--	--
Great Lakes Vessel Transport	19.0	211	28.1	25.9	199	8.1	1E-6	7E-4	0.003
Seaport Handling	7.9	28.6	14.2	3.1	1.3	1.6	--	--	--
Ocean Vessel Transport	429	4,765	635	586	4,495	184	2E-5	0.015	0.07
Total Emissions	**1,509**	**9,367**	**809**	**730**	**4,700**	**405**	**0.0016**	**0.137**	**0.07**

--Could not be calculated based on publicly available data

The per year non-GHG transportation emissions are the highest for this alternative because this alternative evaluates mining 18 Mt of LBA1 coal annually (see Table 2.2-2). However, compared to the 2020 national and Montana transportation emissions, the transportation emissions from the Accelerated Mining Rate alternative would still only contribute a small to moderate percentage.

The estimated average annual CO_2e emissions for the Accelerated Mining Rate alternative are provided in Table 4.4-8 and were calculated using 18 Mtpy. Calculations are provided in Appendix A of this EIS.

Table 4.4-8. Estimated Average Annual CO_2e Emissions from Transportation for the Accelerated Mining Rate Alternative

Source	CO_2e (tons) 100-year Time Horizon	CO_2e (tons) 20-year Time Horizon
Worker Commute	2,498	2,513
Locomotive	296,922	298,081
Terminal Handling[1]	1,849	1,849
Great Lakes Vessel Transport	5,923	5,949
Seaport Handling[1]	2,466	2,466
Ocean Vessel Transport	135,023	135,613
Total Transportation CO_2e Emissions	**444,681**	**446,471**

[1] Terminal handling and seaport handling based on CO_2e from SNC-LAVAUN 2013, calculated using IPCC Sixth Assessment Report GWP values.

Overall impacts to air quality from diesel emissions associated with transportation of SCM coal are expected to be moderate and short-term, lasting 2.2 years under the Accelerated Mining Rate alternative. Emissions would be distributed over long distances and are transitory in nature and as discussed in Section 3.15.1 of this EIS, none of the rail routes pass through any Class I areas.

4.4.3.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. SCM would reclaim the lands within the boundaries of the LBA1 tracts. Impacts to air quality from diesel emissions associated with transportation of SCM coal would be negligible.

4.4.3.2 Mitigation Measures

No mitigation measures beyond those required by EPA and international standards for international shipping would be required for diesel emissions from transportation.

4.4.4 Coal Combustion

4.4.4.1 Direct and Indirect Effects

4.4.4.1.1 Alternative 1 – Proposed Action

Estimated average annual pollutant emissions from the Proposed Action for power generation in the U.S., ROK, and Japan is provided in Table 4.4-9. The information and calculations are provided in Appendix A of this EIS. For comparison, Table 4.4-10 provides the national annual coal-fired power plant emissions for the U.S. from the 2020 NEI, the most recent year with data.

Table 4.4-9. Estimated Average Annual Total Air Pollutant Emission Ranges from Combusting Coal Mined at the SCM for the Proposed Action

Emission Range	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
United States									
Low	56	50	165	506	8	1	8	10	7
High	231	152	6583	2530	106	15	170	62	149
ROK & Japan									
Low	26	23	78	238	4	1	4	5	4
High	109	72	3,098	1,190	50	7	80	29	70

Table 4.4-10. 2020 National Emissions Inventory Annual Coal Fired Power Plant Emissions

	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
2020	61,596	48,525	575,037	773,088	268,220	10,936	30,224	7,231	25,282

Source: EPA 2024f

Indirect effects of coal combustion include possible human health and environmental effects. Sulfur dioxide and particulate emissions have the potential to contribute to acid rain and respiratory illnesses, while nitrogen oxides and particulates can contribute to smog and respiratory illnesses. Carbon monoxide and VOCs can contribute to ozone formation. In addition, mercury and other heavy metals (lead and arsenic) emissions have the potential to cause neurological and development delays in humans and animals.

Effects of most industrial source air pollutants are limited to the immediate area or, at most, the region surrounding the source. However, mercury emissions can have a global effect. Because it does not degrade in the environment, mercury emitted to the atmosphere eventually deposits onto land or water bodies. Through a series of chemical transformations and environmental transport processes, deposited mercury can eventually accumulate in the food chain (EPA 2017). Exposure to mercury threatens human health, with developing fetuses and young children most at risk. Mercury pollution can also harm wildlife and ecosystems (EPA 2024h).

Mercury's fate after it is emitted into the air depends primarily on its as-emitted chemical form and dispersion characteristics of the emitting source, such as stack height, and of the receiving atmosphere, such as wind currents. Depending on these factors, emitted mercury can travel thousands of miles in the atmosphere before eventually depositing in rainfall or in dry gaseous form. Recent estimates of annual global mercury emissions from anthropogenic sources are approximately 2,220 metric tons per year (EPA 2024i).

In the U.S., mercury and other HAP emissions from coal-fired power plants with a capacity of more than 25 MW are regulated by EPA's MATS rule. EPA (2024j) indicates that by 2017 mercury emissions dropped by 86 percent and acid gas HAP and non-mercury metals are down 96 percent and 81 percent, respectively, compared to 2010 levels. As domestic coal-fired power plants have worked to comply with these standards, mercury controls have also progressed and are available for coal-fired generation plants of various designs and ages in Japan and the ROK.

Overall impacts to air quality from coal combustion emissions associated with SCM coal are expected to be short-term, lasting 15 to 16 years. Typically, OSMRE would evaluate the emissions from coal combustion in conjunction with the surrounding background air quality relative to the locally enforceable air quality standards. For this action, OSMRE does not know the exact location of the final coal combustion with enough certainty to conduct such an analysis. Pursuant to 40 CFR 1502.21(c) OSMRE is disclosing that this information is unavailable. That said, as described in Section 3.4.4 of this EIS, combustion emissions at power plants in the U.S. Japan and ROK are subject to air quality control laws designed to ensure emissions and resultant air quality are within acceptable regulatory limits considered protective of human health and the environment. It is therefore reasonable to assume that impacts to air quality from coal combustion are likely to be moderate.

Estimated annual CO_2e emissions from coal combustion from the Proposed Action are provided in Table 4.4-11. As described above, OSMRE has elected to quantify direct and indirect GHG emissions and evaluate these emissions in the context of national GHG emission inventories based on 100-year and 20-year time horizons. The estimated CO_2e emissions generated by combustion of coal mined at the SCM for 2018 and 2020 were estimated in Section 3.4.4 of this EIS. The same variables were used to calculate annual CO_2e emissions for 2024-2039. The estimated annual CO_2e emissions for the Proposed Action were based on the annual average LBA1 coal production from Table 2.2-2

(2.5 Mtpy). Calculations are provided in Appendix A of this EIS, and effects from GHG emissions are discussed in greater detail in section 4.4.5.

Table 4.4-11. Estimated Average Annual CO_2e Emissions from Combustion of Coal Mined at the SCM for the Proposed Action

Source	2024-2039	
	CO_2e (tons) 100-year Time Horizon	CO_2e (tons) 20-year Time Horizon
Coal Combustion	3,598,612	3,628,443

According to the EPA in 2020 (the most recent year of available data), estimated CO_2e emissions from fossil fuel combustion by coal to generate electric power in the U.S. totaled 835.6 million metric tons (EPA 2024g). Using the 2020 U.S. estimate for comparison purposes, the estimated annual 100-year CO_2e contribution from combustion of coal mined from the LBA1 tracts would be approximately 0.4 percent of the 2020 U.S. total.

4.4.4.1.2 Alternative 2 - Partial Mining

Under the Partial Mining alternative, SCM would be limited to mining coal in the LBA1 tracts to a 5-year term. Estimated average annual pollutant emissions related to LBA1 tracts coal combustion for power generation in the U.S., ROK, and Japan for the 5-year term are provided in Table 4.4-12. The information and calculations are provided in Appendix A of this EIS.

Table 4.4-12. Estimated Average Annual Total Air Pollutant Emission Ranges from Combusting Coal Mined at the SCM for the Partial Mining Alternative

Emission Range	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
United States									
Low	86	77	255	782	13	2	13	16	12
High	358	235	10176	3911	164	23	263	96	231
ROK & Japan									
Low	41	36	120	368	6	1	6	7	5
High	168	111	4,789	1,840	77	11	124	45	109

The average annual emissions from this alternative are higher than the Proposed Action because the average annual coal production during the 5-year term would be 3.86 Mtpy (compared to 2.5 Mtpy under the Proposed Action). Overall, the emissions would be minor compared to the national annual coal-fired power plant emissions for the U.S. from the 2020 NEI.

Overall impacts to air quality from coal combustion emissions associated with SCM coal under the partial mining alternative are expected to be short-term, lasting 5 years. Overall impacts to air quality from coal combustion emissions associated with SCM coal are expected to be short-term, lasting 15 to 16 years. Typically, OSMRE would evaluate the emissions from coal combustion in conjunction with the surrounding background air quality relative to the locally enforceable air quality standards. For this action, OSMRE does not know the exact location of the final coal combustion with enough certainty to conduct such an analysis. Pursuant to 40 CFR 1502.21(c) OSMRE is disclosing that this information is unavailable. That said, as described in Section 3.4.4 of this EIS, combustion emissions at power plants in the U.S. Japan and ROK are subject to air quality control laws designed to ensure emissions and resultant air quality are within acceptable regulatory limits considered protective of human health and the environment. It is therefore reasonable to assume that impacts to air quality from coal combustion are likely to be moderate.

Estimated annual CO_2e emissions from coal combustion from the Partial Mining alternative are provided in Table 4.4-13.

Table 4.4-13. Estimated Average Annual CO_2e Emissions from Combustion of Coal Mined at the SCM for the Partial Mining Alternative

Source	2024-2028	
	CO_2e (tons) 100-year Time Horizon	CO_2e (tons) 20-year Time Horizon
Coal Combustion	5,563,308	5,776,130

Using the 2020 U.S. estimate for comparison purposes, the estimated annual 100-year CO_2e contribution from combustion of coal mined from the LBA1 tracts under the Partial Mining alternative would be approximately 0.7 percent of the 2020 U.S. total. Calculations are provided in Appendix A of this EIS, and effects from GHG emissions are discussed in greater detail in section 4.4.5.

4.4.4.1.3 Alternative 3 – Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, SCM would mine the LBA1 tract coal at a rate of 18 Mtpy. Table 4.4-14 provides the estimated average annual pollutant emissions related coal combustion for power generation in the U.S., ROK, and Japan. Calculations are provided in Appendix A of this EIS.

Table 4.4-14. Estimated Annual Total Air Pollutant Emission Ranges from Combusting Coal Mined at the SCM for the Accelerated Mining Rate Alternative

Emission Range	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
United States									
Low	400	357	1,183	3,633	61	9	61	73	54
High	1,662	1,093	47,275	18,167	763	107	1,220	447	1,074
ROK & Japan									
Low	190	170	563	1,727	29	4	29	35	26
High	790	520	22,475	8,637	363	51	580	212	510

The average annual emissions from this alternative are highest because all of the coal in the LBA1 tracts would be mined at a higher rate compared to the Proposed Action and the Partial Mining Alternative. However, compared to the national annual coal-fired power plant emissions for the U.S. from the 2020 NEI, the Conservate Mining Rate alternative would contribute a small percentage.

Overall impacts to air quality from coal combustion emissions associated with SCM coal under the accelerated mining alternative are expected to be short-term, lasting 2.2 years. Overall impacts to air quality from coal combustion emissions associated with SCM coal are expected to be short-term, lasting 15 to 16 years. Typically, OSMRE would evaluate the emissions from coal combustion in conjunction with the surrounding background air quality relative to the locally enforceable air quality standards. For this action, OSMRE does not know the exact location of the final coal combustion with enough certainty to conduct such an analysis. Pursuant to 40 CFR 1502.21(c) OSMRE is disclosing that this information is unavailable. That said, as described in Section 3.4.4 of this EIS, combustion emissions at power plants in the U.S. Japan and ROK are subject to air quality control laws designed to ensure emissions and resultant air quality are within acceptable

regulatory limits considered protective of human health and the environment. It is therefore reasonable to assume that impacts to air quality from coal combustion are likely to be moderate.

Estimated annual CO_2e emissions from coal combustion from the Conservate Mining Rate alternative are provided in Table 4.4-15.

Table 4.4-15. Estimated Average Annual CO_2e Emissions from Combustion of Coal Mined at the SCM under the Accelerated Mining Rate Alternative

Source	2024-2026	
	CO_2e (tons) 100-year Time Horizon	CO_2e (tons) 20-year Time Horizon
Coal Combustion	19,192,596	19,351,694

Using the 2020 U.S. estimate for comparison purposes, the estimated annual 100-year CO_2e contribution from combustion of coal mined from the LBA1 tracts under the Accelerated Mining Rate alternative would be approximately 3.1 percent of the 2020 U.S. total. Calculations are provided in Appendix A of this EIS, and effects from GHG emissions are discussed in greater detail in section 4.4.5.

4.4.4.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. SCM would proceed with reclamation of lands within the boundaries of the LBA1 tracts. Because no additional coal within the LBA1 tracts would be mined under the No Action alternative, the impacts from combustion emissions would be negligible.

4.4.4.2 Mitigation Measures

No mitigation measures beyond those required by the state, federal, and other government permits would be required for emissions from coal combustion.

4.4.5 Climate Change and Social Cost of Greenhouse Gases

Table 4.4-16 summarizes the annual CO_2e emissions for each alternative. The table shows that the annual CO_2e emissions are dependent on the annual coal production. Under the Proposed Action the CO_2e emissions would be spread over 15 to 16 years, while Alternative 2 would only mine a portion of the LBA1 tract coal and emissions would be limited to 5 years. Alternative 3 assumes that all of the LBA1 tract coal would be mined within 2.2 years, leading to the largest annual emissions but with a shorter duration than alternatives 1 and 2.

4.4.5.1 Trends in Global, United States, and Montana Greenhouse Gas Emissions

4.4.5.1.1 Emission Levels

Preliminary estimates from the Rhodium Group for 2022 show global emissions at 50.6 gigatons of carbon dioxide equivalent (Gt CO_2e), representing a 1.1% increase from 2021 levels. Global emissions dropped in 2020 primarily due to the COVID-19 pandemic and global recession. In 2022, China accounted for 26% of all global emissions, the U.S. accounted for approximately 12% of global GHG emissions, while India and the European Union accounted for 7% each. In 2021 (the latest year for which there is sufficient data to provide sectoral level detail) GHGs were emitted across the following primary economic sectors globally: industry (29%); electric power generation (29%); land use, agriculture, and waste (20%); transportation (15%); and buildings (7%) (Rivera et. al. 2023). Annual emissions from mining, rail transport, vessel shipment, and combustion attributable to the Proposed Action are expected to be approximately 0.05% of global emissions.

Table 4.4-16. Summary for Potential Annual GHG Emissions from the LBA1 Tracts by Alternative

Segment	Alternative 1 Proposed Action	Alternative 2 Partial Mining	Alternative 3 Accelerated Mining Rate	Alternative 4 No Action
Annual Coal Production (Mt)	Varies[1] Avg 2.5 Mt	Varies[1] Avg 3.9 Mt	18 Mt	0 Mt
Years	2024-2039	2024-2028	2024-2026	2024
Worker Commute	2,487	2,487	2,487	2,487
Mine operations (ton CO_2e)	14,314	22,129	76,343	5,729[3]
Rail transport (ton CO_2e)	55,221	85,369	294,510	0
Terminal Handling[2] (ton CO_2e)				
Westshore Terminal	272	420	2,466	0
MERC Terminal	204	315	1,849	0
Vessel Shipment[2] (ton CO_2e)				
Westshore Terminal	24,477	37,840	130,380	0
MERC Terminal	1,082	1,672	5,762	0
Coal combustion (ton CO_2e)	3,559,914	5,503,483	18,986,210	0
Annual (ton CO_2e)	**3,657,914**	**5,653,716**	**19,500,008**	**8,216**
Total	**58,527,527**	**28,268,582**	**58,500,023**	**8,216**

[1] Annual coal production is based on Life of Mine mining sequence outlined in the approved MDEQ SMP C1979012 (NTEC 2023a) – see Table 2.2-2

[2] Assumes 32% of annual coal produced from the LBA1 tracts will be transported to the seaport terminal in British Columbia, Canada for vessel transport to Asia, and 24% will be transported to the terminal in Superior, Wisconsin for vessel transport to power plants located along the Great Lakes

[3] Assumes emissions from mine operations associated with reclamation of the current disturbance in the LBA1 tracts

GHG emissions in the U.S. are tracked by the EPA through two complementary programs. First is the Inventory of U.S. Greenhouse Gases and Sinks, which is the annual U.S. GHG emissions inventory published by EPA that represents all U.S. emissions (EPA 2022a). The second is the Greenhouse Gas Reporting Program (GHGRP), which generally applies to facilities that emit more than 25,000 million metric tons (MMT) of CO_2e each year. The facility level emissions reported under GHGRP are published through the Facility Level Information on Greenhouse Gases Tool (FLIGHT) (EPA 2024g). EPA estimates that the FLIGHT data reported by large emitters reflect 85% to 90% of the total U.S. emissions.

In 2020, total gross U.S. GHG emissions were 5,981 MMT CO_2e, and net emissions were 5,222 MMT CO_2e. Net GHG emissions include both anthropogenic and natural emissions of GHGs as well as removals by sinks (e.g., carbon uptake by forests). From 2005 to 2020, net GHG emissions in the U.S. declined 21%. This decline reflects the combined impacts of long-term trends in population and economic growth, energy markets, technological changes including energy efficiency, and energy fuel choices. Net GHG emissions decreased from 2019 to 2020 by 11%. The primary driver for the decrease was an 11% decrease in CO_2 emissions from fossil fuel combustion, primarily due to a 13% decrease in transportation emissions and a 10% decrease in electric power sector emissions, reflecting both a decrease in demand from the COVID-19 pandemic and a continued shift from coal to less carbon intensive natural gas and renewables. CO_2 is the primary GHG contributing to total U.S. emissions, accounting for 79% of the total GHG emissions in 2020. By comparison, CH_4 accounted for 11%, N_2O accounted for 7% of emissions and fluorinated gases accounted for nearly 3% of emissions. In 2020, GHGs were emitted across the following primary economic sectors in the U.S.: transportation (27%), electric power/electricity generation (25%), industry (24%), agriculture (11%) residential homes (7%), and commercial businesses (6%) (EPA

2022a). Under the Proposed Action, annual emissions from mining, rail transport, vessel shipment, and combustion are expected to be approximately 0.4% of U.S. emissions.

In 2022, total Montana GHG emissions were 17.6 MMT CO_2e. GHGs were emitted across the following primary economic sectors in Montana: electric power/electricity generation (75%), refineries (11%), mineral mining (6%), chemicals (5%), waste management (2%), and other sources (1%) (EPA 2024g). The Proposed Action would only contribute mineral mining emissions, which would represent approximately 10% of 2022 annual Montana mineral mining GHG emissions or approximately 0.6% of the annual Montana GHG emissions.

Federal lands are responsible for GHG emissions from activities such as fossil fuel extraction and combustion, as well as carbon sequestration, which is the process of capturing and storing atmospheric carbon dioxide through uptake into soils, vegetation, aquatic environments, and other ecosystems (biologic sequestration) or through injection into porous underground rock formations (geologic sequestration). The U.S. Geological Survey (USGS) has estimated GHG emissions and carbon sequestration on Federal lands for the 10-year period from 2005 to 2014 (Merrill et. al. 2018). GHG emissions (when considering just CO_2) associated with the combustion and extraction of fossil fuels from U.S. Federal lands increased from 1,362 MMT CO_2e in 2005, to 1,429 MMT CO_2e in 2010, and then decreased to 1,279 MMT CO_2e in 2014. CH_4 and N_2O emissions from Federal lands also decreased over the same 10-year period. When the Federal lands' fossil fuel extraction and combustion emissions are combined with ecosystem emissions and sequestration estimates, the annual net carbon emissions from Federal lands within the conterminous U.S. (48 contiguous states) ranged from 683 MMT CO_2e to 783.5 MMT CO_2e from 2005 to 2014, indicating a net increase in carbon emission from Federal lands within the conterminous U.S. The annual net carbon emissions from Montana ranged from 15.6 MMT CO_2e to 20.2 MMT CO_2e from 2005 to 2014, indicating a net increase in carbon emission from Montana Federal lands (Merrill et. al. 2018). Under the Proposed Action, average annual emissions from mining, commuting, transportation, and combustion are expected to be approximately 0.6% of Montana's Federal coal emissions, and 1.8% of national Federal coal emissions.

The BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends presents the estimated emissions of GHGs attributable to fossil fuels produced on lands and mineral estate managed by the BLM. More specifically, the report estimates GHG emissions from coal, oil, and gas development that is occurring, and is projected to occur, on the federal onshore mineral estate. BLM estimated a total of 1,201 Mt CO_2e from all coal production on Federal lands in 2022 and 30.5 Mt CO_2e from all coal production on Federal lands in Montana in 2022 (BLM 2023). The Proposed Action's annual emissions represent approximately 0.3% of national 2022 Federal coal emissions, and 12.0% of Montana's 2022 federal coal emissions. The Partial Mining alternative's annual emissions represent approximately 0.5% of national 2022 Federal coal emissions, and 18.5% of Montana's 2022 federal coal emissions. The Accelerated Mining Rate alternative's annual emissions represent approximately 2.2% of national 2022 Federal coal emissions, and 86.3% of Montana's 2022 federal coal emissions.

4.4.5.1.2 Emission Goals

The IPCC Special Report Global Warming of 1.5°C estimates with high confidence that to limit global warming to 1.5 °C, global GHG emissions in 2030 would need to be 40% to 50% lower than 2010 emissions (IPCC 2021). Based on the IPCC findings, the United Nations Environment Programme (UNEP) Emissions Gap Report estimates global GHG emissions in 2030 would need to be 55% lower than currently projected 2030 emissions in order to limit global warming to 1.5°C and would need to be 30% lower in order to limit warming to 2°C (UNEP 2021). The Paris Agreement is a legally binding international climate change treaty designed to encourage individual countries to pledge specific emissions reductions so that the world can meet the necessary GHG reduction levels to limit global warming to 1.5°C (UN 2022).

The United States National Climate Task Force (NCTF) was established on January 27, 2021, by the Executive Order on Tackling the Climate Crisis at Home and Abroad (EO 14008). EO 14008 was issued to facilitate the organization and deployment of a government-wide approach to combat the climate crisis. The NCTF performed an analysis of potential and measured impacts of various policies and measures (both potential and existing) at all levels of government and in all relevant sectors to develop the U.S. national determined contribution (NDC) under the Paris Agreement. This analysis was conducted using input from all federal government agencies as well as other stakeholders, such as scientists, activists, local and state governments, and various local institutions. For the industrial sector, the NDC outlines that the U.S. government will support research on and implementation of very low- and zero-carbon industrial processes and products, including introducing these products to market. The U.S. government will also incentivize carbon capture, utilization, and storage (CCUS) and the use of new sources of hydrogen for powering industrial facilities (UNFCCC 2021).

The U.S. NDC established an economy-wide target of reducing U.S. net GHG emissions by 50% to 52% below 2005 levels in 2030 (UNFCCC 2021). The U.S. has also established the goal of net-zero emissions no later than 2050 and 100% carbon pollution-free electricity by 2035 (White House 2021 and EO 14057). In 2020, U.S. net GHG emissions totaled 5,222 MMT CO_2e, representing a 21% emissions reduction below 2005 level (EPA 2022a). The U.S. is broadly on-track to meet the 2025 goal of 26% to 28% emissions reductions below 2005 levels (UNFCCC 2021). On August 16, 2022, President Biden signed the Inflation Reduction Act of 2022 (IRA) into law, which is the single largest action ever taken by the United States government to combat climate change. The IRA included several additional economic incentives to support the development of CCUS (White House 2022). However, it should be acknowledged that at this time, CCUS is not yet adequately developed or deployed to fully mitigate all GHGs associated with electricity generation from coal. According to analysis from the Rhodium Group, the net result of all the provisions in the IRA is anticipated to help U.S. net GHG emissions decline to 32-42% below 2005 levels in 2030, which represents a substantial step towards its goals, but still short of the climate target of 50-52% below 2005 levels in 2030 (Larsen et. al. 2022).

The net U.S. emissions in 2005 were 6,635 MMT CO_2e (UNFCCC 2021); therefore, the 2030 net emissions goals are estimated to be between approximately 3,185 and 3,318 MMT CO_2e. Comparing the 2020 net GHG emissions of 5,222 MMT CO_2e to the low end of the 2030 estimated emissions of 3,185 MMT CO_2e shows that annual net U.S. GHG emissions must be reduced by 2,037 MMT CO_2e between 2020 and 2030. Under the Proposed Action, 1.22 MMT CO2e would be emitted annually from 2023 to 2029, representing approximately 1.3% of the necessary emissions reduction of 2,037 MMT CO_2e to meet the 2030 emissions goals.

In 2023, Montana was awarded a four-year $3 million planning grant under the EPA's Climate Pollution Reduction Grant (CPRG) program (MDEQ 2024). Montana's Governor Gianforte designated MDEQ as the lead agency to oversee the planning and coordination involved in this program. In collaboration with various state agencies and stakeholders, MDEQ developed the Montana Climate Action Plan which was published in March 2024 and submitted to the EPA. The Plan identifies pollution reduction measures that are eligible for federal funding under the next phase of the EPA's CPRG program. EPA anticipates it will announce Implementation Grant selection decisions and tentatively plans to issue awards by October 2024.

4.4.5.1.3 Carbon Budget

The global carbon budget is an estimate for the total amount of anthropogenic CO_2 that can be emitted to have a certain chance of limiting the global average temperature increase to below 2 degrees Celsius (°C), or 3.6 F, relative to preindustrial levels. The U.S. does not currently have a carbon budget to compare to the Proposed Action's potential emissions. While a global carbon budget does exist, a comparison of the Proposed Action's emissions to the global carbon budget would not be useful given the relative size of the global carbon budget. This EIS however includes

a discussion of the global carbon budget for background. IPCC estimates that if cumulative global CO_2 emissions from 1870 onwards are limited to approximately 1,000 Gt of carbon (3,670 Gt CO_2), then the probability of limiting the temperature increase to below 2°C (3.6°F) is greater than 66 percent (IPCC 2014). Since this IPCC report was published, various studies have produced differing estimates of the remaining global carbon budget; some estimates have been larger (Millar et al. 2017) and others have been smaller (Mitchel et al. 2018). Most notably, the IPCC Sixth Assessment Report (IPCC 2021) detailed the implications of methodological advancements in estimating the remaining carbon budget. The report concluded that, due to a variety of factors, estimates for limiting warming to 2°C (3.6°F) are about 11 to 14 Gt of carbon (40 to 50 Gt CO_2) higher than estimates in the IPCC Fifth Assessment Report IPCC 2014). In other words, the global carbon budget presented in IPCC Sixth Assessment Report was slightly larger than would have been expected based on the Fifth Assessment Report global carbon budget. Estimates of the remaining global carbon budget vary depending on a range of factors, such as the assumed conditions and the climate model used (Rogelj et al. 2019). Because of underlying uncertainties and assumptions, no one number for the remaining global carbon budget can be considered definite.

Using IPCC's estimated carbon budget in Sixth Assessment Report, as of 2019, approximately 655 Gt of carbon (2,403 Gt CO_2) of this budget has already been emitted, leaving a remaining global budget of 358 Gt of carbon (1,313 Gt CO_2) (IPCC 2021). The emissions reductions needed to keep global emissions within this carbon budget would require dramatic reductions in all United States sectors, as well as from the rest of the world. Even with the full implementation of global emissions reduction commitments to date, global emissions in 2030 would still be roughly 11 Gt CO_2e higher than what is consistent with a scenario that limits warming to 2°C [3.6°F] from preindustrial levels (UNEP 2021).

4.4.5.2 Social Cost of Greenhouse Gases

The "social cost of carbon", "social cost of nitrous oxide", and "social cost of methane" – together, the "social cost of greenhouse gases" (SC-GHG) are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year.

On January 20, 2021, President Biden issued EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis.*[1] Section 1 of EO 13990 establishes an Administration policy to, among other things, listen to the science; improve public health and protect our environment; ensure access to clean air and water; reduce greenhouse gas emissions; and bolster resilience to the impacts of climate change.[2] Section 2 of the EO calls for Federal agencies to review existing regulations and policies issued between January 20, 2017, and January 20, 2021, for consistency with the policy articulated in the EO and to take appropriate action.

Consistent with EO 13990, the CEQ issued interim National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change for public comment through April 10, 2023 (2023 GHG Guidance).[3] While CEQ seeks public comment, it has instructed agencies to use the interim 2023 GHG Guidance.[4]

The 2023 GHG guidance provides steps agencies should take when analyzing climate change including disclosing and providing context for the GHG emissions and climate effects. Section IV(B) states that "agencies should disclose and provide context for GHG emissions and climate effects to help decision makers and the public understand proposed actions' potential GHG emissions and climate change effects." This includes provides quantified GHG emissions and best available

[1] 86 FR 7037 (Jan. 25, 2021).
[2] *Id.*, sec. 1.
[3] 88 FD 1196 (Jan. 9, 2023).
[4] https://www.regulations.gov/document/CEQ-2022-0005-0001.

estimates of SC-GHG for each individual type of GHG emission expected. It also indicates that "the SC-GHG provides an appropriate and valuable metric that gives decision makers and the public useful information and context about a proposed action's climate effects even if no other costs or benefits are monetized, because metric tons of GHGs can be difficult to understand and assess the significance of in the abstract." The SC-GHG can be uses for comparisons to other monetized values and can assist agencies and the public in assessing the significance of climate impacts.

In accordance with this direction, this subsection provides estimates of the monetary value of changes in GHG emissions that could result from selecting each alternative. Such analysis should not be construed to mean a cost determination is necessary to address potential impacts of GHGs associated with specific alternatives. These numbers were monetized; however, they neither constitute a complete cost-benefit analysis nor do present a direct comparison with other impacts analyzed in this document. For instance, OSMRE's overall analysis for this action does not monetize most of the major costs or benefits and does not include all revenue streams from the proposed action. SC-GHG is provided only as a useful measure of the benefits of GHG emissions reductions to inform agency decision-making.

For Federal agencies, the best currently available estimates of the SC-GHG are the interim estimates of the social cost of carbon dioxide (SC-CO_2), methane (SC-CH_4), and nitrous oxide (SC-N_2O) developed by the Interagency Working Group (IWG) on the SC-GHG. Select estimates are published in the Technical Support Document (IWG 2021) and the complete set of annual estimates are available on the Office of Management and Budget's website.[5]

The IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of future damage associated with emissions in a particular year. A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (i.e., future benefits or costs are a less significant factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5% (IWG 2021).

As expected with such a complex model, there are multiple sources of uncertainty inherent in the SC-GHG estimates. Some sources of uncertainty relate to physical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

To further address uncertainty, the IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average damages from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3% annual discount rate for future economic effects. This is a low probability, but high damage scenario, and represents an upper bound of damages within the 3% discount rate model. The estimates below follow the IWG recommendations.

[5] https://www.whitehouse.gov/omb/information-regulatory-affairs/regulatory-matters/#scghgs

4.4.5.3 Alternative 1 – Proposed Action

Under the Proposed Action, SCM would mine the remaining 39.9 Mt of mineable Federal coal within the LBA1 tracts through 2039 at an annual rate based on the Life of Mine mining sequence (see Table 2.2-2). The SC-GHGs associated with estimated emissions from future potential development are reported in Table 4.4-17. These estimates represent the present value (from the perspective of future market and nonmarket costs associated with CO_2, CH_4, and N_2O emissions). Estimates are calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and OSMRE's estimates of emissions in each year. The estimates assume emissions will start in 2024 and end in 2039, based on the current mining plan.

Table 4.4-17. SC-GHGs for the Proposed Action

Social Cost Metric	5% Discount Rate - Average	3% Discount Rate - Average	2.5% Discount Rate - Average	3% Discount Rate - 95th Percentile
SC-CO_2	$781,917,264	$2,876,521,386	$4,325,216,345	$8,685,943,067
SC-CH_4	$5,809,088	$14,210,777	$19,003,396	$37,734,303
SC-N_2O	$8,531,475	$29,268,114	$43,798,633	$77,469,919
Total	$796,257,828	$2,920,000,277	$4,388,018,375	$8,801,147,288

4.4.5.4 Alternative 2 – Partial Mining

Under the Partial Mining alternative, SCM would be limited to mining the Federal coal within the LBA1 tracts to a 5-year term at the annual rate in the current mining plan (see Table 2.2-2). The SC-GHGs associated with estimated emissions from the Partial Mining alternative are reported in Table 4.4-18. These estimates represent the present value (from the perspective of future market and nonmarket costs associated with CO_2, CH_4, and N_2O emissions). Estimates are calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and OSMRE's estimates of emissions in each year. The estimates assume emissions will start in 2024 and end in 2028. Any mining of Federal coal within the LBA1 tracts beyond this 5-year term would require reevaluation of the mining operations by OSMRE.

Table 4.4-18. SC-GHGs for the Partial Mining Alternative

Social Cost Metric	5% Discount Rate - Average	3% Discount Rate - Average	2.5% Discount Rate - Average	3% Discount Rate - 95th Percentile
SC-CO_2	$403,295,403	$1,440,848,695	$2,153,903,099	$4,328,319,818
SC-CH_4	$2,954,021	$6,945,612	$9,212,589	$18,388,297
SC-N_2O	$4,388,136	$14,557,759	$21,624,479	$38,429,054
Total	$410,637,561	$1,462,352,066	$2,184,740,166	$4,385,137,170

4.4.5.5 Alternative 3 – Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, SCM would mine the remaining Federal coal within the LBA1 tracts at a rate of 18 Mtpy. Under this alternative, all of the LBA1 tracts coal would be mined in 2.2 years. The SC-GHGs associated with estimated emissions from the Accelerated Mining Rate alternative are reported in Table 4.4-19. These estimates represent the present value (from the perspective of future market and nonmarket costs associated with CO_2, CH_4, and N_2O emissions). Estimates are calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and OSMRE's estimates of emissions in each year. The estimates assume emissions will start in 2024 and end in 2026.

Table 4.4-19. SC-GHGs for the Accelerated Mining Rate Alternative

Social Cost Metric	5% Discount Rate - Average	3% Discount Rate - Average	2.5% Discount Rate - Average	3% Discount Rate - 95th Percentile
SC-CO_2	$860,721,375	$3,031,163,887	$4,519,276,524	$9,081,578,196
SC-CH_4	$6,092,383	$14,050,601	$18,565,594	$37,148,047
SC-N_2O	$7,876,649	$25,703,362	$38,046,942	$67,750,619
Total	$874,690,407	$3,070,917,850	$4,575,889,059	$9,186,476,862

4.4.5.6 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. SCM would proceed with reclamation of lands within the boundaries of the LBA1 tracts. The social cost of greenhouse gases would be reduced by the amounts provided in Tables 4.4-16 through 4.4-18 of this EIS.

4.4.5.7 Unavoidable Adverse, Irretrievable, and Irreversible Effects

The SCM does not currently employ any CCUS technology, and there are no permit requirements to employ CCUS or reduce GHG emissions through other means; therefore, GHG emissions from the Proposed Action and their contribution to cumulative GHG levels and climate change are unavoidable and irretrievable throughout the life of the mine. Cumulative climate change impacts may be irreversible, depending on what future steps are taken to address future cumulative GHG emissions worldwide, i.e., if the world is unable to limit GHG emissions, climate change impacts may be irreversible.

4.4.5.8 Conclusion

Annual GHG emissions from mining, rail transport, vessel shipment, and combustion will contribute to climate change for each alternative. Under the Proposed Action, average annual emissions from mining, rail transport, vessel shipment, and combustion would be slightly less than the Accelerated Mining Rate alternative and more than the Partial Mining alternative. Annual GHG emissions for the Partial Mining alternative would be roughly half of the emissions for the Proposed Action because the mining would be limited to a 5-year term. The Accelerated Mining Rate alternative would have the greatest impact on annual GHG emissions because coal would be mined at a faster rate. Overall, the total SC-GHG associated with emissions from mining, commuting, transportation, and combustion would vary from a low of $0 (Alternative 4) to a high of $3,070,917,850 (Alternative 3) assuming a 3% average discount rate.

There are currently no set specific thresholds for allowable GHG emissions, therefore, it is not possible to determine if any of the alternatives would significantly impact global GHG emissions on their own; however, all anthropogenic GHG emissions may cumulatively have a significant impact on global climate change.

4.5 Hydrology

4.5.1 Groundwater

4.5.1.1 Direct and Indirect Effects

4.5.1.1.1 Alternative 1 – Proposed Action

The mining process will involve removing the coal aquifer and any overlying alluvial aquifers and overburden. The removed aquifer materials will be replaced with backfilled overburden material. If any of the overburden or alluvial aquifer is critical to the hydrologic balance in the area, essential hydrologic functions will only be restored by reestablishing the aquifer. This can be accomplished by selectively salvaging and replacing removed materials. In general, the

permeability and porosity of the backfilled materials will be greater than those of the removed aquifers. Vertical hydraulic conductivity in the backfilled materials will also be greater than in the removed aquifers. These differences will result in changes to local recharge and groundwater flow patterns. The permeability, porosity and vertical hydraulic conductivity of the backfilled materials will decrease as the materials consolidate over time.

Static water levels will be lowered as the coal and overlying aquifers are dewatered during mining. As discussed in the 2020 MDEQ EIS, dewatering may also affect water levels in surrounding and underlying aquifers, which could impact nearby wells. Water levels in all aquifers will recover as recharge occurs once mined areas are reclaimed and will eventually stabilize near premining levels.

During reclamation, groundwater recharge through the backfilled materials will cause water quality changes. Initial removal of the material used for backfill creates fractures and exposes particle surfaces. TDS concentrations will increase as groundwater contacts newly exposed particle surfaces and dissolves minerals contained in the backfill. In past mining at the SCM, concentrations of sulfate, sodium, and bicarbonate in groundwater have been higher in backfilled materials than in the undisturbed aquifers. These water quality changes are not anticipated to change the suitability of groundwater for beneficial use (MDEQ 2020a). Over time, groundwater quality will eventually equilibrate to background levels.

Overall, the direct and indirect effects of the Proposed Action on groundwater are expected to be moderate and long term.

4.5.1.1.2 Alternative 2 – Partial Mining

Under the Partial Mining alternative, impacts to groundwater quantity and quality would be as described under the Proposed Action, but would be limited to only the areas mined during the 5-year term. During the 5-year term, only a portion of the remaining coal in the LBA1 tracts would be recovered and the remaining area would remain undisturbed. This would reduce the overall impacts that would occur compared to the Proposed Action. Overall, the direct and indirect effects of the Partial Mining alternative on groundwater are expected to be moderate and long term where mining is authorized but would not impact as large an area as the Proposed Action or the Accelerated Mining Rate alternative.

4.5.1.1.3 Alternative 3 – Accelerated Mining Rate

The overall effects of the Accelerated Mining Rate alternative would be similar to the Proposed Action but would occur at a faster rate. Under this alternative, the mining would be complete in 2.2 years, followed by reclamation. This would result in earlier recharge into the area compared to the Proposed Action. Overall, the direct and indirect effects of the Accelerated Mining alternative on groundwater are expected to be moderate and long term.

4.5.1.1.4 Alternative 4 - No Action

Under the No Action alternative SCM would cease coal recovery within the LBA1 tracts and would begin reclamation. The area mined, the amount of aquifer material removed (and backfill placed), and the duration of dewatering would be reduced compared to the other alternatives. Overall, the No Action alternative would not contribute any additional effect on the extent of impacts to groundwater.

4.5.2 Surface Water

4.5.2.1 Direct and Indirect Effects

4.5.2.1.1 Alternative 1 - Proposed Action

During mining, removal of materials will disrupt stream channels and their watersheds. The mining process will involve diverting and impounding surface water to prevent excess runoff from entering the mined area, and to allow sediments to settle out of the water prior to discharge. This is consistent with the existing practices.

Three surface water drainages have been impacted by mining of the LBA1 tracts: Spring Creek, North Fork Spring Creek, and South Fork Spring Creek. Spring Creek flow is currently stored in reservoirs at SCM and upstream of the West Decker mine. Additional reservoirs are located in the North and South Forks of Spring Creek, and further limit flow in Spring Creek. Water impounded in the reservoirs is periodically discharged and ultimately flows into Tongue River and Tongue River Reservoir. Impoundment alters the timing of these discharges. Evaporation and infiltration that occur during impoundment could potentially reduce the volume of surface water that leaves the site; however, mining operations in the Tongue River watershed have not resulted in decreased flow in the Tongue River (MDEQ 2020b). Diversion and impoundment will end when mining is complete, and restoration will reconnect stream channels.

Reclaimed soils may initially have lower infiltration rates and more runoff than the premining land surface. The reclaimed land surface may have less variation in elevation than the premining land surface, which could result in higher infiltration rates and less runoff. Infiltration rates of reclaimed soils eventually return to premining levels, and peak discharges in stream channels compare favorably pre- and postmining.

Surface erosion of reclaimed soils could increase sediment production. SCM uses stormwater best management practices to reduce the impact of sediment on surface water. Sedimentation control measures are used until revegetation of reclaimed areas is sufficient. Runoff is diverted to sedimentation ponds prior to discharge to surface water. As runoff contacts newly exposed particle surfaces in backfilled material, TDS concentrations may increase. Discharge is subject to MDEQ effluent standards, and there has been no measurable increase in total suspended solids (TSS) or TDS in the Tongue River as a result of mining (MDEQ 2020b).

The direct and indirect effects of the Proposed Action on surface water are expected to be moderate and short term.

4.5.2.1.2 Alternative 2- Partial Mining

Direct and indirect effects of the Partial Mining alternative on surface water would be similar to the Proposed Action alternative but predominantly limited to the area mined within the 5-year term. Because SCM would be limited to mining only a portion of the remaining coal in the LBA1 tracts under this alternative, the effects would be moderate where mining occurs, but the impacts would be limited to the disturbed area.

4.5.2.1.3 Alternative 3- Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, impacts to surface water would be similar to the Proposed Action but would be completed more quickly, allowing reclamation to occur earlier. Instead of mining until 2039, under this alternative SCM would mine the remaining LBA1 tract coal at a rate of 18 Mtpy, for an additional 2.2 years. While the disturbance would occur over a shorter time frame and reclamation may occur earlier under this alternative, the impacts would be the same as the Proposed Action and include surface erosion of reclaimed soils which may increase TDS in surface water downstream, resulting in moderate and short-term impacts on surface water.

4.5.2.1.4 Alternative 4 - No Action

Under the No Action alternative SCM would cease coal recovery within the LBA1 tracts and would begin reclamation. Under the No Action alternative, the area mined and the amount of land surface disturbed (and backfill placed) would be reduced. Implementation of the No Action alternative would slightly reduce the total mined area and the duration of mining and would have a minor effect on the extent of impacts to surface water.

4.5.3 Water Rights

4.5.3.1 Direct and Indirect Effects

4.5.3.1.1 Alternative 1 - Proposed Action

The Proposed Action has the potential to impact water rights by reducing the amount or quality of groundwater or surface water available to fulfill other water rights.

Dewatering will lower groundwater levels, which may reduce the amount of groundwater that can be pumped from nearby wells. MDEQ has identified 13 wells that could be impacted by lower water levels (MDEQ 2020a). Reclamation will increase concentrations of TDS in groundwater but is not anticipated to change the suitability of groundwater for beneficial use. Water levels and water quality will eventually stabilize near premining levels.

Two surface water rights have been identified between SCM and the Tongue River, both of which are rights for a pond that was destroyed by mining at West Decker (MDEQ 2020b). Consequently, the nearest downstream surface water rights that could be affected by the Proposed Action would be located on Tongue River. Current mining operations have not decreased flow or degraded water quality in Tongue River (MDEQ 2020b).

The direct and indirect effects of the Proposed Action on groundwater rights are expected to be moderate and long term. The direct and indirect effects of the Proposed Action on surface water rights are expected to be negligible.

4.5.3.1.2 Alternative 2 – Partial Mining

The impacts from the Partial Mining alternative would be the same as the Proposed Action on groundwater and surface water rights but would be limited to a 5-year term. The temporary lowering of groundwater levels in nearby wells would likely still occur; however, the impacts would likely resolve quicker because mining would be limited to the 5-year term. The direct and indirect effects of the Partial Mining alternative on groundwater rights are expected to be moderate and long term. Direct and indirect effects of the Partial Mining alternative on surface water rights would be negligible.

4.5.3.1.3 Alternative 3 – Accelerated Mining Rate

The impacts from the Accelerated Mining Rate alternative would be similar to the Proposed Action on groundwater but dewatering may occur at a quicker rate. Under this alternative the groundwater levels in nearby wells may also recover quicker because the mining would be complete in 2.2 years. The direct and indirect effects of the Accelerated Mining Rate alternative on groundwater rights are expected to be moderate and long term. Direct and indirect effects of the Partial Mining alternative on surface water rights would be negligible.

4.5.3.1.4 Alternative 4 - No Action

Under the No Action alternative SCM would cease coal recovery within the LBA1 tracts and would begin reclamation. The area mined and the amount of aquifer material removed (and backfill placed) would be reduced. The duration of dewatering would also be reduced. Overall, the No Action alternative would not contribute any additional effect on the extent of impacts to

groundwater rights. The effect of the No Action alternative on surface water rights are expected to be negligible.

4.6 Alluvial Valley Floors

4.6.1 Direct and Indirect Effects

No AVFs have been delineated within the tracts so there would be no direct or indirect effects to AVFs from any of the alternatives considered in this EIS.

4.7 Wetlands

4.7.1 Direct and Indirect Effects

No wetlands have been delineated within the tracts so there would be no direct or indirect effects to wetlands from any of the alternatives considered in this EIS.

4.8 Soil

4.8.1 Direct and Indirect Effects

4.8.1.1 Alternative 1 - Proposed Action

As described in Section 2.2 of this EIS, 461.4 acres within the LBA1 tracts have been disturbed as of December 31, 2023. Under the Proposed Action, impacts to the soil resources on the remaining 162.5 acres would continue until 2039 based on the current mine permit. The impacts would be the same as those currently occurring, which include potential changes in soil structure, texture, organic matter content, infiltration rate, permeability, water-holding capacity, soil plant nutrient level, soil microbial composition and activity, and soil fertility. Postmining soils will have a more homogenous mixture compared to premining soils, which would be beneficial to areas that had little topsoil prior to mining but would potentially degrade the soil quality in areas that had a thicker topsoil layer prior to mining. The mining permit requires that the replaced topsoil in the tracts support a stable and productive vegetative cover capable of sustaining planned postmining land uses, which include livestock grazing, cropland, and wildlife habitat. As the vegetation cover becomes reestablished, erosion would not significantly affect productivity.

As stated previously, no “prime” or “unique” farmland exists within the proposed tracts, and therefore none would be disturbed. Drainage features would be reconstructed on the area similar to reclamation techniques used at the Spring Creek Mine.

Overall, the potential impacts to the soil resources would be moderate and long-term.

4.8.1.2 Alternative 2 – Partial Mining

Under the Partial Mining alternative, SCM would be limited to a 5-year term. Based on the current Life of Mine mining sequence, it is assumed that approximately 78.5 acres would be disturbed over the 5-year term (Table 2.2-1). The types of impacts would be the same as those described for the Proposed Action but would occur over approximately half of the acres impacted by the Proposed Action. As with the Proposed Action, SCM would adhere to reclamation requirements and vegetation would be restored to minimize erosion. Overall, the potential impacts to the soil resources would be moderate where the mining occurs but the disturbance footprint would be reduced by approximately fifty percent from the Proposed Action.

4.8.1.3 Alternative 3 – Accelerated Mining Rate

The impacts from the Accelerated Mining Rate alternative would be similar to the Proposed Action on soils. Under this alternative SCM would disturb the remaining 162.5 acres within the LBA1 tracts over 2.2 years. The impacts and reclamation under this alternative would occur sooner than the

Proposed Action, but the outcome would be same because SCM will adhere to reclamation requirements and vegetation would be restored to minimize erosion.

4.8.1.4 Alternative 4 - No Action

Under the No Action Alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. No additional soil would be disturbed within the LBA1 tracts and SCM would complete reclamation on the currently disturbed areas within the LBA1 tracts. The potential impacts to soil under the No Action alternative would be minor and short-term until vegetation is reestablished on currently disturbed areas to reduce the potential for erosion.

4.8.2 Mitigation Measures

SCM's approved mining permit requires sediment control structures to trap eroded soil, revegetation to reduce wind erosion, and the special handling of soil or overburden materials containing potentially harmful levels of chemical constituents (such as selenium). These measures are enforceable under state regulations.

4.9 Vegetation

4.9.1 Direct and Indirect Effects

4.9.1.1 Alternative 1 - Proposed Action

Direct effects to the vegetation within the LBA1 tracts would include loss of habitat for some wildlife species, including reduced species diversity on reclaimed lands. Indirect effects to the vegetation would include increased soil erosion and habitat loss for wildlife and livestock. However, grassland-dependent wildlife species and livestock would benefit from the increased grass cover and production. As described in Section 2.2 of this EIS, 461.4 acres within the LBA1 tracts have been disturbed as of December 31, 2023. Under the Proposed Action, impacts to the vegetation on the remaining 162.5 acres would continue until 2039.

Reclamation of disturbed lands with the SCM permit boundary is performed according to MDEQ regulatory standards (ARM 17.24.3). Reclamation would occur contemporaneously with mining on adjacent lands, i.e., reclamation would begin once an area is mined. In an effort to approximate premining conditions, SCM would plan to reestablish vegetation types during the reclamation operation that are similar to the premine types. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by MDEQ). The reclamation plan for the SCM includes steps to control invasion by weedy (invasive nonnative) plant species. The direct and indirect effects related to the Proposed Action on vegetation would be moderate and short term.

4.9.1.2 Alternative 2 – Partial Mining

Under the Partial Mining alternative, SCM would be limited to a 5-year term to mine Federal coal within the LBA1 tracts. Based on the current Life of Mine mining sequence, it is assumed that approximately 78.5 acres would be disturbed over the 5-year term (Table 2.2-1). The impacts would be the same as those described for the Proposed Action but would occur on fewer acres and for a shorter period. SCM would adhere to reclamation requirements and vegetation would be restored using reclamation seed mixtures approved by MDEQ.

4.9.1.3 Alternative 3 – Accelerated Mining Rate

The impacts from the Accelerated Mining Rate alternative would be the similar to the Proposed Action on vegetation Under this alternative SCM would disturb the remaining 162.5 acres within the LBA1 tracts over 2.2 years. The impacts and reclamation under this alternative would occur sooner than the Proposed Action, but the outcome would be same because SCM will adhere to

reclamation requirements and vegetation would be restored using reclamation seed mixtures approved by MDEQ.

4.9.1.4 Alternative 4 - No Action

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. However, approximately 460 acres within the LBA1 tracts have been disturbed. The currently disturbed areas would be reclaimed and vegetation would be established. The potential impacts to vegetation under the No Action alternative would be negligible.

4.9.2 Mitigation Measures

No mitigation measures would be necessary for vegetation.

4.10 Wildlife

4.10.1 Big Game

4.10.1.1 Direct and Indirect Effects

4.10.1.1.1 Alternative 1 - Proposed Action

Portions of the original LBA1 tracts were designated as high value and moderate winter range for big game (MFWP 2024). Under its approved SMCRA permit, SCM is required to reclaim disturbed habitats within the area back to wildlife habitat. After mining and reclamation, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density, is anticipated to cause a decrease in carrying capacity and diversity on the tracts. Sagebrush would gradually re-establish on the reclaimed land, but the topographic changes would be permanent.

General reclamation practices for establishing or enhancing post-mining wildlife habitat at the SCM are described in the Reclamation Plan (Section 17.24.313) of SMP C1979012. SCM also has a separate HRRP for the GRSG, which is a species of particular interest in the region. Because there is overlap between the big game winter range and the GRSG habitat areas, the reclamation of any GRSG habitat outlined the specific HRRP would fulfill the reclamation requirements for mule deer and pronghorn and would provide quality habitat for big game impacted by the Proposed Action. The direct and indirect effects related to the Proposed Action on big game would be moderate and short term.

4.10.1.1.2 Alternative 2 – Partial Mining

The Partial Mining alternative would result in the same types of direct and indirect effects as the Proposed Action but would be reduced in area and duration because the Partial Mining alternative would only allow the disturbance of 78.5 aces over 5 years. SCM would follow the same reclamation practices described for the Proposed Action and overall impacts to big game from the Partial Mining alternative would be moderate and short term where mining occurs and overall, less than the Proposed Action.

4.10.1.1.3 Alternative 3 - Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, potential impacts to big game would be the same types of direct and indirect effects as described for the Proposed Action but would occur over a shorter period. The impacts would occur over 2.2 years instead of nearly 16 years, shortening the amount of time that big game species may be disturbed by active mining and allowing reclamation to be started and completed years before the Proposed Action. As a result, overall impacts to big game are likely to be moderate but significantly shorter than the Proposed Action.

4.10.1.1.4 Alternative 4 - No Action

Under the No Action alternative SCM would shut down coal recovery within the LBA1 tracts and would begin reclamation. The direct and indirect effects related on big game from the No Action alternative would be minor and short term, until the area is fully reclaimed.

4.10.1.2 Mitigation Measures

No mitigation measures specific to big game are necessary. General reclamation practices for establishing or enhancing post-mining wildlife habitat at the SCM are described in the Reclamation Plan (Section 17.24.313) of SMP C1979012. SCM also has a separate HRRP for the GRSG, which would provide quality habitat for big game.

4.10.2 Raptors

4.10.2.1 Direct and Indirect Effects

4.10.2.1.1 Proposed Action

Potential impacts to raptors include loss of nesting and foraging habitat, collisions with structures and vehicles, nest abandonment and reproductive failure due to increased human activities, reduction in prey populations, and displacement of birds into adjacent areas. The impacts to raptors would be moderate. Approximately 460 acres within the LBA1 tracts have already been disturbed. The Proposed Action will increase the potential for disturbance to nesting and foraging areas by increasing the scale and duration of disturbance.

SCM has approved plans and procedures in place to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the postmining landscape for both raptors and their primary prey species. SCM conducts annual surveys at multiple prairie falcon nest sites throughout the monitoring area and on neighboring lands as part of required and/or voluntary monitoring for this species.

Based on the limited number of nesting raptors within the tracts (in 2022 four pairs of red-tailed hawks were active but only one pair fledged) and the SCM's approved plans and procedures in place to reduce impacts to raptors, the direct and indirect effects related to the Proposed Action on site-specific raptors would be moderate and short term.

4.10.2.1.2 Alternative 2 – Partial Mining

Under the Partial Mining alternative, impacts to raptors would be the same types of impacts as the Proposed Action but would be reduced in duration and acreage. SCM would adhere to approved plans and procedures to minimize impacts to raptors. Based on this, under the Partial Mining alternative, direct and indirect effects on raptors within the disturbed area would be moderate and short term; however, this alternative would disturb less acreage and the disturbance would be limited to 5 years instead of 15 to 16 years.

4.10.2.1.3 Alternative 3 - Accelerated Mining Rate

The Accelerated Mining Rate alternative would result in the same direct and indirect effects as the Proposed Action but would be reduced in duration but have a higher intensity because mining would occur at a faster rate. SCM would follow the same approved plans and procedures described for the Proposed Action and overall impacts to raptors would be moderate and short term.

4.10.2.1.4 Alternative 4 - No Action

Under the No Action alternative SCM would shut down coal recovery within the LBA1 tracts and would begin reclamation. The No Action alternative would have a negligible effect on raptors.

4.10.2.2 Mitigation Measures

No additional mitigation measures specific to raptors are necessary. General reclamation practices for establishing or enhancing post-mining wildlife habitat at the SCM are described in the Reclamation Plan (Section 17.24.313) of SMP C1979012. SCM also has plans and procedures to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the post-mine landscape for raptors and their primary prey species.

4.10.3 Greater Sage-grouse

4.10.3.1 Direct and Indirect Effects

4.10.3.1.1 Proposed Action

As stated in Section 3.10.3 of this EIS, the MSGHCP typically manages land uses and activities that may affect key GRSG habitat. However, activities associated with the LBA1 tracts would not be managed according to the MSGHCP because the tracts are entirely within the SCM's currently approved SMP C1979012 permit boundary and are exempt because the permit was received and deemed complete in 2013 before the EO effective date. The current SCM wildlife monitoring area includes two confirmed active lek sites, six confirmed inactive leks, and one confirmed extirpated (mined through) lek (Map 3.10-1). However, no GRSG have been recorded at either of the two confirmed active leks in the last 5 to 6 years, depending on the site.

The Proposed Action would result in the short and long-term loss of approximately 162.5 acres of potential habitat for GRSG. Approximately 460 acres within the four tracts have already been disturbed. Map 3.8-1 shows the proposed disturbance limits from the Proposed Action, as related to GRSG habitats and leks. According to information included in past annual wildlife monitoring reports, the project area provides limited GRSG habitat for breeding, nesting, brood-rearing, summering, and winter use (Great Plains Wildlife Consulting, Inc. 2023). No GRSG broods have ever been observed during annual targeted surveys along drainage routes and no broods have been observed from 2000 to 2021 (Great Plains Wildlife Consulting, Inc. 2023). No GRSG or their sign were encountered during at least 159 individual winter surveys conducted for wintering sage-grouse or other wintering species (e.g., big game, bald eagles) over the last 28 years (Great Plains Wildlife Consulting, Inc. 2023).

In lieu of the management requirements specified in the MSGHCP, SCM has developed and implemented a detailed HRRP for the management of GRSG at the mine and is voluntarily participating in the TBGPEA to offset potential impacts to GRSG due to mine-related activities. SCM also voluntarily participates in the CCAA program to help minimize impacts to GRSG in the area.

While project construction would result in long-term direct impacts to GRSG habitat within the monitoring area, monitoring indicates that a population-level effect is not likely for the LBA1 tracts. Impacts to GRSG would be moderate. Due to the sequential nature of disturbance, continued coordination with BLM and MFWP, and implementation of SCM's HRRP, the potential impacts to GRSG would remain moderate.

4.10.3.1.2 Alternative 2 – Partial Mining

Under the Partial Mining alternative, SCM would be limited to a 5-year term to mine the remaining coal within the LBA1 tracts. Based on the current Life of Mine mining sequence, it is assumed that approximately 78.5 acres would be disturbed over the 5-year term (Table 2.2-1). The impacts would be the same type of impacts as those described for the Proposed Action but would impact fewer acres and would be shorter in duration.

4.10.3.1.3 Alternative 3 - Accelerated Mining Rate

The impacts from the Accelerated Mining Rate alternative would be the similar to the Proposed Action. Under this alternative, SCM would disturb the remaining 162.5 acres within the LBA1 tracts over 2.2 years. The impacts and reclamation under this alternative would occur sooner than the Proposed Action, but the outcome would be same as those described for the Proposed Action because SCM will adhere to the HRRP for the management of GRSG.

4.10.3.1.4 Alternative 4 – No Action

Under the No Action alternative SCM would shut down coal recovery within the LBA1 tracts and would begin reclamation. The No Action alternative would have a negligible effect on GRSG.

4.10.3.2 Mitigation Measures

SCM has developed and implemented a detailed HRRP for sage-grouse at the mine and its voluntary participation in a large-scale conservation strategy highlighting sagebrush-steppe species across the region further offset potential impacts to sage-grouse due to mine-related activities. The plan is included in Section 17.24.312 of SMP C1979012 and is enforceable under its state-issued mining permit. The HRRP consist of the following five parts:

1. A habitat analysis of the permit areas.
2. A detailed description of the methods selected by the lessee to recover, replace or mitigate habitat loss, together with a comparative analysis of alternate methods which were considered and rejected by the lessee and the rationale for the decision to select the proposed methods.
3. A timetable specifying which will be required to accomplish the habitat recovery or replacement plan and showing how this timetable relates to the overall mining plan.
4. An evaluation of the final plan by the BLM, in consultation with the State of Montana.
5. In the development of this plan, direct liaison with the State of Montana is essential.

SCM also is a voluntary participant in the TBGPEA. The focus if the association is to:

1. Work in collaboration and cooperation with a variety of government and non-government entities, as well as with experts in academia and members of the private sector.
2. Develop and implement a strategy of adaptive management that is informed by and responsive to current conditions and the results of previously implemented conservation efforts.
3. Conduct extensive vegetation monitoring and targeted wildlife monitoring to support and enable adaptive management.
4. Work with the USFWS to implement incentives-based conservation strategy to protect eight species of concern that inhabit the sagebrush steppe and short-grass prairie of northeastern Wyoming.

4.10.4 Threatened and Endangered Species and Other Species of Special Interest

4.10.4.1 Direct and Indirect Effects

4.10.4.1.1 Proposed Action

No USFWS designated T&E species are known to occur in the project area and the USFWS has not designated critical habitat for any T&E species in the vicinity of the project area at this time (USFWS 2024). Because no T&E species or habitats critical to T&E species have been documented within the project area, impacts to T&E species would be negligible.

For the purposes of this discussion, other SOSI include USFWS BCC, BLM Sensitive Species, and MTNHP and MFWP Species of Concern. The MTNHP website was accessed to obtain a comprehensive list of SOSI within the wildlife monitoring area (MTNHP 2024).

As stated in Section 3.10.4 and included in Appendix B of this EIS, 33 vertebrate SOSI have the potential to occur in the region. Of the 33 species, seven species have never been observed in any field wildlife survey within the wildlife monitoring area. The Proposed Action would result in short-term loss of approximately 162.5 acres of habitat for SOSI within the proposed project area. Activities could displace SOSI to lower quality habitat areas and could result in localized lower reproduction and increased predation. Another direct impact on SOSI is mortality during construction and from collisions with vehicles. Impacts would be moderate; however, the sequential nature of disturbance would reduce impacts to SOSI. Seasonal guidelines for wildlife exclusion periods and applicant committed design features described in Section 4.10.3.2 would reduce impacts to SOSI to minor. SCM monitors and protects SOSI based on Section 312, 723, and 751 of SMP C1979012. The SOSI comprehensive plan includes migratory birds, which are protected under the Migratory Bird Treaty Act (MBTA). Under the SOSI, SCM submits a letter annually to USFWS after the initial spring bird nesting monitoring season, documenting the results of the initial spring next surveys. In addition, upon discovery of bird mortality, SCM notifies DEQ, USFWS, and MFWP.

4.10.4.1.2 Alternative 2 – Partial Mining

The Partial Mining alternative would result in the same direct and indirect effects as the Proposed Action but would be reduced in area and duration. Because no T&E species or habitats critical to T&E species have been documented within the project area, impacts to T&E species would be negligible. Impacts to SOSI would be moderate and short-term.

4.10.4.1.3 Alternative 3 - Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, potential impacts to T&E species would be negligible and impacts to SOSI would be moderate and short-term. The difference would be that impacts would occur over a shorter duration compared to the Proposed Action.

4.10.4.1.4 Alternative 4 - No Action

Under the No Action Alternative SCM would shut down coal recovery within the LBA1 tracts and would begin reclamation within the tracts. The No Action alternative would have a negligible effect on T&E species and SOSI.

4.10.4.2 Mitigation Measures

No mitigation measures specific to T&E species and other SOSI are necessary because there are no T&E species within the LBA1 tracts. General reclamation practices for establishing or enhancing post-mining wildlife habitat at the SCM described in the Reclamation Plan (Section 17.24.313) of SMP C1979012 are in place.

4.11 Ownership and Use of Land

4.11.1 Direct and Indirect Effects

4.11.1.1 Alternative 1 - Proposed Action

Surface ownership in the area includes BLM and private lands and the coal removal area is managed by the BLM and SCM. Direct and indirect effects of the Proposed Action include reduction of livestock grazing and loss of wildlife habitat. Section 3.3.2.2 of this EIS describes how CBNG development and production in the northern PRB has ceased; therefore, impacts would be negligible.

As of December 31, 2023, disturbance has already taken place on approximately 460 acres within the LBA1 tracts. Wildlife (particularly big game) use would be displaced while the tracts are being mined and reclaimed. Livestock grazing has already been prohibited due to the tracts being inside the permit boundary and adjacent to active mining areas. Hunting on the tracts is currently not allowed because they are within the mine permit boundary and would continue to be disallowed during mining and reclamation. Following reclamation, the land would be suitable for grazing and wildlife, which are the historic land uses. The direct and indirect effects related to the ownership and use of the land would be moderate and short term.

4.11.1.2 Alternative 2 - Partial Mining

Impacts to surface ownership and land use under the Partial Mining alternative would be the same as described for the Proposed Action but would be shortened in duration and would cover fewer acres. As described for the Proposed Action, disturbance has already taken place with the LBA1 tracts which has impacted livestock grazing and hunting. The direct and indirect effects related to the ownership and use of the land would be moderate and short term.

4.11.1.3 Alternative 3 – Accelerated Mining Rate

The Accelerated Mining Rate alternative would have the same types of impacts as the Proposed Action. Under this alternative, the remaining LBA1 tracts area would be disturbed but the disturbance would occur more quickly and, as a result, reclamation may occur earlier than the Proposed Action. SCM would continue to prohibit livestock grazing and hunting until all reclamation is complete. Based on this, the direct and indirect effects related to the ownership and use of the land would be moderate and short term.

4.11.1.4 Alternative 4 - No Action Alternative

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. The impacts to ownership and land use under the No Action Alternative would be minor until reclamation is complete and the land is returned to its premining uses wildlife habitat and livestock grazing.

4.11.2 Mitigation Measures

No mitigation measures specific to ownership and use of the land are necessary.

4.12 Cultural Resources

4.12.1 Direct and Indirect Effects

As described in Section 3.12 of this EIS, site 24BH404 was the only site within the LBA1 tract requiring mitigation, which was completed in 2015. Because there are no other sites, the direct and indirect effects on cultural resources from all of the alternatives evaluated in this EIS would be negligible.

4.12.2 Mitigation Measures

SCM's cultural resources Memorandum of Agreement (MOA) was established between OSMRE, MDEQ and NTEC pursuant to the NHPA and is enforceable as a condition under the SMCRA permit. The MOA is in place to guide mitigation of incidental cultural discoveries that might be encountered during mining.

4.12.2.1 Unanticipated Discoveries

If a previously unidentified cultural resource is discovered in the project area, SCM would take measures to protect the find locality and provide written notice to the MDEQ and OSMRE within 48 hours of the discovery. A Montana-permitted archaeologist meeting the Secretary of the Interior's Professional Qualification Standards is required to evaluate the discovery, make a

recommendation as to the NRHP eligibility of the resource, and provide written notice to the MDEQ and OSMRE within 48 hours. The MDEQ and OSMRE would then consult with the Tribal Historic Preservation Office (THPO), SHPO, and the BLM (for federally managed sites) on the NRHP eligibility determination(s) and develop appropriate measures necessary to mitigate any adverse effects through the development of a treatment plan.

Should the discovery involve a burial site or a resource thought to have potential religious or cultural significance to a tribe, the tribe(s) with an interest would be notified and consulted as appropriate. When agreement is reached among all of the involved parties, appropriate mitigation, if necessary, would be implemented. The tribes, OSMRE, MDEQ, SHPO, and the surface landowner must agree to any proposed treatment measures.

4.13 Visual Resources

4.13.1 Direct and Indirect Effects

4.13.1.1 Alternative 1 - Proposed Action

No visual resources have been identified on or near the tracts that are unique compared to the surrounding area. The mining operations would continue to affect landscapes classified as VRM Class III by BLM. The objective of this class is to partially retain the existing character of the landscape. Reclaimed terrain would be almost indistinguishable from the surrounding undisturbed terrain. Slopes might appear smoother (less intricately dissected) than the surrounding undisturbed terrain, and sagebrush and trees would not be as abundant for several years; however, within a few years after reclamation, the mined land would not be distinguishable from the surrounding undisturbed terrain except by someone very familiar with landforms and vegetation. The direct and indirect effects related to the visual resources would be moderate and short term.

4.13.1.2 Alternative 2 - Partial Mining

Impacts to visual resources under the Partial Mining alternative would be the same as described for the Proposed Action but would be limited to a 5-year term and 78.5 acres. During mining the direct and indirect effects related to the visual resources would be moderate and short term. Following reclamation the LBA1 tracts lands would blend with the surrounding area.

4.13.1.3 Alternative 3 – Accelerated Mining Rate

The Accelerated Mining Rate alternative would have the same impacts on visual resources as the Proposed Action, but reclamation would likely occur sooner under this alternative. Overall, this alternative would have a moderate impact on visual resources, but the LBA1 tracts would be reclaimed to blend with surrounding terrain.

4.13.1.4 Alternative 4 - No Action Alternative

Under the No Action alternative, SCM would terminate Federal coal recovery operations within the boundaries of the LBA1 tracts. Direct and indirect effects related to the visual resources would be minor and short term while reclamation is completed. Following reclamation, the LBA1 tracts lands would blend with the surrounding area.

4.13.2 Mitigation Measures

No mitigation measures specific to visual resources are necessary.

4.14 Noise

4.14.1 Direct and Indirect Effects

4.14.1.1 Alternative 1 - Proposed Action

Direct effects of noise from the Proposed Action would be to the nearest residences. The nearest residence is approximately 3,000 feet from Tract 1 and the nearest recreational opportunity is at the Tongue River Reservoir, approximately 15,000 feet from the proposed tracts. SCM developed internal criteria on off-site noise acceptable for protection of the local community and established a threshold of 65 dBa. Modeling concluded that this threshold would be exceeded at points less than 4,800 feet from the pit boundary. This threshold would be re-modeled when mining activity encroaches on the 4,800-foot buffer. Overall, direct effects related to noise would be significant in the immediate vicinity but would be reduced as the distance increases. Based on this, direct effects on noise would be moderate and short term.

Indirect effects from the Proposed Action would include noise and vibration associated with rail operation. Both noise and vibration have closely related causal factors with the magnitude of effect relating to the frequency of train passage. According to STB's environmental review regulations for noise analysis (49 C.F.R. § 1105.7e(6)), the thresholds are (1) an incremental increase in noise levels of 3 dBA or (2) an increase to a noise level above 65 L_{dn} or greater. Changes in a noise level of less than 3 dBA are not typically noticed by the human ear.

The following equation was recently used for two projects involving coal transport by rail to calculate the change in noise levels (STB 2015 and WDOE and Cowlitz County 2017).

$$10 \times \log (N2 \div N1) = \text{dBA change}$$

In this equation, NI equals the existing (baseline) traffic volume along the rail line and N2 equals the maximum estimated traffic additive of the action. The equation assumes that the distribution of the number of trains between daytime and nighttime does not change. Using this equation, traffic must increase 100 percent to increase noise by at least 3 dBA.

Because OSMRE does not regulate rail traffic, for associated environmental impacts, this EIS relies upon STB regulations, which only require analysis of noise where rail traffic increases at least 100 percent (i.e., doubles) or increases by at least 8 trains per day on any segment (49 C.F.R. § 1105.7e(6)). Under the Proposed Action, the rail traffic would not increase over current levels. Therefore, a noise analysis associated with rail traffic is not required. Similarly, based on the lack of noise-related impacts associated with the Proposed Action, no corresponding change or impacts relative to FTA human annoyance vibration criteria guidelines would be expected. Therefore, the indirect impacts from noise and vibration from the Proposed Action would be minor and short-term.

4.14.1.2 Alternative 2 - Partial Mining

Noise impacts under the Partial Mining alternative would be the same as described for the Proposed Action but would be limited to a 5-year term. Under the Partial Mining alternative, the rail traffic would not increase over current levels. Therefore, a noise analysis associated with rail traffic is not required. The indirect impacts from noise and vibration would be minor and short-term.

4.14.1.3 Alternative 3 – Accelerated Mining Rate

The Accelerated Mining Rate alternative would have the same direct and indirect impacts on noise and vibration as the Proposed Action. Although rail traffic would increase under the Accelerated Mining Rate alternative it would not increase by at least 8 trains per day and therefore does not require a noise analysis. Additionally, the increase in rail traffic under the Accelerated Mining Rate

alternative would be much shorter in duration compared to the Proposed Action (2.2 years instead of nearly 16 years). This alternative would have a short-term, minor impact on noise and vibration.

4.14.1.4 Alternative 4 - No Action Alternative

Under the No Action alternative, SCM would terminate federal coal recovery operations within the boundaries of the LBA1 tracts. Impacts on noise and vibration under the No Action alternative would be negligible.

4.14.2 Mitigation Measures

No mitigation measures specific to noise impacts are necessary.

4.15 Transportation Facilities

4.15.1 Direct and Indirect Effects

4.15.1.1 Proposed Action

Existing transportation facilities, including roads, railroads, and overhead electrical transmission lines, would continue to be used under the Proposed Action. Most of the coal mined at the SCM is transported by rail with a relatively small amount of retail coal sales transported by truck. U.S. railroad routes used by BNSF to transport SCM coal to various destinations are shown on Map 2.1-1 of this EIS.

The Proposed Action would not increase the current direct impacts on transportation facilities. However, the Proposed Action would result in indirect impacts from coal transport on public health, ecological health, collisions with threatened and endangered species, dust, noise, and vibration. The impacts from rail transportation related to the Proposed Action have been evaluated using 130 coal cars per train and 15,350 short tons of coal per car (NTEC 2021). Under the Proposed Action the LBA1 tract coal would require approximately 50 to 317 coal shipments per year (see Table 2.2-2 for annual coal production). This volume would be less than the current annual rail traffic from SCM coal (2016-2023 average annual rail shipments required approximately 775 coal shipments per year).

Indirect impacts to public health could occur due to inhalation of coal dust or ingestion of soil, sediment, water, agricultural products, fish, or other animals that have ingested soil or water affected by coal deposits.

The existing literature on the emission, dispersion, and deposition of coal dust from rail cars is limited, consisting mainly of industry studies and a few peer-reviewed academic studies. Existing studies have relied on several different analysis methods. Some studies used computer simulations to model the emission and dispersion of fugitive coal dust from rail cars. Others conducted experiments using model trains in wind tunnels or by attaching dust collectors to the outside of train cars. Still others used monitoring equipment to measure the concentration of particulate matter (including coal dust) in the air and/or deposition on the ground near rail lines. These studies vary in their conclusions, especially regarding the quantity of coal dust emitted by moving rail cars. The Draft Tongue River Railroad EIS (STB 2015) and Millennium Bulk Terminals EIS (WDOE and Cowlitz County 2017) provide thorough discussions on human health and ecological impacts that could result from inhalation and ingestion of coal dust emissions from rail transport.

As part of the Draft Tongue River Railroad EIS, STB modeled coal dust deposition and then combined the results with a fate and transport model to estimate coal dust constituents in soil, water, and sediment and the corresponding concentrations in drinking water and fish. Similarly, the Millennium Bulk Terminals EIS provides the results of the AERMOD dispersion model. However, both of these EISs were for rail line projects encompassing a small portion of rail line. Because the Proposed Action uses over 2 million miles of rail line across the U.S., it is not practical to conduct

modeling using AERMOD or a fate and transport model. Instead, the information provided in the Draft Tongue River Railroad EIS is incorporated by reference.

The Draft Tongue River Railroad EIS model indicated that at 26.7 additional coals trains per day the maximum annual increase in PM_{10} from coal dust would be 6.1 $\mu g/m^3$. The report concluded that there would be no exceedance of the PM_{10} NAAQS at 50 meters from the rail line, including exhaust emissions from locomotives and fugitive particulate from wind erosion. Based on the fact that the additional number of trains resulting from the Proposed Action (an additional 1.2 trains per day) is well below the 26.7 trains per day, indirect impacts resulting from the Proposed Action to public health from coal dust constituents in soil, dust, water, and fish would be minor.

Indirect impacts to ecological health could occur due to ingestion of soil and water and collisions with wildlife. The STB (2015) used the dispersion model to estimate potential ecological impacts. The model indicated that none of the chemical concentrations estimated for soil were above the EPA ecological soil screening levels for plants, soil invertebrates, avian wildlife, or mammalian wildlife. In addition, estimated chemical concentration values for water were below the available EPA freshwater screening benchmark, with the exception of barium, which was likely overestimated because barium precipitates to barium sulfate in water. STB did not expect barium to exceed benchmark or screening levels in water.

Indirect impacts to wildlife, including threatened and endangered species, from coal transport would include collisions. Train collisions with wildlife may occur but are expected to be infrequent and therefore, indirect impacts resulting from the Proposed Action to wildlife would be minor.

The potential for emissions of dust from the large volumes of coal transported to large generating stations can be an environmental concern (Ramboll Environ 2016). In addition to the environmental and human health concerns discussed above, coal dust and fine particles blowing or sifting from moving, loaded rail cars have been linked to railroad track stability problems resulting in train derailments and to rangeland fires caused by spontaneous combustion of accumulated coal dust (BLM 2009). In response to allegations that coal spilled from trains pollutes waterways and creates health and safety concerns, BNSF has agreed to study the use of physical covers on coal trains to reduce the effects of blowing coal particles (Seattle Times 2016). BNSF's Coal Loading Rule, in effect since October 2011, requires all shippers loading coal at any Montana or Wyoming mine to follow specific car loading measures to reduce coal dust losses in transit by at least 85 percent compared to cars with no remedial measures (BNSF 2015).

A derailment analysis was completed using accident data from the FRA. Table 4.15-1 provides the overall national rates, as well as the rates for BNSF on all lines and only the mainline. The table also shows the accident rates for derailments on all lines as well as the mainline for all railroads and the BNSF. Train accident rates were not available for specific cargo, such as coal.

Table 4.15-1. Train Accident Rates (per million train-miles)

Accident Scenario	2020	2021	2022	2023
All Railroads – All lines	2.92	2.92	3.23	3.20
All Railroads – Derailments on All lines	1.95	1.93	2.09	2.14
All Railroads – Mainline Only	0.97	0.92	0.90	0.92
All Railroads – Derailments on Mainline Only	0.62	0.58	0.56	0.58
BNSF – All lines	2.11	1.78	2.26	2.70
BNSF – Derailments on All lines	1.73	1.48	1.90	2.34
BNSF – Mainline Only	0.59	0.46	0.46	0.53
BNSF – Derailments on Mainline Only	0.41	0.38	0.32	0.41

Source: FRA 2024a

The number of accidents per year for the Proposed Action was calculated by multiplying the annual amount of coal shipped by a factor of 0.16 (calculated by dividing the 2018 and 2020 tonnage of

coal shipped by total rail miles) and then multiplying by the four different accident rates. Table 4.15-2 provides the predicted number of train accidents for the Proposed Action.

Table 4.15-2. Predicted Probability of a Train Accident for the Proposed Action

Year	LBA1 Coal (Mt)	Rail Miles	All Railroads Derailment on All Lines	All Railroads Derailment on Mainline	BNSF Derailment on All Lines	BNSF Derailment on Mainline
2024	2.20	330,000	0.67	0.19	0.61	0.13
2025	4.51	676,500	1.37	0.40	1.26	0.26
2026	4.14	621,000	1.26	0.36	1.16	0.24
2027	4.87	730,500	1.48	0.43	1.36	0.28
2028	3.59	538,500	1.09	0.32	1.00	0.20
2029	4.21	631,500	1.28	0.37	1.18	0.24
2030	2.51	376,500	0.76	0.22	0.70	0.14
2031	2.51	376,500	0.76	0.22	0.70	0.14
2032	2.51	376,500	0.76	0.22	0.70	0.14
2033	2.51	376,500	0.76	0.22	0.70	0.14
2034	2.51	376,500	0.76	0.22	0.70	0.14
2035	0.78	117,000	0.24	0.07	0.22	0.04
2036	0.78	117,000	0.24	0.07	0.22	0.04
2037	0.78	117,000	0.24	0.07	0.22	0.04
2038	0.78	117,000	0.24	0.07	0.22	0.04
2039	0.78	117,000	0.24	0.07	0.22	0.04

The table shows that under the Proposed Action up to 1.5 derailment accidents could occur per year. The table shows that there is a higher potential for derailment on all lines (includes main, secondary, yard, and industry) compared to the mainline. It should be noted that not every accident of a loaded mine-related train would result in a coal spill, and any spills that might occur would vary in size. A collision or derailment could involve only a few rail cars or lead to a greater number of rail cars being derailed in certain circumstances. Furthermore, even when rail cars are derailed, not all of the derailed cars would end up in a position where some or all of their contents could be spilled, depending on the severity and speed of the accident, as well as the levelness of the surrounding terrain.

Available data from Liu et al. (2012) indicates that the average number of rail cars derailed on main line track (all classes and speeds) for 2001 through 2010 was 8.4 cars; the number of rail cars on yard, siding, and industry track ranged from 4.3 to 5.7 rail cars. These types of track provide a better indication of the consequences of derailments at very low speeds which is consistent with Table 4.15-2.

If an accident caused a significant release of coal, the actual impacts to the environment would depend on the amount of coal released, the length of time that the spilled coal remained in the area before being recovered or cleaned up, the location of the spill relative to areas of environmental concern, and whether the coal ignited, possibly due to the forces involved in the accident. FRA has emergency response teams on call 24/7 (FRA 2024b). FRA has environmental consultants and contractors that work with state environmental agencies to remediate any damage following an incident.

Under the Proposed Action direct impacts from dust would be negligible and indirect impacts would be minor and short-term. Direct and indirect impacts from a train accident, including derailment, would be dependent on the quantity of coal spilled and the location of the spill. Overall, these impacts would be short-term because there are existing rail emergency response and risk management plans in place by FRA and BNSF.

4.15.1.2 Alternative 2 – Partial Mining

Direct and indirect impacts from the Partial Mining alternative would be the same as the Proposed Action but would be shorter in duration. Under this alternative, the LBA1 tract coal would require approximately 143 to 317 coal shipments per year for a 5-year period, which is less than the current rail traffic at SCM. Because SCM would implement dust control mitigation, direct impacts would be negligible and indirect impacts would be minor and short term. The potential for a derailment would be the same as the Proposed Action but would be limited to the 5-year term. Direct and indirect impacts from a derailment would be dependent on the location and quantity of the spill and would be short term.

4.15.1.3 Alternative 3 – Accelerated Mining Rate

Under the Accelerated Mining Rate alternative, the increased rate of mining (18 Mtpy) would require approximately 1,170 coal trains to transport coal from the LBA1 tracts annually. This would require about 1 additional trains per day over current SCM rail traffic. The risk of a derailment would also increase compared to the Proposed Action. Table 4.15-3 shows that there would be potential for over 5 derailments a year under the Accelerated Mining Rate alternative.

Table 4.15-3. Predicted Probability of a Train Accident for the Accelerated Mining Rate Alternative

Year	LBA1 Coal (Mt)	Rail Miles	All Railroads Derailment on All Lines	All Railroads Derailment on Mainline	BNSF Derailment on All Lines	BNSF Derailment on Mainline
2024	18	2,700,000	5.47	1.58	5.03	1.03
2025	18	2,700,000	5.47	1.58	5.03	1.03
2026	3.6	540,000	1.09	0.32	1.01	0.21

While this alternative would require more coal shipments and a greater potential for a derailment, the direct and indirect impacts would be the same as the Proposed Action. The direct impacts and indirect impacts would range from negligible to moderate and would be short term.

4.15.1.4 Alternative 4 – No Action

Under the No Action alternative, SCM would terminate federal coal recovery operations within the boundaries of the LBA1 tracts. Impacts to transportation facilities would be negligible.

4.15.2 Mitigation Measures

Mitigation includes following the Coal Loading Rule.

4.16 Hazardous and Solid Waste

4.16.1 Direct and Indirect Effects

4.16.1.1 Alternative 1 - Proposed Action

Under the Proposed Action, SCM would continue to generate non-hazardous, hazardous, and universal wastes. Non-hazardous solid waste would continue to be shipped to the municipal landfill in Hardin, Montana. The only wastes disposed of onsite would continue to be wastes such as abandoned mining machinery, non-greasy wood, used tires, concrete, and other items permitted under the mine's existing MDEQ permit to mine. No solid waste disposal on the mine site is allowed to be deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites (Spring Creek Coal Company 2014). Hazardous waste and non-hazardous waste such as used grease and used antifreeze would continue to be incinerated for energy recovery at an off-site EPA-permitted facility. Universal wastes including used batteries, electronic waste, and used light bulbs would continue to be shipped off-site to approved facilities

for recycling. No direct or indirect effects from hazardous and solid waste are anticipated as a result of the Proposed Action.

4.16.1.2 Alternative 2 – Partial Mining

As discussed above in section 4.16.1.1, any waste is either sent to a regulated off-site facility or deposited on-site and regulated under the existing MDEQ permit. As a result, no direct or indirect effects from hazardous and solid waste are anticipated under the Partial Mining alternative.

4.16.1.3 Alternative 3 – Accelerated Mining Rate

As discussed above in section 4.16.1.1, any waste is either sent to a regulated off-site facility or deposited on-site and regulated under the existing MDEQ permit. As a result, no direct or indirect effects from hazardous and solid waste are anticipated as a result of the Accelerated Mining Rate alternative.

4.16.1.4 Alternative 4 - No Action

The No Action alternative is not anticipated to create any additional hazardous and/or solid waste and, therefore, no direct or indirect effects.

4.16.2 Mitigation Measures

No mitigation measures specific to hazardous or solid waste would be necessary.

4.17 Socioeconomics

4.17.1 Direct and Indirect Effects

4.17.1.1 Proposed Action

Under the Proposed Action, Montana revenues (royalties, severance tax, gross proceeds tax, and resource indemnity trust tax) and federal revenues (royalties, black lung tax, and federal recreation tax) would extend the duration of the substantial economic benefits related to mining the Federal coal. Continued mining in the LBA1 tracts would not directly create new jobs and therefore, the availability of housing units would not be impacted. No additional employees are anticipated as a result of the tracts being mined, although the Proposed Action would extend the duration of employment for current employees and extend the substantial economic benefits related to mining the federal coal. No additional changes in the current socioeconomic situation, as described in Section 3.17.1 of this EIS, are anticipated. Direct and indirect effects of the Proposed Action would be minor and short-term.

4.17.1.2 Alternative 2 – Partial Mining

Socioeconomic impacts under the Partial Mining alternative would be similar to the Proposed Action but would be limited to the 5-year term. Under this alternative, SCM may not be able to realize the total socioeconomic benefit of the leased Federal coal in the LBA1 tracts because mining may not be completed within the LBA1 tracts by the end of the 5-year term. Based on this, the direct would be moderate and short-term, while the indirect effects would be negative.

4.17.1.3 Alternative 3 – Accelerated Mining Rate

The Accelerated Mining Rate alternative would have the same types of direct and indirect socioeconomic impacts as the Proposed Action. Because the mining rate would be faster under this alternative, the duration of employment may be less than the Proposed Action although it would likely be similar because SCM has other federal, state, and private coal available to mine. Overall the direct and indirect effects would be minor and short-term.

4.17.1.4 Alternative 4 - No Action

Under the No Action alternative, NTEC would terminate federal coal recovery operations within the boundaries of the LBA1 tracts. The No Action alternative would result in moderate direct and indirect negative socioeconomic effects.

4.17.2 Mitigation Measures

No mitigation measures specific to socioeconomic impacts are needed.

4.18 Environmental Justice

Environmental justice is defined by the EPA as "[t]he fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies. Meaningful involvement means: people have an opportunity to participate in decisions about activities that may affect their environment and/or health; the public's contribution can influence the regulatory agency's decision; community concerns will be considered in the decision making process; and decision makers will seek out and facilitate the involvement of those potentially affected" EPA 2022c).

The CEQ's environmental justice guidance (CEQ 1997) states that the analysis should consider relevant data concerning the potential for multiple or cumulative exposures to human health or environmental hazards in the affected population. This analysis considers multimedia and cumulative impacts and references other sections of the EIS for additional detail. Although the analysis is formally organized by individual resource category, cumulative and multiple impacts (if present) are addressed in the most relevant resource category for those impacts.

Section 3.17.5 of this EIS discussed environmental justice populations present in the region. This section identifies the potential impacts to environmental justice populations as result of the Proposed Action and No Action Alternative. An environmental justice analysis consists of three steps: (1) Identify whether an alternative has potential adverse social, economic, or health impacts; (2) Determine if potential adverse impacts would disproportionately affect minority or low-income populations based on population and participation in potentially affected activities; (3) Determine if disproportionate adverse impacts are major.

The region of influence for the analysis is Big Horn and Rosebud counties in Montana and Sheridan County, Wyoming. Big Horn and Rosebud counties are characterized by a high population of minority residents (American Indian) and low-income residents on Native American tribal trust lands. While minorities and low-income residents in the region reside in places other than tribal trust lands, this analysis focuses on Native American populations.

The remainder of this section focuses on identifying the presence and significance of adverse social, economic, or health impacts of each alternative, and whether major impacts disproportionately affect a minority or low-income population. This analysis is based on the information presented in other resource sections in this EIS. Where other resource sections have identified adverse impacts in comparison to the baseline condition, this section describes the potential associated social, economic, or health impacts and determines whether major impacts would disproportionately affect Native Americans.

4.18.1 Significance Criteria

The levels of significance of impacts are classified as major, moderate, minor, or negligible. An impact is considered major if it would result in a substantial adverse change to the environment, which would disproportionately affect a low-income, or minority population. An impact is

considered moderate or minor if it would not result in substantial adverse environmental effects but could still have some effect that would disproportionately affect a low-income or minority population.

4.18.2 Alternative 1 – Proposed Action

4.18.2.1 Cultural Resources

The SCM has been thoroughly surveyed and all potentially eligible resources have been identified and catalogued. If a site cannot be avoided during a surface activity, this site would be mitigated and potentially recovered. SCM has a cultural resources Memorandum of Agreement that is in place to guide mitigation of incidental cultural discoveries that might be encountered during mining.

4.18.2.2 Socioeconomics

The SCM is owned by NTEC, whose sole shareholder is the Navajo Nation. NTEC was named the 2020 American Indian Business of the Year and named one of Winds of Change Top 50 Workplaces for Indigenous STEM Professionals (NTEC 2024b). Approximately 9% of the SCM workforce is Native American with relatively high-paying jobs (NTEC 2022). Under the Proposed Action, there would be no impact to socioeconomics in the region and the key environmental justice community would realize a continuance of socioeconomic activity from the Proposed Action in the form of high-paying positions, and the indirect/induced economic and fiscal benefits that SCM provides the region.

4.18.2.3 Noise and Vibration

Noise and vibration impacts would not be any different than those discussed in Section 4.14.1.1 of this EIS. The impacts would not exceed the significance thresholds or result in major adverse effects to the nearby residences or recreation areas. Therefore, no major disproportionate impacts from noise or vibration to the Native American residents in the direct vicinity of the SCM would occur.

4.18.2.4 Visual Resources

Impacts to visual resources as result of the Proposed Action would be the same as those described in Section 4.13.1.1 of this EIS. These impacts include surface construction impacts (i.e., dust) and observation of existing facilities and mining equipment. Residents and viewers from nearby tribal trust lands would not experience disproportionate effects from the Proposed Action, as these features would result in minor impacts to the visual resources.

4.18.2.5 Air Quality

Air quality impacts are described in detail in Section 4.4 of this EIS. Modeling and air monitoring indicate that impacts from particulate matter and emissions of NO_x and O_3 to nearby Native American residents would be minor. Similarly, impacts from transportation diesel emissions and coal combustion would not represent a disproportionate impact to the Native Americans living in the vicinity of the SCM.

4.18.2.6 Public Health and Safety

Considering that there are no environmental justice populations present within the SCM, potential public health and safety issues are limited to off-site inhalation of air toxins emitted from construction activities and ingestion through the deposition of air toxins in drinking water supplies and via the food chain. While criteria pollutants may be present in the deposition zone, the level of pollution would be below the federally regulated NAAQS, even when added to background concentrations. Therefore, potential human health effects in the region from criteria air pollutants would be minor and would not disproportionately adversely affect a low-income or minority population.

4.18.3 Alternative 2 – Partial Mining

4.18.3.1 Cultural Resources

The SCM has been thoroughly surveyed and all potentially eligible resources have been identified and catalogued. If a site cannot be avoided during a surface activity, this site would be mitigated and potentially recovered. SCM has a cultural resources Memorandum of Agreement that is in place to guide mitigation of incidental cultural discoveries that might be encountered during mining.

4.18.3.2 Socioeconomics

Under the Partial Mining alternative, SCM would be limited to a 5-year term and would not be able to mine all of the remaining coal in the LBA1 tracts which may have a negative impact to socioeconomics in the region. This alternative may also have negative impacts on the key environmental justice community because it may limit high-paying positions.

4.18.3.3 Noise and Vibration

Noise and vibration impacts would not be any different than those discussed in Section 4.14.1.2 of this EIS. The impacts would not exceed the significance thresholds or result in major adverse effects to the nearby residences or recreation areas. Therefore, no major disproportionate impacts from noise or vibration to the Native American residents in the direct vicinity of the SCM would occur.

4.18.3.4 Visual Resources

Impacts to visual resources as result of the Partial Mining alternative would be the same as those described in Section 4.13.1.2 of this EIS. These impacts include surface construction impacts (i.e., dust) and observation of existing facilities and mining equipment which would be limited to a 5-year term. Residents and viewers from nearby tribal trust lands would not experience disproportionate effects from the Partial Mining alternative, as these features would result in minor impacts to the visual resources.

4.18.3.5 Air Quality

Air quality impacts are described in detail in Section 4.4 of this EIS. Modeling and air monitoring indicate that impacts from particulate matter and emissions of NO_x and O_3 to nearby Native American residents would be minor. Similarly, impacts from transportation diesel emissions and coal combustion would not represent a disproportionate impact to the Native Americans living in the vicinity of the SCM.

4.18.3.6 Public Health and Safety

Considering that there are no environmental justice populations present within the SCM, potential public health and safety issues are limited to off-site inhalation of air toxins emitted from construction activities and ingestion through the deposition of air toxins in drinking water supplies and via the food chain. While criteria pollutants may be present in the deposition zone, the level of pollution would be below the federally regulated NAAQS, even when added to background concentrations. Therefore, potential human health effects in the region from criteria air pollutants would be minor and would not disproportionately adversely affect a low-income or minority population.

4.18.4 Alternative 3 – Accelerated Mining Rate

4.18.4.1 Cultural Resources

The SCM has been thoroughly surveyed and all potentially eligible resources have been identified and catalogued. If a site cannot be avoided during a surface activity, this site would be mitigated

and potentially recovered. SCM has a cultural resources Memorandum of Agreement that is in place to guide mitigation of incidental cultural discoveries that might be encountered during mining.

4.18.4.2 Socioeconomics

Under the Accelerated Mining Rate alternative, there would be no impact to socioeconomics in the region and the key environmental justice community would realize a continuance of socioeconomic activity in the form of high-paying positions although these positions would be for a shorter duration compared to the Proposed Action. The indirect/induced economic and fiscal benefits from this alternative would be the same as the Proposed Action because all of the remaining LBA1 tracts coal would be mined under this alternative.

4.18.4.3 Noise and Vibration

Noise and vibration impacts would not be any different than those discussed in Section 4.14.1.3 of this EIS. The impacts would not exceed the significance thresholds or result in major adverse effects to the nearby residences or recreation areas. Therefore, no major disproportionate impacts from noise or vibration to the Native American residents in the direct vicinity of the SCM would occur.

4.18.4.4 Visual Resources

Impacts to visual resources as result of the Partial Mining alternative would be the same as those described in Section 4.13.1.3 of this EIS. These impacts include surface construction impacts (i.e., dust) and observation of existing facilities and mining equipment which would be limited to a 5-year term. Residents and viewers from nearby tribal trust lands would not experience disproportionate effects from the Partial Mining alternative, as these features would result in minor impacts to the visual resources.

4.18.4.5 Air Quality

Air quality impacts are described in detail in Section 4.4 of this EIS. Modeling and air monitoring indicate that impacts from particulate matter and emissions of NO_x and O_3 to nearby Native American residents would be minor. Similarly, impacts from transportation diesel emissions and coal combustion would not represent a disproportionate impact to the Native Americans living in the vicinity of the SCM.

4.18.4.6 Public Health and Safety

Considering that there are no environmental justice populations present within the SCM, potential public health and safety issues are limited to off-site inhalation of air toxins emitted from construction activities and ingestion through the deposition of air toxins in drinking water supplies and via the food chain. While criteria pollutants may be present in the deposition zone, the level of pollution would be below the federally regulated NAAQS, even when added to background concentrations. Therefore, potential human health effects in the region from criteria air pollutants would be minor and would not disproportionately adversely affect a low-income or minority population.

4.18.5 Alternative 4 – No Action

Under the No Action Alternative, SCM would terminate federal coal recovery operations within the boundaries of the LBA1 tracts. After reclamation has been completed, the impacts to low-income or minority population would be negligible.

Chapter 5 – Cumulative Effects

5.0 CUMULATIVE EFFECTS

This chapter assesses the cumulative impacts of the Proposed Action (Alternative 1), Partial Mining (Alternative 2), Accelerated Mining Rate (Alternative 3), and No Action (Alternative 4).

The Council on Environmental Quality's (CEQ) regulations (40 C.F.R. §§ 1500 - 1508) define cumulative impacts as those impacts that result from incremental effects of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. The past, present, and reasonably foreseeable actions considered in the cumulative impact analysis are described in Section 5.1 of this EIS. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

For purposes of discussion and to enable use of a common scale for all resources, resource specialists considered the following impact levels in qualitative terms.

Significant Impact: Impacts that potentially could cause irretrievable loss of a resource; significant depletion, change, or stress to resources; or stress within the social, cultural, and economic realm.

Moderate Impact: Impacts that could potentially cause some change or stress to an environmental resource but the impact levels are not considered significant.

Minor Impact: Impacts that potentially could be detectable but slight.

Negligible Impact: Impacts in the lower limit of detection that potentially could cause an insignificant change or stress to an environmental resource or use.

No Impact: No discernible or measurable impacts.

Impacts can be short-term, meaning these impacts generally occur over a short period during a specific point in the mining process and these changes generally revert to pre-disturbance conditions at or within a few years after the disturbance has taken place. Long-term impacts are defined as those that substantially would remain beyond short-term ground-disturbing activities. Long-term impacts would generally last the life of the federal mining plan modification approval and beyond. Permanent impacts are defined as those that would remain indefinitely. Permanent impacts would permanently alter a resource and/or result in permanent loss of a resource.

The cumulative impacts analysis area differs for each resource. Per EPA guidance regarding consideration of cumulative impacts in NEPA documents, the selection of geographic boundaries for the analysis areas were based on natural boundaries and areas that sustain the resources of concern (EPA 1999). For example, the analysis area for topography is limited to existing areas of the Decker and Spring Creek mines, whereas the analysis area for soils is larger, encompassing Big Horn County, Wyoming. For surface water resources, the analysis area is based on watershed boundaries. The analysis area for each resource is described below.

5.1 Past, Present, and Reasonably Foreseeable Future Actions

This section identifies past, present, and reasonably foreseeable future actions. Actions considered in these analyses were identified by the lead agency resource specialists as well as from publicly available information.

5.1.1 Agriculture

The project area and surrounding areas have been used and will continue to be used for agricultural purposes, particularly livestock grazing. The source of water for livestock is both surface water and groundwater.

5.1.2 Power Plants

The nearest coal-fired power plants are the Colstrip coal-fired power plant, located about 55 miles north-northeast of the SCM, Rosebud waste coal power plant, located approximately 60 miles north-northeast of the SCM, and the Hardin plant, located about 56 miles northwest of the SCM. The Colstrip power plant consists of 2 generating units (Units 3 and 4) capable of producing 1,480 MW of electricity. The Rosebud power plant is capable of generating 38 MW of electricity from one unit. The Hardin power plant can produce up to 115.7 MW of electricity from one unit. In the larger analysis area, there are a number of other major regional point and area sources including other mines and electric generation facilities.

5.1.3 Mining

Decker Mine is a surface coal mine located approximately 1.5 miles southeast of the project area. Lighthouse Resources, Inc. is the current owner and operator. The permitted mine operations area (approximately 11,718 surface acres) is currently undergoing reclamation. The Absaloka Mine is a surface coal mine located on and adjacent to the Crow Reservation, owned and operated by Westmoreland Resources, Inc. The mine is located approximately 45 miles northwest of the SCM. The permitted mine operations area is approximately 10,427 surface acres. In 2020 the annual coal production was 2.1 Mt. In April 2024, the Absaloka Mine lost its only power plant customer; however, Westmoreland indicated that the Absaloka Mine still has coal reserves and customers (Billings Gazette 2024). The Youngs Creek Mine is owned by NTEC and is located in Wyoming, approximately 7 miles southwest of the SCM. It encompasses approximately 7,822 acres of predominately privately held coal resources and surface rights. Estimated recoverable coal resources are 287 Mt (CPE 2015). The mine is permitted, but there are no current or planned mining operations. The Brook Mine, owned by Ramaco Wyoming Coal, LLC, is permitted by the Wyoming Department of Environmental Quality to mine a maximum of 8 Mtpy of coal using a highwall mining technique. The Brook Mine is located in Wyoming, approximately 15 miles southwest of the SCM and encompasses approximately 4,549 acres of privately held coal resources. Ramaco indicates that initial mine development at the Brook Mine began in the fourth quarter of 2023 and is continuing coal exploration efforts to further define its coal deposits (Ramaco 2024). In May 2023, Ramaco announced the discovery of a rare earth element deposit at the Brook Mine (Ramaco 2023). Ramaco is continuing exploration efforts to further refine the rare earth element deposit. No plans for commercial production have been presented by Ramaco.

5.1.4 Recreation

Recreation in Big Horn County, Montana includes Tongue River Reservoir and hunting and fishing opportunities. No new recreation areas are planned in the reasonably foreseeable future.

5.1.5 Wildland Fires

Past wildland fires can increase runoff and erosion and degrade water quality, can altered habitats, can affects climate change through loss of vegetation and the release of CO_2 and other GHGs into the atmosphere, can result in substantial air pollution, particularly through the release of fine particles. Wildland fires have historically occurred in the vicinity of the SCM and are expected to occur for the reasonably foreseeable future.

5.1.6 Oil and Gas Development

CBNG production in Big Horn County, Montana and Sheridan County, Wyoming has ceased and there is limited oil and gas development.

5.2 Resources

5.2.1 Topography and Physiology

The analysis area for evaluation of the cumulative impacts for topography and physiology includes eastern Big Horn County.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to topography and physiology include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts - 970.8 disturbance acres currently approved)
- Past, present mining and future reclamation at Decker Mine (no new disturbance will be added as the Decker Mine is in reclamation phase)

The cumulative effects are related to the amount of physical disturbance occurring within Big Horn County which would alter the topography and physiology. Other than ongoing mining at the SCM and reclamation at Decker Mine no other past, present, or future surface disturbing actions occur within the county. The cumulative impacts on topography and physiology in the study area resulting from past, present, and reasonably foreseeable future actions is small.

The amount of additional disturbance associated with each of the alternatives included in this EIS is discussed in Section 2.2. The greatest amount of additional disturbance would occur under Alternatives 1 and 3. There would be no additional disturbance from Alternative 4. Alternatives 1, 2, and 3 would have a small incremental effect on topography and physiology when added to the small cumulative topography and physiology impacts. There would be no additional cumulative effects to topography and physiology of the area from Alternative 4.

5.2.2 Geology, Mineral Resources, and Paleontology

The analysis area for evaluation of the cumulative impacts for geology, mineral resources, and paleontology includes eastern Big Horn County, Montana and northern Sheridan County, Wyoming.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to geology, mineral resources, and paleontology include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts - 970.8 disturbance acres currently approved)
- Past, present mining and future reclamation at Decker Mine (no new disturbance will be added as the Decker Mine is in reclamation phase)
- Past, present mining and future reclamation at the Brook Mine (1,135 acres of proposed disturbance)

Due to the contained nature of impacts to geology, the cumulative impacts on geology in the study area resulting from past, present, and reasonably foreseeable future actions is small. The cumulative effects to this resource would primarily be associated with past and present mining at the SCM, past mining at the Decker Mine, and future mining at the Brook Mine. The amount of additional disturbance associated with each of the alternatives included in the EIS is discussed in Section 2.2. The greatest amount of additional disturbance would occur under Alternatives 1 and 3. Alternatives 1, 2, and 3 would contribute to moderate and permanent cumulative impacts to the geology of the area. There would be no additional cumulative effects from Alternative 4. All of the alternatives would have a small incremental effect on geology when added to the small cumulative geology impacts.

As described in Section 3.3.2.2 of this EIS CBNG production in Big Horn County has ceased and there is limited oil and gas development. Cumulative impacts on mineral resources in the study

area are small based on past activities. When added to the small cumulative mineral resource impacts Alternatives 1,2, 3, and 4 would have a negligible incremental effect on mineral resources.

Due to the contained nature of impacts to paleontology, the cumulative impacts in the study area resulting from past, present, and reasonably foreseeable future actions is negligible. The cumulative effects to this resource would primarily be associated with large surface disturbing actions like mining and reclamation at the SCM, the Decker Mine, and the Brook Mine. No unique or significant paleontological resources have been identified or are suspected to exist in the SCM and the likelihood of encountering significant paleontological resources is very small. Therefore, Alternatives 1, 2, 3, and 4 would result in negligible incremental effect, but permanent, cumulative impacts to the paleontological resources of the area.

5.2.3 Air Quality

The analysis area for evaluation of the cumulative impacts for air quality includes Big Horn and Rosebud counties, Montana and Sheridan County, Wyoming.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to geology, mineral resources, and paleontology include the following:

- Past, present, and future mining and reclamation
- Past, present mining and future emissions from the Hardin, Rosebud, and Colstrip power plants
- Past, present mining and future wildland fires

5.2.3.1 Cumulative Air Quality Impacts from Mining

The cumulative effects from mining include effects from emissions related to coal excavation and reclamation activities and tailpipe emissions from equipment. As discussed in the Miles City Field Office Supplemental EIS (SEIS), southeast Montana (including Big Horn and Rosebud counties) has met all NAAQS standards for sites within the planning area from 2017 to 2021. Outside of past and present activities within the study area, the only and reasonably foreseeable future action is the Brook Mine. Based on this, the cumulative impacts on air quality from mining in the study area resulting from past, present, and reasonably foreseeable future actions is small.

Cumulative impacts from air quality could be higher in the short term in the study area due to coal mining and electrical generation activities if surface inversion occurs in the region or if wildland fires occur. These impacts would be temporary, lasting the duration of the inversion or until the fire is extinguished.

The cumulative effects from particulate matter emissions related to Alternatives 1, 2, and 3 would result in a small incremental effect when added to the small cumulative impacts to air quality Alternative 4 would have a negligible incremental effect when added to the small cumulative air quality impacts from mining.

5.2.3.2 Cumulative Air Quality Impacts from Transportation Diesel Emissions

The cumulative effects from transportation diesel emissions includes equipment, vehicles, and locomotives in the study area. The impacts of diesel emissions vary depending on location, as well as meteorological conditions. Effects would likely be most noticeable near populated areas, where diesel emissions from mining would combine with diesel emissions from other past, present, and reasonably foreseeable transportation modes that use fossil fuel combustion. Based on this, the cumulative impacts on air quality from transportation diesel emissions in the study area resulting from past, present, and reasonably foreseeable future actions is small.

Diesel emissions related to the alternatives included in the EIS are discussed in Section 4.4.3.1. A comparison of the Alternative 1 (the alternative with the potential to contribute the largest

amount of diesel emissions) transportation emissions to the 2020 national transportation emissions shows that this alternative would contribute a small percentage of emissions to each transportation segment. Alternatives 1, 2, and 3 would increase coal production, leading to an associated increase of cumulative impacts to from diesel emissions.

The cumulative effects from diesel transportation emissions related to Alternatives 1, 2, and 3 are expected to have a small increment effect when added to the small cumulative impacts to air quality from transportation diesel emissions. Alternative 4 would have a negligible incremental effect when added to the small cumulative air quality impacts from transportation diesel emissions.

5.2.3.3 Coal Combustion

The cumulative effects from coal combustion within the study area is related to the three power plants located within the study area. Past and present air quality within the study area indicate that NAAQS are being met. Past, present, and reasonably foreseeable future actions would have a small cumulative impact on air quality due to coal combustion. Alternatives 1 through 4 would have a negligible incremental impact on the small cumulative impacts within the study area since these alternatives do not contribute to coal combustion.

Since coal from Alternatives 1, 2, and 3 will be burned at power plants outside of the study area, this analysis also includes a general evaluation of cumulative air quality impacts. The cumulative effects from coal combustion are localized for air/mercury deposition and global for GHGs. Various government agencies continually monitor ambient air quality to ensure maintenance of acceptable conditions and progress toward improvement where conditions are unacceptable. These multiple regulatory restrictions and monitoring programs address and minimize cumulative air quality impacts from coal combustion. Overall, coal combustion can have a moderate to significant cumulative impact depending on the geographic location.

5.2.3.4 Climate Change

Section 4.4.5 includes a detailed discussion on climate change and GHGs for each of the alternatives. There are currently no set specific thresholds for allowable GHG emissions, therefore, it is not possible to determine if any of the alternatives would significantly impact global GHG emissions on their own; however, all anthropogenic GHG emissions may cumulatively have a significant impact on global climate change.

5.2.4 Hydrology

5.2.4.1 Groundwater

The analysis area for evaluation of the cumulative impacts for groundwater is the Tongue River drainage basin.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to groundwater include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future mining and reclamation at the Brook Mine
- Past CBNG production

The past and present actions within the cumulative groundwater study area have resulted in elevated TDS in some groundwater as a result of recharge to backfilled material. In addition, groundwater pumping from past and present actions (e.g., mining and CBNG) has lowered water levels in the area. Reasonably foreseeable future actions within the cumulative groundwater study

area will continue to impact water quality and water levels. The cumulative impacts on groundwater in the study area resulting from past, present, and reasonably foreseeable future actions is small.

Alternatives 1, 2, and 3 would result in moderate incremental impacts to the cumulative groundwater study area. Alternative 4 would have a negligible incremental impact on the small cumulative groundwater impacts.

5.2.4.2 Surface Water

The analysis area for evaluation of the cumulative impacts for surface water is the Tongue River drainage basin.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to groundwater include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future mining and reclamation at the Brook Mine
- Past, present, and future agricultural activities, primarily livestock grazing
- Past, present, and future wildland fires

Past and present actions within the cumulative surface water study area have disturbed surface water channels. In addition, surface disturbing activities, agriculture, and wildland fire have resulted in surface erosion, which has the potential to increase TDS in surface waters downstream. Reasonably foreseeable future actions within the cumulative surface water study area will continue to impact water quality. The cumulative impacts on surface water in the study area resulting from past, present, and reasonably foreseeable future actions is small.

Alternatives 1, 2, and 3 would result in moderate incremental impacts to the cumulative surface water study area due to the additional disturbance that will occur. Alternative 4 would have a negligible incremental impact on the small cumulative groundwater impacts.

5.2.4.3 Water Rights

The analysis area for evaluation of the cumulative impacts for water rights is the Tongue River drainage basin.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to groundwater include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future mining and reclamation at the Brook Mine
- Past, present, and future agricultural activities, primarily livestock grazing
- Past CBNG

Past, present, and reasonably foreseeable future actions have had and will continue to have a moderate cumulative impact on groundwater rights within the study area. Dewatering for CBNG, mining, and agricultural activities have reduced the amount of groundwater that can be pumped from nearby wells in the vicinity of these activities. Reclamation at the mines has and will continue to have the potential to increase concentrations of TDS in groundwater; however, the suitability of groundwater for beneficial use has not and should not change. Overall, cumulative impacts to groundwater rights within the study area are small and limited to areas near the mines.

Alternatives 1 through 4 will have a moderate incremental effect when added to the small cumulative impacts within the study area.

Surface water rights in Wyoming are controlled by the State Engineers Office and in Montana by the DNRC). The majority of existing surface water rights within the study area are old and associated with irrigation and livestock watering. Past, present, and reasonably foreseeable future actions have had and will continue to have a negligible cumulative impact to surface water rights within the study area. Similarly, Alternatives 1 through 4 would have a negligible incremental effect on the negligible cumulative impact to surface water rights within the study area.

5.2.5 Soil

The analysis area for evaluation of the cumulative impacts to soils includes eastern Big Horn County, Montana

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts - 970.8 disturbance acres currently approved)
- Past, present mining and future reclamation at Decker Mine (no new disturbance will be added as the Decker Mine is in reclamation phase)

Past and present actions of soil salvage, stockpiling, and replacement of soils associated with mining at the SCM and Decker Mine have increased erosion rates and reduced soil productivity in comparison to the undisturbed areas of the mines. In accordance with the mine permits, much of the previously disturbed areas within each mine boundary have been reclaimed, which includes filling and grading, replacing topsoil, and revegetating. Reasonably foreseeable future actions will continue to disturb soils and increase erosion and soil productivity at the SCM, while reclamation will continue at Decker Mine. In addition, past actions including roads, powerlines, rail lines, and other infrastructure have disturbed soils and will likely continue to disturb small areas. Overall, the cumulative soil impacts within the study area are moderate.

Alternatives 1, 2, 3, and 4 would add a small incremental impact to the moderate cumulative impacts to soils within the study area. There would be no additional cumulative impacts from Alternative 4.

5.2.6 Vegetation

The analysis area for evaluation of the cumulative impacts to vegetation includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to soils include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts - 970.8 disturbance acres currently approved)
- Past, present mining and future reclamation at Decker Mine (no new disturbance will be added as the Decker Mine is in reclamation phase)
- Past, present, and future agricultural practices, including livestock grazing
- Past, present, and future wildland fires

Agriculture within Big Horn County, Montana consists mostly of grazing lands. Continued agriculture activities will continue to alter vegetation within the study area and may increase noxious and invasive weeds within the study area. Wildland fires have altered and eliminated vegetation in some areas within the study area. Wildland fires can potentially increase introduced or noxious weed species if a seed source for those invasive species is present. Wildland fires can also remove existing invasive species and allow for an increase in native species or new vegetation communities, such as that of the conifer/sumac complex present in the project area. Fires also

can add nutrients to the soil for vegetation and kill insect pests that may be killing native vegetation. Fires are part of the natural ecosystem, and many native plant communities are accustomed to periodic fires. Periodic wildland fires could contribute both beneficial and adverse cumulative impacts on vegetation. Past, present, and future mining at SCM will continue to have an adverse impact on vegetation until reclamation has reestablished vegetative communities. Based on this, the cumulative vegetation impacts within the study area are small.

Alternatives 1, 2, and 3 will have a moderate incremental impact to the small cumulative impacts to the vegetation within the study area. There would be no additional cumulative impacts from Alternative 4.

5.2.7 Wildlife

The analysis area for evaluation of the cumulative impacts to wildlife is eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to soils include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future agricultural practices, including livestock grazing
- Past, present, and future recreation
- Past, present, and future wildland fires

5.2.7.1 Big Game

Cumulative impacts to big game from past, present, and reasonably foreseeable future actions could include habitat loss, restrictions in seasonal and daily movement caused by railroads, access roads, and mining operations, poaching, urban development, range overuse, possible lack of water sources, and increased road kills. Past, present, and future recreation within the study area has likely deterred wildlife from highly visited areas. Past, present, and future wildland fires have likely changed or eliminated habitat components in the burn areas. General reclamation practices for establishing or enhancing post-mine wildlife habitat are included in the Reclamation Plans for each mine. In addition, SCM also has developed a separate HRRP for the GRSG, which is a species of particular interest in the region. Because there is overlap between the big game winter range and the GRSG habitat areas, the reclamation of any GRSG habitat outlined the specific HRRP would fulfill the reclamation requirements for mule deer and pronghorn and would provide quality habitat for big game The cumulative impacts to big game within the study area are small.

Alternatives 1, 2, and 3 would result in a moderate incremental contribution to the small cumulative impacts to the big game within the study area. There would be no additional cumulative impacts from Alternative 4.

5.2.7.2 Raptors

Potential cumulative impacts to raptors from past, present, and reasonably foreseeable future actions include loss of nesting and foraging habitat, collisions with structures and vehicles, nest abandonment and reproductive failure due to increased human activities, reduction in prey populations, and displacement of birds into adjacent areas. Past, present, and future recreation within the study area has likely deterred raptors from highly visited areas. Past wildland fires likely changed or eliminated habitat components in the burn areas. Approved mine permits include regulations specifying mitigation measures for raptors, including minimization of disturbance, reclamation of habitats, and raptor-safe power line construction. The measures specified in mining permits and enforced by MDEQ ensure compliance with the Migratory Bird Treaty Act, the Bald

and Golden Eagle Protection Act, and the ESA, thereby ensuring regional impacts to those protected wildlife species would be minor. Based on this, cumulative impacts to raptors within the study area are small.

Alternatives 1, 2, and 3 would result in moderate incremental impact to the small cumulative impacts to the raptors in the study area. There would be no additional cumulative impacts from Alternative 4.

5.2.7.3 Greater Sage-grouse

Cumulative impacts to GRSG from past, present, and reasonably foreseeable future actions could include habitat loss and restrictions in seasonal and daily movement caused mining operations. The cumulative effects to this resource would primarily be linked to the existing SCM and the adjacent Decker Mine. Past wildland fires likely changed or eliminated habitat components in the burn areas.

A wildlife conservation strategy for the SCM was developed in collaboration with the USFWS, other state and federal agencies, and many other stakeholders in the region that would benefit numerous special interest species, including GRSG. SCM would implement a variety of conservation measures both on and off-property, with special emphasis in habitats identified as Conservation Priority Areas (e.g., GRSG core areas, occupied short-grass prairie habitats, etc.) throughout the coverage area. These voluntary measures include a wide variety of land management actions that are designed to avoid or minimize impacts, and to restore, enhance, and/or maintain habitat benefiting one or more of the targeted species, including GRSG. Alternatives 1, 2, and 3 would result in moderate incremental impact to the small cumulative impacts to the GRSG of the study area. There would be no additional cumulative impacts from Alternative 4.

5.2.7.4 T&E Species and other Species of Special Interest

Because no T&E species or habitats critical to T&E species have been documented within the project area, this project would have negligible and short-term cumulative impacts to T&E species. The cumulative impacts to other SOSI would be minor and result in long-term loss of habitat for SOSI.

5.2.8 Ownership and Use of Land

The analysis area for evaluation of the cumulative impacts to ownership and use of the land includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to ownership and use of the land include the following:

- Past, present, and future agricultural activities, primarily livestock grazing
- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine

The cumulative effects on ownership and use of the land from past, present, and reasonably foreseeable future actions include a reduction of livestock grazing and subsequent revenues, a reduction in habitat for some species of wildlife (particularly pronghorn, GRSG, and mule deer), and loss of recreational access to public lands (particularly for hunters). Mine boundaries within the study area have the biggest impact on use of land since livestock grazing and hunting are restricted within the permit boundaries. Overall, cumulative impacts on ownership and use of land are small within the study area.

Because the Decker Mine is undergoing reclamation, the amount of additional disturbance contributing to the cumulative effects to these resources will decrease as reclamation is completed and lands become available for alternate uses. Wildlife (particularly big game) use

would be displaced while the tracts are being mined and reclaimed. Livestock grazing has already been prohibited due to the tracts being inside permit boundaries and adjacent to active mining areas. Hunting on the tracts is currently not allowed because they are within mine permit boundaries and would continue to be disallowed during mining and reclamation. Following reclamation, the land would be suitable for grazing and wildlife uses, which are the historic land uses. The amount of additional disturbance associated with each of the alternatives included in the EIS is discussed in Section 2.2. The greatest amount of additional disturbance would occur under Alternatives 1 and 3. There would be no additional disturbance from Alternative 4.

Alternatives 1, 2, 3, and 4 would result in moderate incremental impact to the small cumulative ownership and use of the land impacts within the study area. There would be no additional disturbance from Alternative 4.

5.2.9 Cultural Resources

The analysis area for evaluation of the cumulative impacts to cultural resources includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to cultural resources include the following:

- Past, present, and future agricultural activities, primarily livestock grazing
- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future wildland fires

Past, present, and reasonably foreseeable agricultural development of surrounding lands has the potential to result in ground disturbances and may affect the integrity of buried archeological sites as well as known and unknown historic properties. Past and future wildland fires in and around the project area have had and will continue to have the potential to destroy historic artifacts and properties, resulting in cumulative impacts on cultural resources. Overall, cumulative impacts to cultural resources within the study area is small.

Since SCM is required to evaluate cultural resource sites and avoid or mitigate all unavoidable disturbance to NRHP eligible sites, the cumulative effects to cultural resources have been minor. The cumulative impacts on cultural resources from Alternatives 1, 2, and 3 would have a minor impact when added to the small cumulative impacts. There would be no additional cumulative impacts from Alternative 4.

5.2.10 Visual Resources

The analysis area for evaluation of the cumulative impacts to visual resources includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to cultural resources include the following:

- Past, present, and future agricultural activities, primarily livestock grazing
- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future wildland fires

Cumulative resource visual resource impacts from past, present, and reasonably foreseeable future actions include removal of vegetation and exposure of soil, as well as changes to the contour of the landscape. Wildland fire also has impacted visual resources by burning the shrubs, grasses,

and trees in the area and leaving large swaths of blackish charred areas with some burned stumps remaining. The visual impacts from wildland fires would continue until the burned areas have become naturally revegetated over the next several years. The greatest visual impact in this area is the visibility of mine pits and facility areas. After mining, the reclaimed slopes might appear somewhat smoother than premining slopes and there would be fewer gullies, bluffs, and rock outcrops than at present. Cumulative impacts on visual resources within the study area is small.

Alternatives 1, 2, 3, and 4 would result in moderate increment to the small cumulative visual resource impacts in the study area.

5.2.11 Noise

The analysis area for evaluation of the cumulative impacts to noise includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts to cultural resources include the following:

- Past, present, and future mining and reclamation at the SCM (outside of the LBA1 tracts)
- Past, present mining and future reclamation at Decker Mine
- Past, present, and future recreation

Past, present, and reasonably foreseeable future actions that have caused and will continue to cause noise within the study area include recreation, transportation, and mining. Recreation and transportation noises are temporary and would dissipate quickly, while mining noises occur for the duration of the mine. Wildlife in the immediate vicinity of the noise may be adversely affected by noise; however, observations at the SCM indicate that wildlife generally adapt to noise conditions associated with activities. While recreational users, local residents, and grazing lessees using lands surrounding active mining areas do hear mining-related noise, this has not been reported to cause a substantial impact. Mining-related noise is generally masked by the wind at short distances, so cumulative overlap of noise impacts would primarily be linked to the existing SCM and the adjacent Decker Mine. Overall, the cumulative noise impact for the study area is small.

Alternatives 1, 2, 3, and 4 would result in moderate increment to the small cumulative impacts from noise in the study area.

Guideline criteria for evaluating rail-related noise and vibration effects are based on existing rail traffic on rail line segments. As discussed in Section 4.15.1.1 of this EIS, rail transport is forecast to slightly increase. Noise and vibration effects of future actions related to rail operations will be evaluated by FRA, STB, and/or other permitting authorities in the context of existing regulations. Avoidance, minimization, and mitigation measures will be adopted in association with approvals, as needed, to reduce rail-related noise effects to acceptable levels and avoid major impacts related to noise and vibration. Examples include, but are not limited to, wheel treatments to reduce wheel/rail interaction, use of sound barriers, use of wayside horns versus locomotive horns, stringent noise specifications for grade-crossing signals and equipment, operational restrictions lowering speed and reducing nighttime operations) and use of ballast versus concrete for guideways to improve ground absorption of noise (FTA 2006). The cumulative impacts from Alternatives 1, 2, and 3 related to noise from rail transport would be moderate. There would be no additional cumulative impacts from Alternative 4.

5.2.12 Transportation

The analysis area for evaluation of the cumulative impacts on transportation includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts on transportation include the following:

- Recreation activities in the area
- Agricultural operations
- Past, present, and future mining and reclamation at the SCM
- Past, present mining and future reclamation at Decker Mine
- Past, present mining and future reclamation at the Brook Mine

Past, present, and reasonably foreseeable future actions have contributed to and will continue to wear and tear on existing roads, additional air emissions and fugitive dusts, greater noise, and increased risk of vehicle collisions with livestock, wildlife, and other vehicles. Local, regional, and national transportation facilities are already in place and future coal production levels are not expected to change. Cumulative transportation impacts in the study area are small.

The annual rail traffic generated by the Alternatives 1, 2, or 3 represents a small fraction of the total U.S. rail freight traffic so the cumulative effects related to transportation would be minor but extended to out to 2039 under these alternatives. There would be no additional cumulative impacts from Alternative 4.

Coal dust would combine with dust generated from other past, present, and reasonably foreseeable future coal haulage. Continued application of BNSF's Coal Loading Rule (BNSF 2015, 2017) ensures that coal dust emissions are minimized on BNSF-owned and operated rail lines, thereby minimizing the potential for coal-dust related emissions and subsequent deposition to soil and water. Increases to port capacity are not foreseeable, so the future rate of coal transport on the main routes would not change significantly from recent shipping rates. Based on this and the findings of evaluations for other rail transport projects (WDOE and Cowlitz County 2017, STB 2015), project-related coal dust emissions, dispersion, and deposition would result in negligible long-term cumulative effects from coal transport on public health, ecological health, collisions with T&E species, dust, noise, and vibration.

Alternatives 1, 2, and 3 would result in minor and short-term cumulative impacts from coal dust. There would be no coal dust generated from Alternative 4.

5.2.13 Hazardous and Solid Waste

The analysis area for evaluation of the cumulative impacts from hazardous and solid wastes includes eastern Big Horn County, Montana.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts from hazardous and solid wastes include the following:

- Past, present, and future mining and reclamation at the SCM
- Past, present mining and future reclamation at Decker Mine

Past, present, and reasonably foreseeable future actions have generated and will continue to generate hazardous and solid wastes within the study area. Hazardous and solid wastes generated in the study area are disposed of at landfills in Hardin, Montana and Sheridan, Wyoming. It is anticipated that future hazardous and solid waste will continue to be disposed of at these locations. Cumulative hazardous and solid waste impacts within the study area are small.

Mining activities would generate hazardous, non-hazardous, hazardous, and universal wastes. Non-hazardous solid waste would continue to be shipped to local municipal landfills in Hardin, Montana and Sheridan, Wyoming. The only wastes disposed of onsite would continue to be wastes such as abandoned mining machinery, non-greasy wood, used tires, concrete, and other items permitted under the mines' existing MDEQ or WDEQ permits to mine. Hazardous waste and non-hazardous waste such as used grease and used antifreeze would continue to be incinerated for energy recovery at an off-site EPA-permitted facility. Universal wastes including used batteries,

electronic waste, and used light bulbs would continue to be shipped off-site for recycling. No solid waste is deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites (Spring Creek Coal Company 2014).

Alternatives 1, 2, and 3 would result in minor incremental impact to the small cumulative impacts from hazardous and solid wastes in the study area. There would be no additional hazardous wastes generated from Alternative 4.

5.2.14 Socioeconomics

The analysis area for evaluation of the cumulative impacts on socioeconomics includes eastern Big Horn County, Montana and Sheridan County, Wyoming.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts on socioeconomics include the following:

- Agricultural operations
- Past, present, and future mining and reclamation at the SCM
- Past, present mining and future reclamation at Decker Mine
- Past, present mining and future reclamation at the Brook Mine

The traditional major industries of coal mining and agriculture (ranching and farming) that have been and are the driving forces of the area's economy would likely continue into the future. Past and present mining at the SCM and Decker Mine have resulted in the loss of potential agricultural lands and economic productivity associated with agriculture. It should be noted that this loss of potential agricultural lands is temporary, as mined areas are reclaimed and returned to post-mine land use. Future mining at SCM and Brook Mine would continue to have a beneficial impact to the State of Montana revenues (royalties, severance tax, gross proceeds tax, and resource indemnity trust tax) and federal revenues (royalties, black lung tax, and federal recreation tax). The cumulative socioeconomic impact to the study area is moderate.

Alternatives 1, 2, and 3 would result in minor positive incremental impact to the moderate cumulative socioeconomic impacts. There would be no additional cumulative impacts generated from Alternative 4.

5.2.15 Environmental Justice

The analysis area for evaluation of the cumulative environmental justice impacts includes Big Horn County, Montana and Sheridan County, Wyoming.

Related past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts on socioeconomics include the following:

- Agricultural operations
- Past, present, and future mining and reclamation at the SCM
- Past, present mining and future reclamation at Decker Mine
- Past, present mining and future reclamation at the Brook Mine

Economic and demographic data presented in Section 4.18 indicate that no environmental justice concerns are present in the Study Area. Therefore, none of the Alternatives considered would contribute to cumulative environmental justice impacts.

6.0 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

OSMRE has determined that the No Action alternative is the environmentally preferable alternative that will best promote the national environmental policy expressed in Section 101 of NEPA. As outlined in Section 2.2.4, under the No Action alternative, the Federal mining plan modification for the LBA1 tracts would not be approved and SCM would no longer be able to mine Federal coal in the LBA1 tracts. SCM would be required to apply for and receive all appropriate approvals to fully reclaim any disturbed areas according to its current approved mining and reclamation permit but no additional LBA1 coal removal would be allowed. Aside from impacts related to reclaiming areas within LBA1 that have already been disturbed by mining, the No Action alternative will not cause additional adverse environmental effects from ground disturbances or coal removal, including effects on topography, geology, mineral resources, paleontology, air quality, hydrology, soil, vegetation, wildlife, cultural resources, visual resources, or noise. Similarly, because additional mining would not be allowed in the LBA1 tracts, the No Action Alternative would also be the only alternative that would not contribute to additional global greenhouse gas emissions from the removal or combustion of additional LBA1 coal. Alternatives 1, 2, and 3, would all authorize further mining with the related environmental consequences outlined in chapters 4 and 5. For these reasons, OSMRE has determined that the No Action alternative is the environmentally preferable alternative.

7.0 CONSULTATION AND COORDINATION

7.1 Public Comment Process

OSMRE developed a project specific website that provided legal notices, outreach notice letters, mailing address, and an email address for comments to be sent. The website can be accessed at https://www.osmre.gov/laws-and-regulations/nepa/projects.

OSMRE issued a NOI to prepare an EIS in the Federal Register and announced the NOI through a news release and on its website on March 17, 2022. The scoping period began on March 17, 2022, and ended April 15, 2022. OSMRE mailed letters to federal agencies, state agencies, tribes, counties, municipalities and conservation districts, non-government organizations, and individuals on March 17, 2022.

During the public scoping period, OSMRE hosted a virtual public scoping meeting on March 31, 2022, via Zoom. The public was provided the opportunity to comment on the project via mail, email, and/or during the virtual meeting.

7.2 Preparers and Contributors

OSMRE personnel that contributed to the development of this EIS are listed in Table 7.2-1 and third party contractors who contributed to the development of this EIS are identified in Table 7.2-2.

Table 7.2-1. OSMRE Personnel

Name	Organization	Project Responsibility
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Logan Sholar	OSMRE	Project Lead/Project Coordination
Roberta Martinez Hernandez	OSMRE	Air Quality, Climate Change
Stephanie Hamlett	OSMRE	Environmental Protection Specialist
Christine Allen	OSMRE	NEPA Coordinator

Table 7.2-2. Third Party Contractor Personnel

Name	Organization	Project Responsibility	Education/Experience
Beth Wilson	WWC Engineering	Project Manager, Primary Author	NEPA Specialist
Kim Venton	WWC Engineering	Hydrology	Hydrogeologist
Kyna Christensen	WWC Engineering	Hydrology, Ecology	Environmental Scientist
John Berry	WWC Engineering	QAQC	Wildlife Biologist
Rodney Ventling	WWC Engineering	AutoCAD	A.S. Engineering

7.3 Distribution of the EIS

This EIS will be distributed to individuals who specifically request a copy of the document. It will also be made available electronically on the OSMRE website at:

https://www.osmre.gov/laws-and-regulations/nepa/projects.

8.0 REFERENCES

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APPENDIX A

CALCULATIONS OF TRANSPORTATION DIESEL EMISSIONS, COAL COMBUSTION EMISSIONS, AND GREENHOUSE GAS EMISSIONS

2018	Tons Shipped	Percent of Shipments	Number of Trips[2]	Round-trip Rail Miles[1]	Total Rail Miles
DTE-BRSC Shared Storage	3,756,426	27%	241	2,064	497,004
TransAlta Centralia Generation (WA)	2,361,244	17%	151	2,400	363,268
Clay Boswell (MN)	659,895	5%	42	1,954	82,656
Coronado Generating Station (AZ)	563,243	4%	36	2,876	103,839
Hoot Lake (MN)	326,360	2%	21	1,660	34,728
Presque Isle (WI)	260,860	2%	17	2,064	34,514
Sub-total (from USEIA)	*7,928,028*	58%	508	13,018	1,116,009
Asia	4,503,000	33%	289	3,000	865,962
Additional Shipments (information not publicly available)	1,337,027	10%	86	2,196	188,210
TOTAL	**13,768,055**	**100%**	**883**	**18,214**	**2,170,181**

2020	Tons Shipped	Percent of Shipments	Number of Trips[2]	Round-trip Rail Miles[1]	Total Rail Miles
DTE-BRSC Shared Storage	1,879,560	20%	120	2,064	248,680
TransAlta Centralia Generation	1,959,814	21%	126	2,400	301,510
Clay Boswell (MN)	908,001	10%	58	1,954	113,733
Coronado Generating Station (AZ)	313,995	3%	20	2,876	57,888
Sub-total (from USEIA)	*5,061,370*	53%	324	9,294	721,811
Japan	531,862	6%	34	3,000	102,281
Korea	2,687,618	28%	172	3,000	516,850
Additional Shipments (information not publicly available)	1,232,406	13%	79	2,225	175,756
TOTAL	**9,513,255**	**100%**	**610**	**17,519**	**1,516,697**

Conversion Factors & Constants

Value	Units and Notes
453.6	g/lb
2,544	Btu/hp-hr
137,000	Btu/gas diesel; diesel fuel energy content (EPA 1995)
0.39	fraction of usable power, calculated
2,000	lb/ton

100-Yr Global Warming Potentials (unitless) (IPCC AR6 WGI Chapter 7, Table 7.15)

1	CO2
29.8	CH4
273	N2O

20-Yr Global Warming Potentials (unitless) (IPCC AR6 WGI Chapter 7, Table 7.15)

1	CO2
82.5	CH4
273	N2O

Train and Transport Characteristics

15,350	short tons coal/train (NTEC 2021)
130	cars/train (NTEC 2021)
286,000	lb/car, loaded (BNSF)
143	tons/car, loaded; calculated
18,590	tons/train; loaded train gross weight (without locomotives), calculated
3,240	tons/train; empty train gross weight (without locomotives), calculated
848	ton-mi/gal diesel, loaded gross weight basis
0.0000143	Multiplication Factor to convert PM2.5 to Hg (EPA 2020 National Emissions Inventory Technical Support Document: Locomotives)
0.0010789	Multiplication Factor to convert PM2.5 to As (EPA 2020 National Emissions Inventory Technical Support Document: Locomotives)

Passenger Car	VOC exhaust	CO	NO_x	SO2	PM10 exhaust	CO2	CH4	N2O	Hg	As
emission factor (grams/mile)[1,2,3]	0.1065	2.8547	0.1198	0.0042	0.0076	348.51	0.0116	0.0043	1.60E-09	2.30E-06
gal/mile[4]	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
hp rating	150	150	150	150	150	150	150	150	150	150
average speed (mph)	70	70	70	70	70	70	70	70	70	70
grams/hp-hr	0.0497	1.332193	0.055907	0.00196	0.003547	162.638	0.005413	0.002007	7.47E-10	1.07E-06
lb/hp-hr calculated	1.09E-04	2.93E-03	1.23E-04	4.32E-06	7.81E-06	0.36	1.19E-05	4.42E-06	1.64E-12	2.36E-09
lb/hp-hr AP-42	0.0150	0.0070	0.0110	0.0006	0.0007	1.08				

Diesel Light Truck	VOC exhaust	CO	NO_x	SO2	PM10 exhaust	CO2	CH4	N2O	Hg	As
emission factor (grams/mile)[1,2,3]	0.0716	2.7317	0.2311	0.002	0.005	571.9101	0.092	0.0007	1.60E-09	2.30E-06
gal/mile[4]	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
hp rating	260	260	260	260	260	260	260	260	260	260
average speed (mph)	70	70	70	70	70	70	70	70	70	70
grams/hp-hr	0.019277	0.735458	0.062219	0.000538	0.001346	153.9758	0.024769	0.000188	4.31E-10	6.19E-07
lb/hp-hr calculated	4.25E-05	1.62E-03	1.37E-04	1.19E-06	2.97E-06	0.34	5.46E-05	4.15E-07	9.49E-13	1.36E-09
lb/hp-hr AP-42	0.0025	0.0067	0.0310	0.0021	0.0022	1.15				

[1] - Source: EPA Updated Emission Factors of Air Pollutants from Vehicle Operations in GREETTM Using MOVES (September 2013) https://www.epa.gov/sites/default/files/2020-10/documents/c03s03.pdf
[2] - Particulate phase mercury https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1010TJM.pdf
[3] - EPA CO2 emission factor https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle
[4] - Department of Energy Average Fuel Economy by Major Vehicle Category https://afdc.energy.gov/data/10310

Worker Transport		
Total Employees	256	SCM 2024
Total Employees per Day	192	Assume 75%
No of One-Way Trips per day	384	Assumes 2 one-way trips/day
Passenger Car	192	Assumes 50% use a passenger car to commute
Diesel Light Truck	192	Assumes 50% use a diesel light weight truck to commute
Distance traveled	32	miles (assumes all workers come from Sheridan)
Duration of Operation per Trip	0.5	hr/trip
Passenger Car Operation	35040	hrs/yr
Diesel Light Truck Operation	35040	hrs/yr

Combustion Emissions from Worker Transport (tons/yr)

	VOC exhaust	**CO**	**NO_x**	**SO2**	**PM10 exhaust**	**CO2**	**CH4**	**N2O**	**Hg**	**As**
Worker Commute	0.48	15.09	0.95	0.02	0.03	2486.35	0.28	1.35E-02	8.64E-09	1.24E-05

	CO2	**CH4**	**N2O**	**CO2e**
Actual	2,486.4	0.3	0.01	2,486.6
100-Yr GWP	2,486.4	8.3	3.7	2,498.4
20-Yr GWP	2,486.4	23.1	3.7	2,513.1

One-Way Loaded Train Emissions from Transporting 1 Mt

	Pollutant Specific Emission Factor (g/bhp-hr)	Emissions per 1,000 gallon of Diesel Fuel (tons)	DTE-BRSC Shared Storage (WI)			TransAlta Centralia Generation (WA)			Clay Boswell (MN)			Coronado Generating Station (AZ)			Hoot Lake (MN)			Presque Isle (WI)			Additional Shipments (information not publicly available)			Westshore Terminal			AVERAGE
One-Way Miles			1,032			1,200			977			1,438			830			2,064			1,104			1500			2,309
			Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	Loaded	Empty	Round-Trip	
Criteria Pollutants																										
PM10	0.15	0.0035	5.12	0.89	6.01	5.95	1.04	6.99	4.85	0.84	5.69	7.13	1.24	8.37	4.12	0.72	4.83	10.24	1.78	12.02	5.48	0.95	6.43	7.44	1.30	8.74	6.7
PM2.5	0.14	0.0032	4.78	0.83	5.61	5.55	0.97	6.52	4.52	0.79	5.31	6.66	1.16	7.82	3.84	0.67	4.51	9.55	1.67	11.22	5.11	0.89	6.00	6.94	1.21	8.15	6.3
NOx	5.38	0.1246	183.57	31.99	215.56	213.45	37.20	250.66	173.79	30.29	204.08	255.79	44.58	300.37	147.64	25.73	173.37	367.14	63.99	431.13	196.38	34.23	230.60	266.82	46.50	313.32	241.1
SO2	0.005	0.0001	0.17	0.03	0.20	0.20	0.03	0.23	0.16	0.03	0.19	0.24	0.04	0.28	0.14	0.02	0.16	0.34	0.06	0.40	0.18	0.03	0.21	0.25	0.04	0.29	0.2
CO	1.28	0.0296	43.67	7.61	51.29	50.78	8.85	59.64	41.35	7.21	48.55	60.86	10.61	71.46	35.13	6.12	41.25	87.35	15.22	102.57	46.72	8.14	54.86	63.48	11.06	74.54	57.4
VOCs	0.26	0.0060	8.87	1.55	10.42	10.32	1.80	12.11	8.40	1.46	9.86	12.36	2.15	14.52	7.13	1.24	8.38	17.74	3.09	20.84	9.49	1.65	11.14	12.89	2.25	15.14	11.7
Greenhouse Gases																											
CO2	493.13	11.4163	16,826	2,933	19,759	19,565	3,410	22,975	15,929	2,776	18,706	23,446	4,086	27,532	13,533	2,359	15,891	33,652	5,865	39,517	18,000	3,137	21,137	24,456	4,262	28,719	22,103
CH4	0.04	0.0009	1.36	0.24	1.60	1.59	0.28	1.86	1.29	0.23	1.52	1.90	0.33	2.23	1.10	0.19	1.29	2.73	0.48	3.21	1.46	0.25	1.71	1.98	0.35	2.33	1.8
N2O	0.01	0.0002	0.34	0.06	0.40	0.40	0.07	0.47	0.32	0.06	0.38	0.48	0.08	0.56	0.27	0.05	0.32	0.68	0.12	0.80	0.37	0.06	0.43	0.50	0.09	0.58	0.4
CO2e					19,761			22,977			18,707			27,535			15,893			39,521			21,139			28,722	22,105

			DTE-BRSC Shared Storage (WI)			TransAlta Centralia Generation (WA)			Clay Boswell (MN)			Coronado Generating Station (AZ)			Hoot Lake (MN)			Presque Isle (WI)			Additional Shipments (information not publicly available)			Westshore Terminal			
Total Emissions																											TOTAL
2018 Mt Shipped					3.8			2.4			0.7			0.6			0.3			0.3			1.3			4.5	13.8
Criteria Pollutants																											
PM10					22.6			16.5			3.8			4.7			1.6			3.9			8.6			39.3	101
PM2.5					21.1			15.4			3.5			4.4			1.5			3.7			8.0			36.7	94
NOx					809.8			591.9			134.7			169.2			56.6			140.7			308.3			1410.9	3622
SO2					0.8			0.6			0.1			0.2			0.1			0.1			0.3			1.3	3
CO					192.7			140.8			32.0			40.3			13.5			33.5			73.4			335.7	862
VOCs					39.1			28.6			6.5			8.2			2.7			6.8			14.9			68.2	175
Greenhouse Gases																											
CO2					74221.6			54249.8			12343.7			15507.1			5186.2			12896.8			28260.8			129321.0	331987
CH4					6.0			4.4			1.0			1.3			0.4			1.0			2.3			10.5	27
N2O					1.5			1.1			0.3			0.3			0.1			0.3			0.6			2.6	7
CO2e					74,229			54,255			12,345			15,509			5,187			12,898			28,264			129,334	332021
Total Emissions																											TOTAL
2020 Mt Shipped					1.9			2.0			0.9			0.3									1.2			3.2	9.5
Criteria Pollutants																											
PM10					11.3			13.7			5.2			2.6									7.9			28.1	69
PM2.5					10.5			12.8			4.8			2.5									7.4			26.2	64
NOx					405.2			491.2			185.3			94.3									284.2			1008.7	2469
SO2					0.4			0.5			0.2			0.1									0.3			0.9	2
CO					96.4			116.9			44.1			22.4									67.6			240.0	587
VOCs					19.6			23.7			9.0			4.6									13.7			48.7	119
Greenhouse Gases																											
CO2					37137.4			45026.9			16984.7			8644.9									26049.5			92459.8	226303
CH4					3.0			3.7			1.4			0.7									2.1			7.5	18
N2O					0.8			0.9			0.3			0.2									0.5			1.9	5
CO2e					37141.2			45031.5			16986.4			8645.7			0.0			0.0			26052.1			92469.2	226326.0

BASELINE LOCOMOTIVE EMISSIONS

Year	PM10	PM2.5	NOx	SO2	CO	VOCs	Hg	As	CO2	CH4	N2O	CO2e
2018	101	94	3,622	3	862	175	0.0013	0.102	331,987	27	7	332,021
2020	69	64	2,469	2	587	119	0.0009	0.069	226,303	18	5	226,326

BASELINE LOCOMOTIVE GHG EMISSIONS - 100-YR GWP

Year	CO2	CH4	N2O	CO2e
2018	331,987	802	1,838	334,628
2020	226,303	547	1,253	228,103

BASELINE LOCOMOTIVE GHG EMISSIONS - 20-YR GWP

Year	CO2	CH4	N2O	CO2e
2018	331,987	2,222	1,838	336,047
2020	226,303	1,514	1,253	229,070

LOCOMOTIVE EMISSIONS

Proposed Action

													100 Yr GWP				20 Yr GWP			
	Mt	PM10	PM2.5	NOx	SO2	CO	VOCs	Hg	As	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Baseline	1	6.7	6.3	241.1	0.2	57.4	11.7	1.8	0.4	22,103	2	0.4	22,105	22,103	53	122	22,278	22,103	148	122	22,373
2024	2.2	15	14	531	0	126	26	3.9	1.0	48,626	4	1	48,631	48,626	118	269	49,012	48,626	325	269	49,220
2025	4.51	30	28	1,088	1	259	53	8.1	2.0	99,683	8	2	99,693	99,683	241	552	100,475	99,683	667	552	100,902
2026	4.14	28	26	998	1	238	48	7.4	1.9	91,505	7	2	91,514	91,505	221	507	92,232	91,505	612	507	92,624
2027	4.87	33	31	1,174	1	279	57	8.7	2.2	107,640	9	2	107,650	107,640	260	596	108,496	107,640	720	596	108,956
2028	3.59	24	23	866	1	206	42	6.4	1.6	79,348	6	2	79,356	79,348	192	439	79,979	79,348	531	439	80,319
2029	4.21	28	26	1,015	1	242	49	7.5	1.9	93,052	8	2	93,061	93,052	225	515	93,792	93,052	623	515	94,190
2030	2.51	17	16	605	1	144	29	4.5	1.1	55,477	5	1	55,483	55,477	134	307	55,919	55,477	371	307	56,156
2031	2.51	17	16	605	1	144	29	4.5	1.1	55,477	5	1	55,483	55,477	134	307	55,919	55,477	371	307	56,156
2032	2.51	17	16	605	1	144	29	4.5	1.1	55,477	5	1	55,483	55,477	134	307	55,919	55,477	371	307	56,156
2033	2.51	17	16	605	1	144	29	4.5	1.1	55,477	5	1	55,483	55,477	134	307	55,919	55,477	371	307	56,156
2034	2.51	17	16	605	1	144	29	4.5	1.1	55,477	5	1	55,483	55,477	134	307	55,919	55,477	371	307	56,156
2035	0.78	5	5	188	0	45	9	1.4	0.3	17,240	1	0	17,242	17,240	42	95	17,377	17,240	115	95	17,451
2036	0.78	5	5	188	0	45	9	1.4	0.3	17,240	1	0	17,242	17,240	42	95	17,377	17,240	115	95	17,451
2037	0.78	5	5	188	0	45	9	1.4	0.3	17,240	1	0	17,242	17,240	42	95	17,377	17,240	115	95	17,451
2038	0.78	5	5	188	0	45	9	1.4	0.3	17,240	1	0	17,242	17,240	42	95	17,377	17,240	115	95	17,451
2039	0.78	5	5	188	0	45	9	1.4	0.3	17,240	1	0	17,242	17,240	42	95	17,377	17,240	115	95	17,451
Avg	2.5	16.8	15.7	602	0.6	143.3	29.1	4.5	1.1	55,215	4.5	1.1	55,221	55,215	133	306	55,654	55,215	369	306	55,890
Min	0.78	5.2	4.9	188	0.2	44.7	9.1	1.4	0.3	17,240	1.4	0.3	17,242	17,240	42	95	17,377	17,240	115	95	17,451
Max	4.87	32.7	30.6	1,174	1.1	279	56.8	8.7	2.2	107,640	8.7	2.2	107,650	107,640	260	596	108,496	107,640	720	596	108,956

Partial Mining Alternative (5-Yr Term)

													100 Yr GWP				20 Yr GWP			
	Mt	PM10	PM2.5	NOx	SO2	CO	VOCs	Hg	As	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
Avg	3.86	26.0	24.2	931	0.9	222	45.0	0.0003	0.026	85,360	6.9	1.7	85,369	85,360	206	473	86,039	85,360	571	473	86,404
Min	2.2	14.8	13.8	531	0.5	126	25.6	0.0002	0.015	48,626	3.9	1.0	48,631	48,626	118	269	49,012	48,626	325	269	49,220
Max	4.87	32.7	30.6	1,174	1.1	279	56.8	0.0004	0.033	107,640	8.7	2.2	107,650	107,640	260	596	108,496	107,640	720	596	108,956

Accelerated Mining Rate (18 Mt)

													100 Yr GWP				20 Yr GWP			
	Mt	PM10	PM2.5	NOx	SO2	CO	VOCs	Hg	As	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
2025-2027	18	121	113	4,340	4.0	1,033	210	0.0016	0.122	397,846	32	8	397,887	397,846	962	2,203	401,011	397,846	2,662	2,203	402,711

TERMINAL EMISSIONS

	Mt Coal	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
Emissions from Westshore Terminal	36	88.89	19.11	178.87	8.31	49.68	10.2	20822
	1	2.47	0.53	4.97	0.23	1.38	0.28	578.39

Note: CO2e amounts are consistent with the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR) Global Warming Potential (GWP) values of 1, 21 and 310 for CO2, CH4, and N2O, respectively.

Baseline

Westshore Terminal	Mt Coal	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
2018	5	11	2	22	1	6	1	2,604
2020	3	8	2	16	1	4	1	1,862
MERC Terminal								
2018	4	9	2	19	1	5	1	2,173
2020	2	5	1	9	0.4	3	1	1,087

Proposed Action Seaport Handling

Year	Mt Coal	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
2024	0.70	1.7	0.9	4.6	1.1	1.5	0.4	239
2025	1.44	3.6	1.9	9.4	2.2	3.0	0.8	491
2026	1.32	3.3	1.7	8.6	2.0	2.7	0.8	450
2027	1.56	3.8	2.0	10.1	2.3	3.2	0.9	530
2028	1.15	2.8	1.5	7.5	1.7	2.4	0.7	391
2029	1.35	3.3	1.8	8.8	2.0	2.8	0.8	458
2030	0.80	2.0	1.1	5.2	1.2	1.7	0.5	273
2031	0.80	2.0	1.1	5.2	1.2	1.7	0.5	273
2032	0.80	2.0	1.1	5.2	1.2	1.7	0.5	273
2033	0.80	2.0	1.1	5.2	1.2	1.7	0.5	273
2034	0.80	2.0	1.1	5.2	1.2	1.7	0.5	273
2035	0.25	0.6	0.3	1.6	0.4	0.5	0.1	85
2036	0.25	0.6	0.3	1.6	0.4	0.5	0.1	85
2037	0.25	0.6	0.3	1.6	0.4	0.5	0.1	85
2038	0.25	0.6	0.3	1.6	0.4	0.5	0.1	85
2039	0.25	0.6	0.3	1.6	0.4	0.5	0.1	85
Avg	**0.80**	**2.0**	**1.0**	**5.2**	**1.2**	**1.7**	**0.5**	**272**
Min	**0.25**	**0.6**	**0.3**	**1.6**	**0.4**	**0.5**	**0.1**	**85**
Max	**1.56**	**3.8**	**2.0**	**10.1**	**2.3**	**3.2**	**0.9**	**530**

Approximately 32% shipped to Westshore (overseas)

Proposed Action Great Lakes Terminal Handling

Year	Mt Coal	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
2024	0.53	1.3	0.7	3.4	0.8	1.1	0.3	180
2025	1.08	2.7	1.4	7.0	1.6	2.2	0.6	368
2026	0.99	2.5	1.3	6.5	1.5	2.1	0.6	338
2027	1.17	2.9	1.5	7.6	1.8	2.4	0.7	397
2028	0.86	2.1	1.1	5.6	1.3	1.8	0.5	293
2029	1.01	2.5	1.3	6.6	1.5	2.1	0.6	344
2030	0.60	1.5	0.8	3.9	0.9	1.2	0.4	205
2031	0.60	1.5	0.8	3.9	0.9	1.2	0.4	205
2032	0.60	1.5	0.8	3.9	0.9	1.2	0.4	205
2033	0.60	1.5	0.8	3.9	0.9	1.2	0.4	205
2034	0.60	1.5	0.8	3.9	0.9	1.2	0.4	205
2035	0.19	0.5	0.2	1.2	0.3	0.4	0.1	64
2036	0.19	0.5	0.2	1.2	0.3	0.4	0.1	64
2037	0.19	0.5	0.2	1.2	0.3	0.4	0.1	64
2038	0.19	0.5	0.2	1.2	0.3	0.4	0.1	64
2039	0.19	0.5	0.2	1.2	0.3	0.4	0.1	64
Avg	**0.60**	**1.5**	**0.8**	**3.9**	**0.9**	**1.2**	**0.4**	**204**
Min	**0.19**	**0.5**	**0.2**	**1.2**	**0.3**	**0.4**	**0.1**	**64**
Max	**1.17**	**2.9**	**1.5**	**7.6**	**1.8**	**2.4**	**0.7**	**397**

Approximately 32% shipped to Westshore (overseas)

Partial Mining Alternative Seaport Handling

	Mt	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
Avg	1.2	3.1	1.6	8.0	1.9	2.6	0.7	420.1
Min	0.70	1.74	0.92	4.58	1.06	1.46	0.41	239.3
Max	1.56	3.85	2.04	10.15	2.34	3.23	0.92	529.8

Partial Mining Alternative Great Lakes Terminal Handling

	Mt	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
Avg	0.9	2.3	1.2	6.0	1.4	1.9	0.5	315.1
Min	0.53	1.30	0.69	3.44	0.79	1.10	0.31	179.5
Max	1.17	2.89	1.53	7.61	1.76	2.42	0.69	397.4

Accelerated Mining Rate (18 Mt)

	Mt Coal	PM10	PM2.5	NOx	SO2	CO	VOC	CO2e
32 % of 18 Mt Westshore	5.76	14.2	3.1	28.6	1.3	7.9	1.6	3,332
24% of 18 Mt MERC	4.32	10.7	2.3	21.5	1.0	6.0	1.2	2,499

VESSEL EMISSIONS

Conversion Factors & Constants

Value	ID	Units and Notes
64.07	*A*	g/g-mol; molecular weight of SO2
32.07	*B*	g/g-mol; molecular weight of sulfur
2000	*C*	lb/ton
1.102	*D*	ton/tonne
1.15	*E*	(mi/hr)/knot
453.6	*F*	g/lb

Fleet & Terminal Attributes

196	*G*	ship calls in 2016 (olszewski 2017)
25.8	*H*	million tonnes coal shipped in 2016 from Westshore Terminal
28.4	*I*	Mt coal shipped in 2016 from Westshore, calculated *I = H * D*
0.145	*J*	Mt coal/ship *J = I / G*

2016 Fleet Age Brackets Pertaining to Nox, SO2 and Particulate Emission Regulations

Year Manufactured (Age Bracket)	Number of Ships	Percent of Ships in Fleet
Nox Age Brackets		
<2000	5	3%
2000-2011	79	40%
>2011	112	57%
SO2 and Particulate Emissions Age Brackets		
<2012	113	58%
2012-2020	83	42%
>2020	0	0%

CRITERIA POLLUTANT EMISSIONS CALCULATIONS
Vessel and Transport Characteristics

13120	*K*	kW; average main engine power rating (Man 2014)
0.8	*L*	unitless; average propulsion load under normal cruise speeds (Westshore Terminal LP 2013)
13	*M*	knots; average normal bulk carrier cruise speed (Westshore Terminal LP 2013)
15	*N*	miles/hr; average normal bulk carrier cruise speed, calculated
180	*O*	g fuel/kWh; average fuel consumption rate estimate, main 2-stroke engine (Westshore Terminal LP 2013)
9946	*P1*	2019 round tip miles; approximate weighted average distance between Westshore Terminal and ports in Japan and ROK
10010	*P2*	2020 round tip miles; approximate weighted average distance between Westshore Terminal and ports in Japan and ROK
588	*P3*	MERC Terminal shipments - Great Lakes

PM emission factor equation for engines: EF (g/kWh) = 0.4653(S) + 0.25 (Westshore 2013)
where EF = emission factor; S = % sulfur in fuel

0.4653	*Q*	PM emission factor equation multiplier
0.25	*R*	PM emission factor equation term
0.96	*S*	PM10/PM ratio
0.92	*T*	PM2.5/PM10 ratio
0.0000259		PM2.5 to As multiplication factor (EPA Port Emissions Inventory Guidance, Appendix D (EPA 2022))
0.000125		PM2.5 to Pb multiplication factor (EPA Port Emissions Inventory Guidance, Appendix D (EPA 2022))
4.18E-08		PM2.5 to Hg multiplication factor (EPA Port Emissions Inventory Guidance, Appendix D (EPA 2022))

Nox Emission Limits Outside and ECA

Year Manufactured (Age Bracket)	Nox Emission Limit (g/kWh)
<2000	18.1
2000-2011	17
>2011	14.4

Engine Particulate and SO2 Emission Factors

Year Manufactured (Age Bracket)	Fuel Sulfur (%)	PM10 (g/kWh)	PM2.5 (g/kWh)	SOx (g/kWh)	
Value ID	*FS*	*V*	*W*	*X*	*V = (S * FS * 100 * Q) + R*
<2012	4.50%	2.26	2.08	16.2	*W = V * T*
2012-2020	3.50%	1.81	1.67	12.6	*X = O * FS * (A/B)*
>2020	0.50%	0.47	0.44	1.8	

ESTIMATED CRITERIA POLLUTANT EMISSIONS

Units	Value ID	PM10	PM2.5	NOx	SO2	CO	VOC	As	Hg	Pb
Emission Rate by Engine Power Output (g/kWh)	AA	2.07	1.91	15.54	14.66	1.4	0.6	4.9E-05	8.0E-08	2.4E-04
2018 Total Round-trip Ocean Transport Emissions per 1.0 Mt Coal (tons)	BB	109.8	101.3	824.6	777.9	74.3	31.8	2.6E-03	4.2E-06	1.3E-02
2020 Total Round-trip Ocean Transport Emissions per 1.0 Mt Coal (tons)		110.5	102.0	829.9	782.9	74.8	32.0	2.6E-03	4.3E-06	1.3E-02
Average Ocean Transport Emissions per 1.0 Mt Coal (tons)		110.2	101.7	827.2	780.4	74.5	31.9	2.6E-03	4.2E-06	1.3E-02
2019/2020 Total Round-trip Great Lakes Transport Emissions per 1.0 Mt Coal (tons)		6.5	6.0	48.7	46.0	4.4	1.9	1.6E-04	2.5E-07	7.5E-04

*AA = (EF * AD) + (EF * AD) + (EF * AD)*

*BB = AA/F * K * L / (N * J * C) * P*

Baseline Vessel Emissions (tons)

	Mt Shipped	PM10	PM2.5	Nox	SO2	CO	VOC	As	Hg	Pb
2018 Total Round-trip Ocean Transport	4.5	495	456	3713	3503	335	143	1.2E-02	1.9E-05	5.7E-02
2020 Total Round-trip Ocean Transport	3.2	356	328	2672	2521	241	103	8.5E-03	1.4E-05	4.1E-02
2018 Total Round-trip Great Lakes Transport	3.8	24	23	183	173	16	7	5.8E-04	9.4E-07	2.8E-03
2020 Total Round-trip Great Lakes Transport	1.9	12	11	92	86	8	4	2.9E-04	4.7E-07	1.4E-03

Proposed Action Ocean Vessel Transport Emissions (tons)

Year	Mt Shipped	PM10	PM2.5	Nox	SO2	CO	VOC	As	Hg	Pb
2024	0.7	78	72	582	549	52	22	1.9E-03	3.0E-06	8.9E-03
2025	1.4	159	147	1194	1126	108	46	3.8E-03	6.1E-06	1.8E-02
2026	1.3	146	135	1096	1034	99	42	3.5E-03	5.6E-06	1.7E-02
2027	1.6	172	158	1289	1216	116	50	4.1E-03	6.6E-06	2.0E-02
2028	1.1	127	117	950	897	86	37	3.0E-03	4.9E-06	1.5E-02
2029	1.3	148	137	1114	1051	100	43	3.5E-03	5.7E-06	1.7E-02
2030	0.8	89	82	664	627	60	26	2.1E-03	3.4E-06	1.0E-02
2031	0.8	89	82	664	627	60	26	2.1E-03	3.4E-06	1.0E-02
2032	0.8	89	82	664	627	60	26	2.1E-03	3.4E-06	1.0E-02
2033	0.8	89	82	664	627	60	26	2.1E-03	3.4E-06	1.0E-02
2034	0.8	89	82	664	627	60	26	2.1E-03	3.4E-06	1.0E-02
2035	0.2	28	25	206	195	19	8	6.6E-04	1.1E-06	3.2E-03
2036	0.2	28	25	206	195	19	8	6.6E-04	1.1E-06	3.2E-03
2037	0.2	28	25	206	195	19	8	6.6E-04	1.1E-06	3.2E-03
2038	0.2	28	25	206	195	19	8	6.6E-04	1.1E-06	3.2E-03
2039	0.2	28	25	206	195	19	8	6.6E-04	1.1E-06	3.2E-03
Avg	0.8	88.1	81.3	661.3	623.8	59.6	25.5	2.1E-03	3.4E-06	1.0E-02
Min	0.2	27.5	25.4	206.5	194.8	18.6	8.0	6.6E-04	1.1E-06	3.2E-03
Max	1.6	171.7	158.4	1289.2	1216.2	116.1	49.8	4.1E-03	6.6E-06	2.0E-02

Proposed Action Ocean Vessel Transport Emissions (tons)

Year	Mt Shipped	PM10	PM2.5	Nox	SO2	CO	VOC	As	Hg	Pb
2024	0.5	3	3	26	24	2	1	8.2E-05	1.3E-07	4.0E-04
2025	1.1	7	6	53	50	5	2	1.7E-04	2.7E-07	8.1E-04
2026	1.0	6	6	48	46	4	2	1.5E-04	2.5E-07	7.4E-04
2027	1.2	8	7	57	54	5	2	1.8E-04	2.9E-07	8.8E-04
2028	0.9	6	5	42	40	4	2	1.3E-04	2.2E-07	6.5E-04
2029	1.0	7	6	49	46	4	2	1.6E-04	2.5E-07	7.6E-04
2030	0.6	4	4	29	28	3	1	9.3E-05	1.5E-07	4.5E-04
2031	0.6	4	4	29	28	3	1	9.3E-05	1.5E-07	4.5E-04
2032	0.6	4	4	29	28	3	1	9.3E-05	1.5E-07	4.5E-04
2033	0.6	4	4	29	28	3	1	9.3E-05	1.5E-07	4.5E-04
2034	0.6	4	4	29	28	3	1	9.3E-05	1.5E-07	4.5E-04
2035	0.2	1	1	9	9	1	0	2.9E-05	4.7E-08	1.4E-04
2036	0.2	1	1	9	9	1	0	2.9E-05	4.7E-08	1.4E-04
2037	0.2	1	1	9	9	1	0	2.9E-05	4.7E-08	1.4E-04
2038	0.2	1	1	9	9	1	0	2.9E-05	4.7E-08	1.4E-04
2039	0.2	1	1	9	9	1	0	2.9E-05	4.7E-08	1.4E-04
Avg	0.6	3.9	3.6	29.2	27.6	2.6	1.1	9.3E-05	1.5E-07	4.5E-04
Min	0.2	1.2	1.1	9.1	8.6	0.8	0.4	2.9E-05	4.7E-08	1.4E-04
Max	1.2	7.6	7.0	57.0	53.8	5.1	2.2	1.8E-04	2.9E-07	8.8E-04

Partial Mining Alternative Ocean Vessel Transport Emissions

	Mt	**PM10**	**PM2.5**	**NOx**	**SO2**	**CO**	**VOC**	**As**	**Hg**	**Pb**
Avg	1.2	136.2	125.7	1022.3	964.4	92.1	39.5	3.3E-03	5.3E-06	1.6E-02
Min	0.70	77.57	71.58	582.37	549.39	52.47	22.49	1.9E-03	3.0E-06	8.9E-03
Max	1.56	171.72	158.45	1289.16	1216.16	116.14	49.77	4.1E-03	6.6E-06	2.0E-02

Partial Mining Alternative Great Lakes Vessel Emissions

	Mt	**PM10**	**PM2.5**	**NOx**	**SO2**	**CO**	**VOC**	**As**	**Hg**	**Pb**
Avg	0.9	6.0	5.6	45.2	42.6	4.1	1.7	1.4E-04	2.3E-07	6.9E-04
Min	0.53	3.43	3.16	25.74	24.28	2.32	0.99	8.2E-05	1.3E-07	4.0E-04
Max	1.17	7.59	7.00	56.98	53.75	5.13	2.20	1.8E-04	2.9E-07	8.8E-04

Accelerated Mining Rate Alternative Vessel Emissions

	Mt Shipped	PM10	PM2.5	Nox	SO2	CO	VOC	As	Hg	Pb
Proposed Action Ocean Transport (32% of 18 Mt)	5.8	635	586	4,765	4,495	429	184	1.5E-02	2.4E-05	7.3E-02
Proposed Action Great Lake Transport (24% of 18 Mt)	4.3	28.1	25.9	211	199	19.0	8.1	6.7E-04	1.1E-06	3.2E-03

GREENHOUSE GAS EMISSIONS CALCULATIONS

100-Yr Global Warming Potentials (unitless) (IPCC AR6 WGI Chapter 7, Table 7.15)

1	CO2
29.8	CH4
273	N2O

20-Yr Global Warming Potentials (unitless) (IPCC AR6 WGI Chapter 7, Table 7.15)

1	CO2
82.5	CH4
273	N2O

Factors

3190	HH	kg CO2/tonne fuel; for marine distillate oil (Westshore Terminal LP 2013, pg. 25)
574	II	g CO2/kWh; calculated KK = HH * O * 10^3 / (D *F *C)
0.06	JJ	g CH4/kWh (Westshore Terminal LP 2013, Pg. 25; 2-stroke main engine)
0.07	KK	g N2O/kWh (Westshore Terminal LP 2013, Pg. 25; 2-stroke main engine)
1.27	LL	lb CO2/kWh; calculated *LL = II / F*
0.00013	MM	lb CH4/kWh; calculated *MM = JJ / F*
0.00015	NN	lb N2O/kWh; calculated *NN = KK / F*
3.064	OO	ton CO2/Mt coal/mi; calculated *OO = LL * K * L / (N * J * C)*
0.00032	PP	ton CH4/Mt coal/mi; calculated *OO = LL * K * L / (N * J * C)*
0.00037	QQ	ton N2O/Mt coal/mi; calculated *OO = LL * K * L / (N * J * C)*

	CO2	**CH4**	**N2O**	**Total CO2e**
1 Mt in 2018	30,476	3	4	30,483
1 Mt in 2020	30,672	3	4	30,679
Avg 1 Mt	30,574	3	4	30,581
1 Mt MERC	1,802	0	0	1,802

Baseline

Overseas	**CO2**	***CH4***	**N2O**	**Total CO2e**
2018	137,235	14	17	137,266
2020	98,749	10	12	98,771
MERC				
2018	6,768	1	1	6,770
2020	3,386	0	0	3,387

Baseline – 100-Yr GWP

Overseas	**CO2**	***CH4***	**N2O**	**Total CO2e**
2018	137,235	427	4,566	142,228
2020	98,749	307	3,286	102,342
MERC				
2018	6,768	21	225	7,014
2020	3,386	11	113	3,510

Baseline – 20-Yr GWP

Overseas	**CO2**	***CH4***	**N2O**	**Total CO2e**
2018	137,235	1,183	4,566	142,983
2020	98,749	851	3,286	102,886
MERC				
2018	6,768	58	225	7,052
2020	3,386	29	113	3,528

Proposed Action Ocean Vessel Transport

					100 Yr GWP				20 Yr GWP			
Year	CO2	*CH4*	N2O	**Total CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**
2024	21,524	15	16	21,556	21,524	450	4,494	26,469	21,524	1,247	4,494	27,265
2025	44,125	31	34	44,190	44,125	924	9,212	54,261	44,125	2,557	9,212	55,894
2026	40,505	28	31	40,564	40,505	848	8,457	49,809	40,505	2,347	8,457	51,308
2027	47,647	33	36	47,717	47,647	997	9,948	58,592	47,647	2,761	9,948	60,356
2028	35,124	25	27	35,175	35,124	735	7,333	43,192	35,124	2,035	7,333	44,492
2029	41,190	29	32	41,250	41,190	862	8,600	50,651	41,190	2,387	8,600	52,176
2030	24,557	17	19	24,593	24,557	514	5,127	30,198	24,557	1,423	5,127	31,107
2031	24,557	17	19	24,593	24,557	514	5,127	30,198	24,557	1,423	5,127	31,107
2032	24,557	17	19	24,593	24,557	514	5,127	30,198	24,557	1,423	5,127	31,107
2033	24,557	17	19	24,593	24,557	514	5,127	30,198	24,557	1,423	5,127	31,107
2034	24,557	17	19	24,593	24,557	514	5,127	30,198	24,557	1,423	5,127	31,107
2035	7,631	5	6	7,643	7,631	160	1,593	9,384	7,631	442	1,593	9,667
2036	7,631	5	6	7,643	7,631	160	1,593	9,384	7,631	442	1,593	9,667
2037	7,631	5	6	7,643	7,631	160	1,593	9,384	7,631	442	1,593	9,667
2038	7,631	5	6	7,643	7,631	160	1,593	9,384	7,631	442	1,593	9,667
2039	7,631	5	6	7,643	7,631	160	1,593	9,384	7,631	442	1,593	9,667
Avg	**24,441**	**17.2**	**18.7**	**24,477**	**24,441**	**512**	**5,103**	**30,055**	**24,441**	**1,416**	**5,103**	**30,960**
Min	**7,631**	**5.4**	**5.8**	**7,643**	**7,631**	**160**	**1,593**	**9,384**	**7,631**	**442**	**1,593**	**9,667**
Max	**47,647**	**33.5**	**36.4**	**47,717**	**47,647**	**997**	**9,948**	**58,592**	**47,647**	**2,761**	**9,948**	**60,356**

Approximately 32% shipped to Westshore

Proposed Action Great Lakes Vessel Transport

					100 Yr GWP				20 Yr GWP			
Year	CO2	*CH4*	N2O	**Total CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**
2024	951	1	1	953	951	20	199	1,170	951	55	199	1,205
2025	1,950	1	1	1,953	1,950	41	407	2,398	1,950	113	407	2,470
2026	1,790	1	1	1,793	1,790	37	374	2,201	1,790	104	374	2,268
2027	2,106	1	2	2,109	2,106	44	440	2,590	2,106	122	440	2,668
2028	1,552	1	1	1,555	1,552	32	324	1,909	1,552	90	324	1,966
2029	1,820	1	1	1,823	1,820	38	380	2,239	1,820	105	380	2,306
2030	1,085	1	1	1,087	1,085	23	227	1,335	1,085	63	227	1,375
2031	1,085	1	1	1,087	1,085	23	227	1,335	1,085	63	227	1,375
2032	1,085	1	1	1,087	1,085	23	227	1,335	1,085	63	227	1,375
2033	1,085	1	1	1,087	1,085	23	227	1,335	1,085	63	227	1,375
2034	1,085	1	1	1,087	1,085	23	227	1,335	1,085	63	227	1,375
2035	337	0	0	338	337	7	70	415	337	20	70	427
2036	337	0	0	338	337	7	70	415	337	20	70	427
2037	337	0	0	338	337	7	70	415	337	20	70	427
2038	337	0	0	338	337	7	70	415	337	20	70	427
2039	337	0	0	338	337	7	70	415	337	20	70	427
Avg	**1,080**	**0.8**	**0.8**	**1,082**	**1,080**	**23**	**226**	**1,328**	**1,080**	**63**	**226**	**1,368**
Min	**337**	**0.2**	**0.3**	**338**	**337**	**7**	**70**	**415**	**337**	**20**	**70**	**427**
Max	**2,106**	**1.5**	**1.6**	**2,109**	**2,106**	**44**	**440**	**2,590**	**2,106**	**122**	**440**	**2,668**

Approximately 24% shipped to Merc

Partial Mining Alternative Ocean Vessel Transport Emissions

					100 Yr GWP				20 Yr GWP			
Year	CO2	*CH4*	N2O	**Total CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**
Avg	37,785	27	29	37,840	37,785	791	7,889	46,465	37,785	2,189	7,889	47,863
Min	21,524	15	16	21,556	21,524	450	4,494	26,469	21,524	1,247	4,494	27,265
Max	47,647	33	36	47,717	47,647	997	9,948	58,592	47,647	2,761	9,948	60,356

Partial Mining Alternative Great Lakes Vessel Emissions

					100 Yr GWP				20 Yr GWP			
	CO2	*CH4*	N2O	**Total CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**
Avg	1,670	1	1	1,672	1,670	35	349	2,054	1,670	97	349	2,115
Min	951	1	1	953	951	20	199	1,170	951	55	199	1,205
Max	2,106	1	2	2,109	2,106	44	440	2,590	2,106	122	440	2,668

Accelerated Mining Rate (18 Mt)

					100 Yr GWP				20 Yr GWP			
	CO2	*CH4*	N2O	**Total CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**	**CO2**	**CH4**	**N2O**	**CO2e**
32 % of 18 Mt Overseas	176,108	18	21	176,148	176,108	548	5,860	182,516	176,108	1,518	5,860	183,485
24% of 18 Mt MERC	7,783	1	1	7,785	7,783	24	259	8,067	7,783	67	259	8,110

COAL COMBUSTION EMISSIONS

Conversion Factors

1000000	*A*	µg/g
2000	*B*	lb/ton
1000000	*C*	Btu/MMBtu

Typical SCM Coal Characteristics

Value	ID	Units and Notes
9345	*D*	Btu/lb coal, as received basis (NTEC 2021)
0.33	*E*	wt % sulfur, as received basis (NTEC 2021)
4.16	*F*	wt % ash, as received basis (NTEC 2021)
25.12	*G*	wt % moisture, as received basis (NTEC 2021)
39.25	*H*	wt % carbon, as received basis (NTEC 2021)
0.06	*I*	µg/g mercury (Hg), dry basis (NTEC 2021)
1.61	*J*	µg/g arsenic (Hg), dry basis (NTEC 2021)
1.6	*K*	µg/g lead (Hg), dry basis (NTEC 2021)
0.03	*L*	µg/g Hg, as received basis *L=I/(1 + G/100)*
2.2	*M*	µg/g As, as received basis *M=J/(1 + G/100)*
2.5	*N*	µg/g Pb, as received basis *N=K/(1 + G/100)*

CRITERIA POLLUTANT EMISSIONS CALCULATIONS

Input Terms for Calculating Uncontrolled Emission Factors (Pulverized, Bituminous Coal)

38	*O*	unitless SOx emission factor multiplier; all pulverized coal (PC) firing configurations (EPA 1998, Table 1.1-3)
2.3	*P*	unitless filterable PM10 emission factor multiplier; PC dry bottom firing configurations (EPA 1998, Table 1.1-3)
2.6	*Q*	unitless filterable PM10 emission factor multiplier; PC wet bottom firing configurations (EPA 1998, Table 1.1-3)
0.6	*R*	unitless filterable PM2.5 emission factor multiplier; PC dry and dry bottom tangential (EPA 2001)
1.48	*S*	unitless filterable PM2.5 emission factor multiplier; PC wet boom (EPA 2001)
95	*T*	wt % fuel sulfur emitted as SO2 (EPA 1998, Table 1.1-3)
0.1	*U*	unitless total condensable particulate matter factor; PC firing without FGB (EPA 1998, Table 1.1-3)
0.03	*V*	unitless total condensable particulate matter term; PC firing without FGB (EPA 1998, Table 1.1-3)

Uncontrolled Emission Factors (Pulverized, Bituminous Coal)

11.9	*W*	lb SO2/ton coal; calculated *W = O * E * (T/100)*
9.7	*X*	lb Nox/ton coal; PC dry bottom, tangentially-fired with low Nox burner (EPA 1998, Table 1.1-3)
31	*Y*	lb Nox/ton coal; PC wet bottom, wall-fired and PC dry bottom, cell burner (EPA 1998, Table 1.1-3)
0.5	*Z*	lb CO/ton coal; all pulverized coal firing configurations (EPA 1998, Table 1.1-3)

9.6	*AA*	lb filterable PM10/ton coal; low end, calculated *AA = F * P*
10.8	*BB*	lb filterable PM10/ton coal; high end, calculated *BB = F * Q*
2.5	*CC*	lb filterable PM2.5/ton coal; low end, calculated *CC = F * R*
6.2	*DD*	lb filterable PM2.5/ton coal; high end, calculated *DD = F * S*
0.003	*EE*	lb total condensable PM/MMBtu; calculated *EE = (E * U) - V*
0.06	*FF*	lb total condensable/ton coal; calculated *FF = EE * D *B/C*
0.00006	*GG*	lb Hg/ton coal; calculated *GG = L * B/A*
0.0044	*HH*	lb As/ton coal; calculated *HH = M * B/A*
0.005	*II*	lb Pb/ton coal; calculated *II = N * B/A*
0.07	*JJ*	lb VOC /ton coal; PC dry bottom (EPA 1993)

Coal Combustion Emissions Control Efficiency Ranges

Control Efficiency Range	Filterable PM10 (%)	Filterable PM2.5 (%)	Cond. PM (%)	Nox (%)	Sox (%)	CO (%)	VOC (%)	Pb (%)	Hg (%)
Low	98	98	0	75	75	75	75	98	39
High	99.9	99.9	0	98	95	98	98	99.9	90

Estimated Controlled Pollutant and HAP Emissions Ranges per 1.0 Mt of Coal Combusted

Pollutant Emission Range	PM10 (tons)	PM2.5 (tons)	Nox (tons)	Sox (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg(lbs)	As (lbs)
Low	33	29	97	298	5.0	0.7	5	6	4.4
High	136	90	3875	1489	63	8.8	100	36.6	88

Saleable Coal Annual Production Rate

	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
Low									
Baseline (11.6 Mt)	381	340	1125	3455	58	8	58	70	51
Proposed Action									
2024	2.2	72	64	213	655	11	2	11	13
2025	4.51	148	132	437	1343	23	3	23	27
2026	4.14	136	121	402	1233	21	3	21	25
2027	4.87	160	143	472	1450	24	3	24	29
2028	3.59	118	105	348	1069	18	3	18	22
2029	4.21	138	123	408	1254	21	3	21	25
2030	2.51	82	74	243	748	13	2	13	15
2031	2.51	82	74	243	748	13	2	13	15
2032	2.51	82	74	243	748	13	2	13	15
2033	2.51	82	74	243	748	13	2	13	15
2034	2.51	82	74	243	748	13	2	13	15
2035	0.78	26	23	76	232	4	1	4	5
2036	0.78	26	23	76	232	4	1	4	5
2037	0.78	26	23	76	232	4	1	4	5
2038	0.78	26	23	76	232	4	1	4	5
2039	0.78	26	23	76	232	4	1	4	5
Avg	2.50	82	73	242	744	12	2	12	15
U.S.	1.70	56	50	165	506	8	1	8	10
Asia	0.80	26	23	78	238	4	1	4	5
Alternative 2 - Partial Mining Alternative									
Avg	3.86	127	113	375	1150	19	3	19	23
U.S.	2.63	86	77	255	782	13	2	13	16
Asia	1.24	41	36	120	368	6	1	6	7
Alternative 3 - Accelerated Mining Rate									
	18	591	527	1746	5361	90	13	90	108
U.S.	12.2	400	357	1183	3633	61	9	61	73
Asia	5.8	190	170	563	1727	29	4	29	35

	PM_{10} (tons)	$PM_{2.5}$ (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	Pb (lbs)	Hg (lbs)	As (lbs)
High									
Baseline (11.6 Mt)	1580	1039	44950	17274	725	102	1160	425	1021
Proposed Action									
2024	2.2	300	197	8525	3276	138	19	220	81
2025	4.51	614	404	17476	6716	282	39	451	165
2026	4.14	564	371	16043	6165	259	36	414	152
2027	4.87	663	436	18871	7252	304	43	487	178
2028	3.59	489	322	13911	5346	224	31	359	131
2029	4.21	573	377	16314	6269	263	37	421	154
2030	2.51	342	225	9726	3738	157	22	251	92
2031	2.51	342	225	9726	3738	157	22	251	92
2032	2.51	342	225	9726	3738	157	22	251	92
2033	2.51	342	225	9726	3738	157	22	251	92
2034	2.51	342	225	9726	3738	157	22	251	92
2035	0.78	106	70	3023	1162	49	7	78	29
2036	0.78	106	70	3023	1162	49	7	78	29
2037	0.78	106	70	3023	1162	49	7	78	29
2038	0.78	106	70	3023	1162	49	7	78	29
2039	0.78	106	70	3023	1162	49	7	78	29
Avg	0.78	340	224	9680	3720	156	22	250	91
U.S.	2.50	231	152	6583	2530	106	15	170	62
Asia	1.70	109	72	3098	1190	50	7	80	29
Alternative 2 - Partial Mining Alternative									
Avg	3.86	526	346	14965	5751	241	34	386	141
U.S.	2.63	358	235	10176	3911	164	23	263	96
Asia	1.24	168	111	4789	1840	77	11	124	45
Alternative 3 - Accelerated Mining Rate									
	18	2452	1613	69750	26804	1125	158	1800	659
U.S.	12.2	1662	1093	47275	18167	763	107	1220	447
Asia	5.8	790	520	22475	8637	363	51	580	212

GREENHOUSE GAS EMISSIONS

Conversion Factors

453.66	KK	g/lb
0.99	LL	unitless; carbon-CO2 conversion factor (AP-42, able 1.1-20)
44	MM	lb/lb-mol; CO2 molecular weight
12	NN	lb/lb-mol; C molecular weight

100-Yr Global Warming Potentials (unitless) (IPCC AR6 WGI Chapter 7, Table 7.15)

1	CO2	CO2
29.8	CH4	CH4
273	N2O	N2O

20-Yr Global Warming Potentials (unitless) (IPCC AR6 WGI Chapter 7, Table 7.15)

1	CO2	CO2
82.5	CH4	CH4
273	N2O	N2O

GHG Emission Factors

11	RR	g CH4/MMBtu (40 CFR 98.33, Table C-2)
1.6	SS	g N2O/MMBtu (40 CFR 98.33, Table C-2)

GHG Emissions

2849.55	TT	lb CO2/ton of coal, calculated *TT = H/100 * LL * MM/NN * E*
0.453	UU	lb CH4/ton of coal, calculated *UU = RR * DD * B / (KK * C)*
0.066	VV	lb N2O/ton of coal, calculated VV = SS * DD * B / (KK * C)
2850.069	WW	lb CO2e/ton of coal, calculated
1425035		Total CO2e emissions from combusting 1.0 Mt of coal

Proposed Action	Production (Mt)	CO2	CH4	N2O	CO2e
2024	2.2	3,134,505	498	73	3,135,076
2025	4.51	6,425,735	1,022	149	6,426,906
2026	4.14	5,898,569	938	136	5,899,643
2027	4.87	6,938,654	1,103	161	6,939,918
2028	3.59	5,114,942	813	118	5,115,874
2029	4.21	5,998,303	954	139	5,999,395
2030	2.51	3,576,185	569	83	3,576,837
2031	2.51	3,576,185	569	83	3,576,837
2032	2.51	3,576,185	569	83	3,576,837
2033	2.51	3,576,185	569	83	3,576,837
2034	2.51	3,576,185	569	83	3,576,837
2035	0.78	1,111,325	177	26	1,111,527
2036	0.78	1,111,325	177	26	1,111,527
2037	0.78	1,111,325	177	26	1,111,527
2038	0.78	1,111,325	177	26	1,111,527
2039	0.78	1,111,325	177	26	1,111,527
Avg	2.50	3,559,266	566	82	3,559,914
Partial Mining Alternative					
2024	2.2	3,134,505	498	73	3,135,076
2025	4.51	6,425,735	1,022	149	6,426,906
2026	4.14	5,898,569	938	136	5,899,643
2027	4.87	6,938,654	1,103	161	6,939,918
2028	3.59	5,114,942	813	118	5,115,874
Avg	3.86	5,502,481	875	127	5,503,483

Alternative	CO2	CH4	N2O	CO2e
Proposed Action	3,559,266	566	82	3,559,914
Partial Mining	5,502,481	875	127	5,503,483
Accelerated Mining Rate	25,645,950	4,079	593	25,650,622

100-Yr GWP

Alternative	CO2	CH4	N2O	CO2e
Proposed Action	3,559,266	16,868	22,477	3,598,612
Partial Mining	5,502,481	26,078	34,749	5,563,308
Accelerated Mining Rate	25,645,950	121,543	161,959	25,929,452

20-Yr GWP

Alternative	CO2	CH4	N2O	CO2e
Proposed Action	3,559,266	46,699	22,477	3,628,443
Partial Mining	5,502,481	238,900	34,749	5,776,130
Accelerated Mining Rate	25,645,950	336,487	161,959	26,144,395

Alternative 1 - Proposed Action GHG Emissions

CO2 Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	**2,486**	**39,782**
Mine operations	12,604	25,838	23,718	27,900	20,567	24,119	14,380	14,380	14,380	14,380	14,380	4,469	4,469	4,469	4,469	4,469	**14,312**	**228,988**
Rail transport	48,626	99,683	91,505	107,640	79,348	93,052	55,477	55,477	55,477	55,477	55,477	17,240	17,240	17,240	17,240	17,240	**55,215**	**883,440**
Terminal Handling																		
32% of 18 Mt Westshore	239	491	450	530	391	458	273	273	273	273	273	85	85	85	85	85	**272**	**4,348**
24% of 18 Mt MERC	180	368	338	397	293	344	205	205	205	205	205	64	64	64	64	64	**204**	**3,261**
Vessel Shipment																		
32% of 18 Mt Overseas	21,524	44,125	40,505	47,647	35,124	41,190	24,557	24,557	24,557	24,557	24,557	7,631	7,631	7,631	7,631	7,631	**24,441**	**391,057**
24% of 18 Mt MERC	951	1,950	1,790	2,106	1,552	1,820	1,085	1,085	1,085	1,085	1,085	337	337	337	337	337	**1,080**	**17,284**
Coal combustion	3,134,505	6,425,735	5,898,569	6,938,654	5,114,942	5,998,303	3,576,185	3,576,185	3,576,185	3,576,185	3,576,185	1,111,325	1,111,325	1,111,325	1,111,325	1,111,325	**3,559,266**	**56,948,257**
Total	**3,221,115**	**6,600,676**	**6,059,361**	**7,127,360**	**5,254,704**	**6,161,772**	**3,674,649**	**3,674,649**	**3,674,649**	**3,674,649**	**3,674,649**	**1,143,637**	**1,143,637**	**1,143,637**	**1,143,637**	**1,143,637**	**3,657,276**	**58,516,417**

CH4 Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	**0**	**4**
Mine operations	1	3	3	3	2	3	2	2	2	2	2	1	1	1	1	1	**2**	**26**
Rail transport	4	8	7	9	6	8	5	5	5	5	5	1	1	1	1	1	**4**	**72**
Terminal Handling																		
32% of 18 Mt Westshore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Vessel Shipment																		
32% of 18 Mt Overseas	15	31	28	33	25	29	17	17	17	17	17	5	5	5	5	5	**17**	**275**
24% of 18 Mt MERC	0.7	1.4	1.3	1.5	1.1	1.3	0.8	0.8	0.8	0.8	0.8	0.2	0.2	0.2	0.2	0.2	**1**	**12**
Coal combustion	498	1,022	938	1,103	813	954	569	569	569	569	569	177	177	177	177	177	**566**	**9,057**
Total	**520**	**1,066**	**978**	**1,151**	**848**	**995**	**593**	**593**	**593**	**593**	**593**	**185**	**185**	**185**	**185**	**185**	**590**	**9,445**

N2O Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0**	**0**
Mine operations	1	2	2	2	1	2	1	1	1	1	1	0	0	0	0	0	**1**	**16**
Rail transport	1	2	2	2	2	2	1	1	1	1	1	0	0	0	0	0	**1**	**18**
Terminal Handling																		
32% of 18 Mt Westshore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Vessel Shipment																		
32% of 18 Mt Overseas	16	34	31	36	27	32	19	19	19	19	19	6	6	6	6	6	**19**	**299**
24% of 18 Mt MERC	0.7	1.5	1.4	1.6	1.2	1.4	0.8	0.8	0.8	0.8	0.8	0.3	0.3	0.3	0.3	0.3	**1**	**13**
Coal combustion	73	149	136	161	118	139	83	83	83	83	83	26	26	26	26	26	**82**	**1,317**
Total	**92**	**188**	**172**	**203**	**149**	**175**	**105**	**105**	**105**	**105**	**105**	**32**	**32**	**32**	**32**	**32**	**104**	**1,664**

CO2e Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	**2,487**	**39,786**
Mine operations	12,606	25,843	23,722	27,905	20,571	24,124	14,382	14,382	14,382	14,382	14,382	4,469	4,469	4,469	4,469	4,469	**14,314**	**229,030**
Rail transport	48,631	99,693	91,514	107,650	79,356	93,061	55,483	55,483	55,483	55,483	55,483	17,242	17,242	17,242	17,242	17,242	**55,221**	**883,530**
Terminal Handling																		
32% of 18 Mt Westshore	239	491	450	530	391	458	273	273	273	273	273	85	85	85	85	85	**272**	**4,348**
24% of 18 Mt MERC	180	368	338	397	293	344	205	205	205	205	205	64	64	64	64	64	**204**	**3,261**
Vessel Shipment																		
32% of 18 Mt Overseas	21,556	44,190	40,564	47,717	35,175	41,250	24,593	24,593	24,593	24,593	24,593	7,643	7,643	7,643	7,643	7,643	**24,477**	**391,631**
24% of 18 Mt MERC	952.7	1,953.1	1,792.8	2,109.0	1,554.6	1,823.1	1,087.0	1,087.0	1,087.0	1,087.0	1,087.0	337.8	337.8	337.8	337.8	337.8	**1,082**	**17,309**
Coal combustion	3,135,076	6,426,906	5,899,643	6,939,918	5,115,874	5,999,395	3,576,837	3,576,837	3,576,837	3,576,837	3,576,837	1,111,527	1,111,527	1,111,527	1,111,527	1,111,527	**3,559,914**	**56,958,631**
Total	**3,221,727**	**6,601,929**	**6,060,511**	**7,128,714**	**5,255,701**	**6,162,942**	**3,675,347**	**3,675,347**	**3,675,347**	**3,675,347**	**3,675,347**	**1,143,854**	**1,143,854**	**1,143,854**	**1,143,854**	**1,143,854**	3,657,970	**58,527,527**

100-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	**2,486**	**39,782**
Mine operations	12,604	25,838	23,718	27,900	20,567	24,119	14,380	14,380	14,380	14,380	14,380	4,469	4,469	4,469	4,469	4,469	**14,312**	**228,988**
Rail transport	48,626	99,683	91,505	107,640	79,348	93,052	55,477	55,477	55,477	55,477	55,477	17,240	17,240	17,240	17,240	17,240	**55,215**	**883,440**
Terminal Handling																		
32% of 18 Mt Westshore	239	491	450	530	391	458	273	273	273	273	273	85	85	85	85	85	**272**	**4,348**
24% of 18 Mt MERC	180	368	338	397	293	344	205	205	205	205	205	64	64	64	64	64	**204**	**3,261**
Vessel Shipment																		
32% of 18 Mt Overseas	21,524	44,125	40,505	47,647	35,124	41,190	24,557	24,557	24,557	24,557	24,557	7,631	7,631	7,631	7,631	7,631	**24,441**	**391,057**
24% of 18 Mt MERC	951	1,950	1,790	2,106	1,552	1,820	1,085	1,085	1,085	1,085	1,085	337	337	337	337	337	**1,080**	**17,284**
Coal combustion	3,134,505	6,425,735	5,898,569	6,938,654	5,114,942	5,998,303	3,576,185	3,576,185	3,576,185	3,576,185	3,576,185	1,111,325	1,111,325	1,111,325	1,111,325	1,111,325	**3,559,266**	**56,948,257**
Total	**3,221,115**	**6,600,676**	**6,059,361**	**7,127,360**	**5,254,704**	**6,161,772**	**3,674,649**	**3,674,649**	**3,674,649**	**3,674,649**	**3,674,649**	**1,143,637**	**1,143,637**	**1,143,637**	**1,143,637**	**1,143,637**	3,657,276	**58,516,417**

100-Yr GWP CH4 Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	**8**	**133**
Mine operations	42.2	86.4	79.3	93.3	68.8	80.7	48.1	48.1	48.1	48.1	48.1	14.9	14.9	14.9	14.9	14.9	**48**	**766**
Rail transport	118	241	221	260	192	225	134	134	134	134	134	42	42	42	42	42	**133**	**2,135**
Terminal Handling																		
32% of 18 Mt Westshore	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**	**0**
24% of 18 Mt MERC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0**	**0**
Vessel Shipment																		
32% of 18 Mt Overseas	450	924	848	997	735	862	514	514	514	514	514	160	160	160	160	160	**512**	**8,185**
24% of 18 Mt MERC	19.9	40.8	37.5	44.1	32.5	38.1	22.7	22.7	22.7	22.7	22.7	7.1	7.1	7.1	7.1	7.1	**23**	**362**
Coal combustion	14,855	30,453	27,955	32,884	24,241	28,428	16,949	16,949	16,949	16,949	16,949	5,267	5,267	5,267	5,267	5,267	**16,868**	**269,893**
Total	**15,494**	**31,753**	**29,149**	**34,287**	**25,278**	**29,642**	**17,676**	**17,676**	**17,676**	**17,676**	**17,676**	**5,499**	**5,499**	**5,499**	**5,499**	**5,499**	17,592	**281,475**

100-Yr GWP N2O Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	**4**	**59**
Mine operations	247	506	465	547	403	473	282	282	282	282	282	88	88	88	88	88	**280**	**4,487**
Rail transport	269	552	507	596	439	515	307	307	307	307	307	95	95	95	95	95	**306**	**4,891**
Terminal Handling																		
32% of 18 Mt Westshore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**	**0**
24% of 18 Mt MERC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**	**0**
Vessel Shipment																		
32% of 18 Mt Overseas	4,494	9,212	8,457	9,948	7,333	8,600	5,127	5,127	5,127	5,127	5,127	1,593	1,593	1,593	1,593	1,593	**5,103**	**81,646**
24% of 18 Mt MERC	199	407	374	440	324	380	227	227	227	227	227	70	70	70	70	70	**226**	**3,609**
Coal combustion	19,795	40,580	37,250	43,819	32,302	37,880	22,584	22,584	22,584	22,584	22,584	7,018	7,018	7,018	7,018	7,018	**22,477**	**359,638**
Total	**25,007**	**51,261**	**47,056**	**55,353**	**40,805**	**47,851**	**28,531**	**28,531**	**28,531**	**28,531**	**28,531**	**8,869**	**8,869**	**8,869**	**8,869**	**8,869**	**28,396**	**454,329**

100-Yr GWP CO2e Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	**2,498**	**39,974**
Mine operations	12,893	26,431	24,262	28,540	21,039	24,672	14,710	14,710	14,710	14,710	14,710	4,571	4,571	4,571	4,571	4,571	**14,640**	**234,241**
Rail transport	49,012	100,475	92,232	108,496	79,979	93,792	55,919	55,919	55,919	55,919	55,919	17,377	17,377	17,377	17,377	17,377	**55,654**	**890,466**
Terminal Handling																		
32% of 18 Mt Westshore	239	491	450	530	391	458	273	273	273	273	273	85	85	85	85	85	**272**	**4,348**
24% of 18 Mt MERC	180	368	338	397	293	344	205	205	205	205	205	64	64	64	64	64	**204**	**3,261**
Vessel Shipment																		
32% of 18 Mt Overseas	26,469	54,261	49,809	58,592	43,192	50,651	30,198	30,198	30,198	30,198	30,198	9,384	9,384	9,384	9,384	9,384	**30,055**	**480,888**
24% of 18 Mt MERC	1,169.8	2,398.2	2,201.4	2,589.6	1,909.0	2,238.7	1,334.7	1,334.7	1,334.7	1,334.7	1,334.7	414.8	414.8	414.8	414.8	414.8	**1,328**	**21,254**
Coal combustion	3,169,155	6,496,768	5,963,774	7,015,357	5,171,485	6,064,611	3,615,718	3,615,718	3,615,718	3,615,718	3,615,718	1,123,610	1,123,610	1,123,610	1,123,610	1,123,610	**3,598,612**	**57,577,788**
Total	**3,261,616**	**6,683,690**	**6,135,566**	**7,217,000**	**5,320,786**	**6,239,265**	**3,720,856**	**3,720,856**	**3,720,856**	**3,720,856**	**3,720,856**	**1,158,004**	**1,158,004**	**1,158,004**	**1,158,004**	**1,158,004**	**3,703,264**	**59,252,221**

20-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	2,486	**2,486**	**39,782**
Mine operations	12,604	25,838	23,718	27,900	20,567	24,119	14,380	14,380	14,380	14,380	14,380	4,469	4,469	4,469	4,469	4,469	**14,312**	**228,988**
Rail transport	48,626	99,683	91,505	107,640	79,348	93,052	55,477	55,477	55,477	55,477	55,477	17,240	17,240	17,240	17,240	17,240	**55,215**	**883,440**
Terminal Handling																		
32% of 18 Mt Westshore	239	491	450	530	391	458	273	273	273	273	273	85	85	85	85	85	**272**	**4,348**
24% of 18 Mt MERC	180	368	338	397	293	344	205	205	205	205	205	64	64	64	64	64	**204**	**3,261**
Vessel Shipment																		
32% of 18 Mt Overseas	21,524	44,125	40,505	47,647	35,124	41,190	24,557	24,557	24,557	24,557	24,557	7,631	7,631	7,631	7,631	7,631	**24,441**	**391,057**
24% of 18 Mt MERC	951	1,950	1,790	2,106	1,552	1,820	1,085	1,085	1,085	1,085	1,085	337	337	337	337	337	**1,080**	**17,284**
Coal combustion	3,134,505	6,425,735	5,898,569	6,938,654	5,114,942	5,998,303	3,576,185	3,576,185	3,576,185	3,576,185	3,576,185	1,111,325	1,111,325	1,111,325	1,111,325	1,111,325	**3,559,266**	**56,948,257**
Total	**3,221,115**	**6,600,676**	**6,059,361**	**7,127,360**	**5,254,704**	**6,161,772**	**3,674,649**	**3,674,649**	**3,674,649**	**3,674,649**	**3,674,649**	**1,143,637**	**1,143,637**	**1,143,637**	**1,143,637**	**1,143,637**	**3,657,276**	**58,516,417**

20-Yr GWP CH4 Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	**23**	**369**
Mine operations	117	239	220	258	190	223	133	133	133	133	133	41	41	41	41	41	**133**	**2,121**
Rail transport	325	667	612	720	531	623	371	371	371	371	371	115	115	115	115	115	**369**	**5,912**
Terminal Handling																		
32% of 18 Mt Westshore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Vessel Shipment																		
32% of 18 Mt Overseas	1,247	2,557	2,347	2,761	2,035	2,387	1,423	1,423	1,423	1,423	1,423	442	442	442	442	442	**1,416**	**22,659**
24% of 18 Mt MERC	55	113	104	122	90	105	63	63	63	63	63	20	20	20	20	20	**63**	**1,001**
Coal combustion	41,126	84,309	77,392	91,038	67,110	78,701	46,921	46,921	46,921	46,921	46,921	14,581	14,581	14,581	14,581	14,581	**46,699**	**747,188**
Total	**42,894**	**87,908**	**80,698**	**94,923**	**69,980**	**82,062**	**48,935**	**48,935**	**48,935**	**48,935**	**48,935**	**15,223**	**15,223**	**15,223**	**15,223**	**15,223**	**48,703**	**779,250**

20-Yr GWP N2O Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	**4**	**59**
Mine operations	247	506	465	547	403	473	282	282	282	282	282	88	88	88	88	88	**280**	**4,487**
Rail transport	269	552	507	596	439	515	307	307	307	307	307	95	95	95	95	95	**306**	**4,891**
Terminal Handling																		
32% of 18 Mt Westshore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Vessel Shipment																		
32% of 18 Mt Overseas	4,494	9,212	8,457	9,948	7,333	8,600	5,127	5,127	5,127	5,127	5,127	1,593	1,593	1,593	1,593	1,593	**5,103**	**81,646**
24% of 18 Mt MERC	199	407	374	440	324	380	227	227	227	227	227	70	70	70	70	70	**226**	**3,609**
Coal combustion	19,795	40,580	37,250	43,819	32,302	37,880	22,584	22,584	22,584	22,584	22,584	7,018	7,018	7,018	7,018	7,018	**22,477**	**359,638**
Total	**25,007**	**51,261**	**47,056**	**55,353**	**40,805**	**47,851**	**28,531**	**28,531**	**28,531**	**28,531**	**28,531**	**8,869**	**8,869**	**8,869**	**8,869**	**8,869**	**28,396**	**454,329**

20-Yr GWP CO2e Emissions (tons)

Segment	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**4.21**	**2.51**	**2.51**	**2.51**	**2.51**	**2.51**	**0.78**	**0.78**	**0.78**	**0.78**	**0.78**	**2.50**	**39.97**
Worker transport	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	**2,513**	**40,210**
Mine operations	12,968	26,583	24,402	28,705	21,161	24,815	14,795	14,795	14,795	14,795	14,795	4,598	4,598	4,598	4,598	4,598	**14,725**	**235,596**
Rail transport	49,220	100,902	92,624	108,956	80,319	94,190	56,156	56,156	56,156	56,156	56,156	17,451	17,451	17,451	17,451	17,451	**55,890**	**894,243**
Terminal Handling																		
32% of 18 Mt Westshore	239	491	450	530	391	458	273	273	273	273	273	85	85	85	85	85	**272**	**4,348**
24% of 18 Mt MERC	180	368	338	397	293	344	205	205	205	205	205	64	64	64	64	64	**204**	**3,261**
Vessel Shipment																		
32% of 18 Mt Overseas	27,265	55,894	51,308	60,356	44,492	52,176	31,107	31,107	31,107	31,107	31,107	9,667	9,667	9,667	9,667	9,667	**30,960**	**495,362**
24% of 18 Mt MERC	1,205.1	2,470.4	2,267.7	2,667.5	1,966.4	2,306.0	1,374.9	1,374.9	1,374.9	1,374.9	1,374.9	427.2	427.2	427.2	427.2	427.2	**1,368**	**21,894**
Coal combustion	3,195,426	6,550,623	6,013,211	7,073,511	5,214,354	6,114,884	3,645,691	3,645,691	3,645,691	3,645,691	3,645,691	1,132,924	1,132,924	1,132,924	1,132,924	1,132,924	**3,628,443**	**58,055,082**
Total	**3,289,016**	**6,739,845**	**6,187,114**	**7,277,636**	**5,365,489**	**6,291,685**	**3,752,114**	**3,752,114**	**3,752,114**	**3,752,114**	**3,752,114**	**1,167,728**	**1,167,728**	**1,167,728**	**1,167,728**	**1,167,728**	**3,734,375**	**59,749,996**

ALTERNATIVE 2 - PARTIAL MINING GHG EMISSIONS

CO2 Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	2,486	2,486	2,486	2,486	2,486	**2,486**	**12,432**
Mine operations	12,604	25,838	23,718	27,900	20,567	**22,125**	**110,627**
Rail transport	48,626	99,683	91,505	107,640	79,348	**85,360**	**426,801**
Terminal Handling							
32% of 18 Mt Westshore	239	491	450	530	391	**420**	**2,101**
24% of 18 Mt MERC	180	368	338	397	293	**315**	**1,576**
Vessel Shipment							
32% of 18 Mt Overseas	21,524	44,125	40,505	47,647	35,124	**37,785**	**188,925**
24% of 18 Mt MERC	951	1,950	1,790	2,106	1,552	**1,670**	**8,350**
Coal combustion	3,134,505	6,425,735	5,898,569	6,938,654	5,114,942	**5,502,481**	**27,512,405**
Total	**3,221,115**	**6,600,676**	**6,059,361**	**7,127,360**	**5,254,704**	**5,652,643**	**28,263,216**

CH4 Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	0.3	0.3	0.3	0.3	0.3	**0**	**1**
Mine operations	1	3	3	3	2	**2**	**12**
Rail transport	4	8	7	9	6	**7**	**35**
Terminal Handling							
32% of 18 Mt Westshore	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	**0**	**0**
Vessel Shipment							
32% of 18 Mt Overseas	15	31	28	33	25	**27**	**133**
24% of 18 Mt MERC	0.7	1.4	1.3	1.5	1.1	**1**	**6**
Coal combustion	498	1,022	938	1,103	813	**875**	**4,375**
Total	**520**	**1,066**	**978**	**1,151**	**848**	**912**	**4,562**

N2O Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	0.01	0.01	0.01	0.01	0.01	**0**	**0**
Mine operations	1	2	2	2	1	**2**	**8**
Rail transport	1	2	2	2	2	**2**	**9**
Terminal Handling							
32% of 18 Mt Westshore	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	**0**	**0**
Vessel Shipment							
32% of 18 Mt Overseas	16	34	31	36	27	**29**	**144**
24% of 18 Mt MERC	0.7	1.5	1.4	1.6	1.2	**1**	**6**
Coal combustion	73	149	136	161	118	**127**	**636**
Total	**92**	**188**	**172**	**203**	**149**	**161**	**804**

CO2e Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	2,486.64	2,486.64	2,486.64	2,486.64	2,486.64	**2,487**	**12,433**
Mine operations	12,606	25,843	23,722	27,905	20,571	**22,129**	**110,647**
Rail transport	48,631	99,693	91,514	107,650	79,356	**85,369**	**426,844**
Terminal Handling							
32% of 18 Mt Westshore	239	491	450	530	391	**420**	**2,101**
24% of 18 Mt MERC	180	368	338	397	293	**315**	**1,576**
Vessel Shipment							
32% of 18 Mt Overseas	21,556	44,190	40,564	47,717	35,175	**37,840**	**189,202**
24% of 18 Mt MERC	952.7	1,953.1	1,792.8	2,109.0	1,554.6	**1,672**	**8,362**
Coal combustion	3,135,076	6,426,906	5,899,643	6,939,918	5,115,874	**5,503,483**	**27,517,417**
Total	**3,221,727**	**6,601,929**	**6,060,511**	**7,128,714**	**5,255,701**	**5,653,716**	**28,268,582**

100-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	2,486	2,486	2,486	2,486	2,486	**2,486**	**12,432**
Mine operations	12,604	25,838	23,718	27,900	20,567	**22,125**	**110,627**
Rail transport	48,626	99,683	91,505	107,640	79,348	**85,360**	**426,801**
Terminal Handling							
32% of 18 Mt Westshore	239	491	450	530	391	**420**	**2,101**
24% of 18 Mt MERC	180	368	338	397	293	**315**	**1,576**
Vessel Shipment							
32% of 18 Mt Overseas	21,524	44,125	40,505	47,647	35,124	**37,785**	**188,925**
24% of 18 Mt MERC	951	1,950	1,790	2,106	1,552	**1,670**	**8,350**
Coal combustion	3,134,505	6,425,735	5,898,569	6,938,654	5,114,942	**5,502,481**	**27,512,405**
Total	**3,221,115**	**6,600,676**	**6,059,361**	**7,127,360**	**5,254,704**	**5,652,643**	**28,263,216**

100-Yr GWP CH4 Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	8.3	8.3	8.3	8.3	8.3	**8**	**42**
Mine operations	42	86	79	93	69	**74**	**370**
Rail transport	118	241	221	260	192	**206**	**1,032**
Terminal Handling							
32% of 18 Mt Westshore	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	**0**	**0**
Vessel Shipment							
32% of 18 Mt Overseas	450	924	848	997	735	**791**	**3,954**
24% of 18 Mt MERC	20	41	37	44	32	**35**	**175**
Coal combustion	14,855	30,453	27,955	32,884	24,241	**26,078**	**130,389**
Total	**15,494**	**31,753**	**29,149**	**34,287**	**25,278**	**27,192**	**135,961**

100-Yr GWP N2O Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	3.7	3.7	3.7	3.7	3.7	**4**	**18**
Mine operations	247	506	465	547	403	**434**	**2,168**
Rail transport	269	552	507	596	439	**473**	**2,363**
Terminal Handling							
32% of 18 Mt Westshore	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	**0**	**0**
Vessel Shipment							
32% of 18 Mt Overseas	4,494	9,212	8,457	9,948	7,333	**7,889**	**39,444**
24% of 18 Mt MERC	199	407	374	440	324	**349**	**1,743**
Coal combustion	19,795	40,580	37,250	43,819	32,302	**34,749**	**173,746**
Total	**25,007**	**51,261**	**47,056**	**55,353**	**40,805**	**43,896**	**219,482**

100-Yr GWP CO2e Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	2,498.38	2,498.38	2,498.38	2,498.38	2,498.38	**2,498**	**12,492**
Mine operations	12,893	26,431	24,262	28,540	21,039	**22,633**	**113,165**
Rail transport	49,012	100,475	92,232	108,496	79,979	**86,039**	**430,195**
Terminal Handling							
32% of 18 Mt Westshore	239	491	450	530	391	**420**	**2,101**
24% of 18 Mt MERC	180	368	338	397	293	**315**	**1,576**
Vessel Shipment							
32% of 18 Mt Overseas	26,469	54,261	49,809	58,592	43,192	**46,465**	**232,323**
24% of 18 Mt MERC	1,169.8	2,398.2	2,201.4	2,589.6	1,909.0	**2,054**	**10,268**
Coal combustion	3,169,155	6,496,768	5,963,774	7,015,357	5,171,485	**5,563,308**	**27,816,540**
Total	**3,261,616**	**6,683,690**	**6,135,566**	**7,217,000**	**5,320,786**	**5,723,732**	**28,618,659**

20-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	2,486	2,486	2,486	2,486	2,486	**2,486**	**12,432**
Mine operations	12,604	25,838	23,718	27,900	20,567	**22,125**	**110,627**
Rail transport	48,626	99,683	91,505	107,640	79,348	**85,360**	**426,801**
Terminal Handling							
32% of 18 Mt Westshore	239	491	450	530	391	**420**	**2,101**
24% of 18 Mt MERC	180	368	338	397	293	**315**	**1,576**
Vessel Shipment							
32% of 18 Mt Overseas	21,524	44,125	40,505	47,647	35,124	**37,785**	**188,925**
24% of 18 Mt MERC	951	1,950	1,790	2,106	1,552	**1,670**	**8,350**
Coal combustion	3,134,505	6,425,735	5,898,569	6,938,654	5,114,942	**5,502,481**	**27,512,405**
Total	**3,221,115**	**6,600,676**	**6,059,361**	**7,127,360**	**5,254,704**	**5,652,643**	**28,263,216**

20-Yr GWP CH4 Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	23	23	23	23	23	**23**	**115**
Mine operations	117	239	220	258	190	**205**	**1,025**
Rail transport	325	667	612	720	531	**571**	**2,856**
Terminal Handling							
32% of 18 Mt Westshore	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	**0**	**0**
Vessel Shipment							
32% of 18 Mt Overseas	1,247	2,557	2,347	2,761	2,035	**2,189**	**10,947**
24% of 18 Mt MERC	55	113	104	122	90	**97**	**484**
Coal combustion	41,126	84,309	77,392	91,038	67,110	**72,195**	**360,975**
Total	**42,894**	**87,908**	**80,698**	**94,923**	**69,980**	**75,280**	**376,402**

20-Yr GWP N2O Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	3.7	3.7	3.7	3.7	3.7	**4**	**18**
Mine operations	247	506	465	547	403	**434**	**2,168**
Rail transport	269	552	507	596	439	**473**	**2,363**
Terminal Handling							
32% of 18 Mt Westshore	0	0	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	0	0	**0**	**0**
Vessel Shipment							
32% of 18 Mt Overseas	4,494	9,212	8,457	9,948	7,333	**7,889**	**39,444**
24% of 18 Mt MERC	199	407	374	440	324	**349**	**1,743**
Coal combustion	19,795	40,580	37,250	43,819	32,302	**34,749**	**173,746**
Total	**25,007**	**51,261**	**47,056**	**55,353**	**40,805**	**43,896**	**219,482**

20-Yr GWP CO2e Emissions (tons)

Segment	2024	2025	2026	2027	2028	Avg	Total
Coal Mined	**2.2**	**4.51**	**4.14**	**4.87**	**3.59**	**3.86**	**3.86**
Worker transport	2,513.13	2,513.13	2,513.13	2,513.13	2,513.13	**2,513**	**12,566**
Mine operations	12,968	26,583	24,402	28,705	21,161	**22,764**	**113,819**
Rail transport	49,220	100,902	92,624	108,956	80,319	**86,404**	**432,020**
Terminal Handling							
32% of 18 Mt Westshore	239	491	450	530	391	**420**	**2,101**
24% of 18 Mt MERC	180	368	338	397	293	**315**	**1,576**
Vessel Shipment							
32% of 18 Mt Overseas	27,265	55,894	51,308	60,356	44,492	**47,863**	**239,315**
24% of 18 Mt MERC	1,205.1	2,470.4	2,267.7	2,667.5	1,966.4	**2,115**	**10,577**
Coal combustion	3,195,426	6,550,623	6,013,211	7,073,511	5,214,354	**5,609,425**	**28,047,126**
Total	**3,289,016**	**6,739,845**	**6,187,114**	**7,277,636**	**5,365,489**	**5,771,820**	**28,859,100**

ALTERNATIVE 3 - ACCELARATED MINING RATE GHG EMISSIONS

CO2 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	2,486	2,486	2,486	**2,486**	**7,459**
Mine operations	103,122	103,122	22,744	**76,329**	**228,988**
Rail transport	397,846	397,846	87,747	**294,480**	**883,440**
Terminal Handling					**0**
32% of 18 Mt Westshore	3,332	3,332	735	**2,466**	**7,398**
24% of 18 Mt MERC	2,499	2,499	551	**1,849**	**5,548**
Vessel Shipment					**0**
32% of 18 Mt Overseas	176,108	176,108	38,842	**130,352**	**391,057**
24% of 18 Mt MERC	7,783	7,783	1,717	**5,761**	**17,284**
Coal combustion	25,645,950	25,645,950	5,656,357	**18,982,752**	**56,948,257**
Total	**26,339,126**	**26,339,126**	**5,811,179**	**19,496,477**	**58,489,431**

CH4 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	0.3	0.3	0.3	**0**	**1**
Mine operations	12	12	3	**9**	**26**
Rail transport	32	32	7	**24**	**72**
Terminal Handling					**0**
32% of 18 Mt Westshore	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	**0**	**0**
Vessel Shipment					**0**
32% of 18 Mt Overseas	15	15	3	**11**	**34**
24% of 18 Mt MERC	0.7	0.7	0.1	**0**	**1**
Coal combustion	4,079	4,079	900	**3,019**	**9,057**
Total	**4,139**	**4,139**	**913**	**3,063**	**9,190**

N2O Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	0.01	0.01	0.01	**0**	**0**
Mine operations	7	7	2	**5**	**16**
Rail transport	8	8	2	**6**	**18**
Terminal Handling					**0**
32% of 18 Mt Westshore	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	**0**	**0**
Vessel Shipment					**0**
32% of 18 Mt Overseas	21	21	5	**16**	**48**
24% of 18 Mt MERC	0.7	0.7	0.2	**1**	**2**
Coal combustion	593	593	131	**439**	**1,317**
Total	**631**	**631**	**139**	**467**	**1,401**

CO2e Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	2,486.64	2,486.64	2,486.64	**2,487**	**7,460**
Mine operations	103,141	103,141	22,748	**76,343**	**229,030**
Rail transport	397,887	397,887	87,756	**294,510**	**883,530**
Terminal Handling					**0**
32% of 18 Mt Westshore	3,332	3,332	735	**2,466**	**7,398**
24% of 18 Mt MERC	2,499	2,499	551	**1,849**	**5,548**
Vessel Shipment					**0**
32% of 18 Mt Overseas	176,145	176,145	38,850	**130,380**	**391,139**
24% of 18 Mt MERC	7,784.9	7,784.9	1,717.0	**5,762**	**17,287**
Coal combustion	25,650,622	25,650,622	5,657,387	**18,986,210**	**56,958,631**
Total	**26,343,896**	**26,343,896**	**5,812,231**	**19,500,008**	**58,500,023**

100-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	2,486	2,486	2,486	**2,486**	**7,459**
Mine operations	103,122	103,122	22,744	**76,329**	**228,988**
Rail transport	397,846	397,846	87,747	**294,480**	**883,440**
Terminal Handling					
32% of 18 Mt Westshore	3,332	3,332	735	**2,466**	**7,398**
24% of 18 Mt MERC	2,499	2,499	551	**1,849**	**5,548**
Vessel Shipment					
32% of 18 Mt Overseas	176,108	176,108	38,842	**130,352**	**391,057**
24% of 18 Mt MERC	7,783	7,783	1,717	**5,761**	**17,284**
Coal combustion	25,645,950	25,645,950	5,656,357	**18,982,752**	**56,948,257**
Total	**26,339,126**	**26,339,126**	**5,811,179**	**19,496,477**	**58,489,431**

100-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	8	8	8	**8**	**25**
Mine operations	345	345	76	**255**	**766**
Rail transport	962	962	212	**712**	**2,135**
Terminal Handling					
32% of 18 Mt Westshore	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	**0**	**0**
Vessel Shipment					
32% of 18 Mt Overseas	450	450	99	**333**	**1,000**
24% of 18 Mt MERC	20	20	4	**15**	**44**
Coal combustion	121,543	121,543	26,807	**89,964**	**269,893**
Total	**123,328**	**123,328**	**27,207**	**91,288**	**273,864**

100-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	3.7	3.7	3.7	**4**	**11**
Mine operations	2,021	2,021	446	**1,496**	**4,487**
Rail transport	2,203	2,203	486	**1,630**	**4,891**
Terminal Handling					
32% of 18 Mt Westshore	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	**0**	**0**
Vessel Shipment					
32% of 18 Mt Overseas	5,860	5,860	1,292	**4,337**	**13,011**
24% of 18 Mt MERC	199	199	44	**147**	**441**
Coal combustion	161,959	161,959	35,721	**119,879**	**359,638**
Total	**172,244**	**172,244**	**37,992**	**127,493**	**382,480**

100-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	2,498.38	2,498.38	2,498.38	**2,498**	**7,495**
Mine operations	105,488	105,488	23,266	**78,080**	**234,241**
Rail transport	401,011	401,011	88,445	**296,822**	**890,466**
Terminal Handling					
32% of 18 Mt Westshore	3,332	3,332	735	**2,466**	**7,398**
24% of 18 Mt MERC	2,499	2,499	551	**1,849**	**5,548**
Vessel Shipment					
32% of 18 Mt Overseas	182,418	182,418	40,233	**135,023**	**405,069**
24% of 18 Mt MERC	8,002.0	8,002.0	1,764.9	**5,923**	**17,769**
Coal combustion	25,929,452	25,929,452	5,718,885	**19,192,596**	**57,577,788**
Total	**26,634,699**	**26,634,699**	**5,876,378**	**19,715,258**	**59,145,775**

20-Yr GWP CO2 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	2,486	2,486	2,486	**2,486**	**7,459**
Mine operations	103,122	103,122	22,744	**76,329**	**228,988**
Rail transport	397,846	397,846	87,747	**294,480**	**883,440**
Terminal Handling					
32% of 18 Mt Westshore	3,332	3,332	735	**2,466**	**7,398**
24% of 18 Mt MERC	2,499	2,499	551	**1,849**	**5,548**
Vessel Shipment					
32% of 18 Mt Overseas	176,108	176,108	38,842	**130,352**	**391,057**
24% of 18 Mt MERC	7,783	7,783	1,717	**5,761**	**17,284**
Coal combustion	25,645,950	25,645,950	5,656,357	**18,982,752**	**56,948,257**
Total	**26,339,126**	**26,339,126**	**5,811,179**	**19,496,477**	**58,489,431**

20-Yr GWP CH4 Emissions (tons)

Segment	2024	2025	2026	Avg	Total
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	23	23	23	**23**	**69**
Mine operations	955	955	211	**707**	**2,121**
Rail transport	2,662	2,662	587	**1,971**	**5,912**
Terminal Handling					
32% of 18 Mt Westshore	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	**0**	**0**
Vessel Shipment					
32% of 18 Mt Overseas	1,247	1,247	275	**923**	**2,769**
24% of 18 Mt MERC	55	55	12	**41**	**122**

Coal combustion	336,487	336,487	74,214	**249,063**	**747,188**
Total	**341,430**	**341,430**	**75,322**	**252,727**	**758,181**

20-Yr GWP N2O Emissions (tons)

Segment	**2024**	**2025**	**2026**	**Avg**	**Total**
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	3.7	3.7	3.7	**4**	**11**
Mine operations	2,021	2,021	446	**1,496**	**4,487**
Rail transport	2,203	2,203	486	**1,630**	**4,891**
Terminal Handling					
32% of 18 Mt Westshore	0	0	0	**0**	**0**
24% of 18 Mt MERC	0	0	0	**0**	**0**
Vessel Shipment					
32% of 18 Mt Overseas	5,860	5,860	1,292	**4,337**	**13,011**
24% of 18 Mt MERC	199	199	44	**147**	**441**
Coal combustion	161,959	161,959	35,721	**119,879**	**359,638**
Total	**172,244**	**172,244**	**37,992**	**127,493**	**382,480**

20-Yr GWP CO2e Emissions (tons)

Segment	**2024**	**2025**	**2026**	**Avg**	**Total**
Coal Mined	**18**	**18**	**3.97**	**13.32**	**39.97**
Worker transport	2,513.13	2,513.13	2,513.13	**2,513**	**7,539**
Mine operations	106,098	106,098	23,400	**78,532**	**235,596**
Rail transport	402,711	402,711	88,820	**298,081**	**894,243**
Terminal Handling					
32% of 18 Mt Westshore	3,332	3,332	735	**2,466**	**7,398**
24% of 18 Mt MERC	2,499	2,499	551	**1,849**	**5,548**
Vessel Shipment					
32% of 18 Mt Overseas	183,215	183,215	40,409	**135,613**	**406,838**
24% of 18 Mt MERC	8,037.2	8,037.2	1,772.7	**5,949**	**17,847**
Coal combustion	26,144,395	26,144,395	5,766,292	**19,351,694**	**58,055,082**
Total	**26,852,800**	**26,852,800**	**5,924,493**	**19,876,697**	**59,630,092**

Accident Scenario	2020	2021	2022	2023	Avg
All Railroads – All lines	2.92	2.92	3.23	3.2	3.07
All Railroads – Derailments on All lines	1.95	1.93	2.09	2.14	**2.03**
All Railroads – Mainline Only	0.97	0.92	0.9	0.92	0.93
All Railroads – Derailments on Mainline Only	0.62	0.58	0.56	0.58	**0.59**
BNSF – All lines	2.11	1.78	2.26	2.7	2.21
BNSF – Derailments on All lines	1.73	1.48	1.9	2.34	**1.86**
BNSF – Mainline Only	0.59	0.46	0.46	0.53	0.51
BNSF – Derailments on Mainline Only	0.41	0.38	0.32	0.41	**0.38**

Proposed Action

Year	LBA1 Coal	Rail Miles	All Railroads Derailment on All Lines	All Railroads Derailment on Mainline	BNSF Derailment on All Lines	BNSF Derailment on Mainline
2024	2.20	330,000	0.67	0.19	0.61	0.13
2025	4.51	676,500	1.37	0.40	1.26	0.26
2026	4.14	621,000	1.26	0.36	1.16	0.24
2027	4.87	730,500	1.48	0.43	1.36	0.28
2028	3.59	538,500	1.09	0.32	1.00	0.20
2029	4.21	631,500	1.28	0.37	1.18	0.24
2030	2.51	376,500	0.76	0.22	0.70	0.14
2031	2.51	376,500	0.76	0.22	0.70	0.14
2032	2.51	376,500	0.76	0.22	0.70	0.14
2033	2.51	376,500	0.76	0.22	0.70	0.14
2034	2.51	376,500	0.76	0.22	0.70	0.14
2035	0.78	117,000	0.24	0.07	0.22	0.04
2036	0.78	117,000	0.24	0.07	0.22	0.04
2037	0.78	117,000	0.24	0.07	0.22	0.04
2038	0.78	117,000	0.24	0.07	0.22	0.04
2039	0.78	117,000	0.24	0.07	0.22	0.04

Proposed Action

Year	LBA1 Coal	Rail Miles	All Railroads Derailment on All Lines	All Railroads Derailment on Mainline	BNSF Derailment on All Lines	BNSF Derailment on Mainline
2024	2.20	330,000	0.67	0.19	0.61	0.13
2025	4.51	676,500	1.37	0.40	1.26	0.26
2026	4.14	621,000	1.26	0.36	1.16	0.24
2027	4.87	730,500	1.48	0.43	1.36	0.28
2028	3.59	538,500	1.09	0.32	1.00	0.20

Accelerated Mining Rate Alternative

Year	LBA1 Coal	Rail Miles	All Railroads Derailment on All Lines	All Railroads Derailment on Mainline	BNSF Derailment on All Lines	BNSF Derailment on Mainline
2024	18	2,700,000	5.47	1.58	5.03	1.03
2025	18	2,700,000	5.47	1.58	5.03	1.03
2026	3.6	540,000	1.09	0.32	1.01	0.21

APPENDIX B

SOSI OBSERVED DURING FIELD SURVEYS WITHIN AND SURROUNDING THE PROJECT AREA OR INCLUDED IN AGENCY DATABASES AS OCCURRING IN THE EVALUATION AREA

Species	Habitat	Historic Occurrence in Analysis Area (1994-2018)	Recent Occurrence and Year Observed (2019-2022)	
			Annual Area	Expanded Area
Amphibians & Reptiles				
Great Plains toad *Anaxyrus cognatus*	Wetlands, floodplain pools	Infrequently	Never	Never
Greater short-horned lizard *Phrynosoma hernandesi*	Rocky outcrops, sparsely vegetated flats with sandy/gravelly soils	Rarely	Never	Never
Plains hog-nosed snake *Heterodon nasicus*	Friable soils	Never	Never	Never
Snapping turtle *Chelydra serpentina*	Prairie rivers and streams	Infrequently	Never	Never
Spiny softshell *Apalone spinifera*	Prairie rivers and larger streams	Never	Never	Never
Western milksnake *Lampropeltis gentilis*	Rock outcrops	Never	Never	Never
Birds				
Black-billed cuckoo *Coccyzus erythropthalmus*	Wooded draws (cottonwood, ash, and elm), thickets and deciduous woodlands	Never	Never	Never
Brewer's sparrow *Spizella breweri*	Sagebrush and shrub-steppe	Regularly	Every year from 2019 to 2022	Every year from 2019 to 2022
Burrowing owl *Athene cunicularia*	Open grasslands where abandoned mammal burrows are available	Occasionally	2021, 2022	2020, 2021
Cassin's finch *Haemorhous cassinii*	Forests, especially ponderosa pine	Never	Never	Never
Clark's nutcracker *Nucifraga columbiana*	Conifer forests, including ponderosa pine	Rarely	Never	2021
Golden eagle *Aquila chrysaetos*	Hunt over grasslands, shrublands, and open woodlands; nest on cliffs and large trees	Regularly	Every year from 2019 to 2022	Every year from 2019 to 2022
Great blue heron *Ardea herodias*	Wetlands, and edges of rivers and lakes	Regularly	Every year from 2019 to 2022	Every year from 2019 to 2022
Greater sage grouse *Centrocercus urophasianus*	Sagebrush, riparian meadows	Occasionally	Never	Never
Green-tailed towhee *Pipilo chlorurus*	Diverse shrub communities, especially on ecotone of sagebrush and mixed montane shrub	Once	Never	Never

Species	Habitat	Historic Occurrence in Analysis Area (1994-2018)	Recent Occurrence and Year Observed (2019-2022)	
			Annual Area	Expanded Area
Lewis's woodpecker *Melanerpes lewis*	Open forest and woodland, especially ponderosa pine and riparian	Rarely	Never	Never
Loggerhead shrike *Lanius ludovicianus*	Grasslands, shrublands, pastures/fields, and other open habitats with short vegetation	Regularly	Every year from 2019 to 2022	Every year from 2019 to 2022
Long-billed curlew *Numenius americanus*	Mixed grass prairie and moist meadows	Occasionally	2019	2019
Northern goshawk *Accipiter gentilis*	Mixed conifer forests	Once	Never	Never
Peregrine falcon *Falco peregrinus*	Nests on tall cliffs in open areas near water and abundant prey	Infrequently	2020	Never
Pinyon jay *Gymnorhinus cyanocephalus*	Ponderosa pine and limber pine-juniper woodlands	Occasionally	2020/2021	Never
Sage thrasher *Oreoscoptes montanus*	Sagebrush shrublands	Infrequently	2022	2020, 2021
Veery *Catharus fuscescens*	Deciduous riparian, especially where willow is present	Never	Never	Never
Yellow-billed cuckoo *Coccyzus americanus*	Deciduous riparian woodland (not known to breed in Montana)	Never	Never	Never
Mammals				
Black-tailed prairie dog *Cynomys ludovicianus*	Flat, open grasslands and shrub-steppe with low, sparse vegetation.	Regularly	Every year from 2019 to 2022	Every year from 2019 to 2022
Eastern red bat *Lasiurus borealis*	Riparian forest	Unknown	Never (not specifically monitored)	Never (not specifically monitored)
Fringed myotis *Myotis thysanodes*	Ponderosa pine and cottonwood riparian; caves, mines, buildings (roosting)	Occasionally	Never (not specifically monitored)	Never (not specifically monitored)
Hoary bat *Lasiurus cinereus*	Forested areas, riparian corridors	Regularly	Never (not specifically monitored)	Never (not specifically monitored)
Long-eared myotis *Myotis evotis*	Forrest areas	Regularly	Never (not specifically monitored)	Never (not specifically monitored)
Long-legged *Myotis volans*	Riparian and dry mixed conifer forest	Unknown	Never (not specifically monitored)	Never (not specifically monitored)

Species	Habitat	Historic Occurrence in Analysis Area (1994-2018)	Recent Occurrence and Year Observed (2019-2022)	
			Annual Area	Expanded Area
Little brown myotis *Myotis lucifugus*	Generalist, found in a variety of habitats and elevations; buildings, cave/mines (roosting)	Regularly	Never (not specifically monitored)	Never (not specifically monitored)
Spotted bat *Euderma maculatum*	Open juniper, sagebrush, ponderosa pine savannah; cliffs/canyons near water (roosting)	Occasionally	Never (not specifically monitored)	Never (not specifically monitored)
Townsend's big-eared bat *Corynorhinus townsendii*	Caves/mines (roosting); forest, woodlands, and cottonwood bottomland	Unknown	Never (not specifically monitored)	Never (not specifically monitored)