BNI Coal Ltd.

LBA Tracts Federal Coal Lease-by-Application

Serial Number: NDM-105513

Supplemental Environmental Assessment

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US Department of the Interior
Office of Surface Mining Reclamation and Enforcement
Program Support Division
One Denver Federal Center
Lakewood, CO 80225
Phone (303) 236-2900

Table of Contents

List of Tables

List of Figures

List of Appendices

Abbreviations and Acronyms

µg	microgram
µg/m^2/yr	micrograms per square meter per year
µg/m^3/yr	micrograms per cubic meter per year
µg/yr	micrograms per square meter per year
ASLM	Assistant Secretary for Land and Minerals Management
BA	Biological Assessment
BLM	Bureau of Land Management
BNI	BNI Coal Ltd.
CCR	Coal Combustion Residuals
CCUS	carbon capture, utilization, and storage
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CO_2e	carbon dioxide equivalent
°C	degrees centigrade
°F	degrees Fahrenheit
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FLIGHT	Facility Level Information on Greenhouse Gases Tool
FONSI	Finding of No Significant Impact
FWS	U.S. Fish and Wildlife Service
Gt	gigaton
GHG	greenhouse gas
GHRP	Greenhouse Gas Reporting Program
Hg(0)	elemental mercury
Hg(II)	oxidized mercury
Hg-p	particle bound mercury
IWG	Interagency Working Group
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act of 2022
km	kilometers
L	liter(s)
lb/yr	pounds per year
LBA Tracts	lease area
LBA	lease by application
m^2	square meters
m^3	cubic meters
MeHg	methylmercury
mg/kg	milligrams per kilogram
MLA	Mineral Leasing Act of 1920
MMT	million metric tons

MPDD	mining plan decision document
NADP	National Atmospheric Deposition Program
NCTF	National Climate Task Force
NDC	national determined contribution
NEPA	National Environmental Policy Act of 1969
ng	nanogram
ng/L	nanograms per liter
OSMRE	Office of Surface Mining Reclamation and Enforcement
PM_{10}	particulate matter less than 10 microns in size
PSC	Public Service Commission
R2P2	Resource Recovery and Protection Plan
SC-CH_4	social cost of methane
SC-CO_2	social cost of carbon dioxide
SC-GHG	social cost of greenhouse gases
SC-N_2O	social cost of nitrous oxide
SMCRA	Surface Mining Control and Reclamation Act
UNEP	United Nations Environment Programme
U.S.C.	United States Code
USDOI	United States Department of the Interior

Chapter 1 Introduction

1.1 Introduction

BNI Coal Ltd. (BNI), operator of the Center Mine in North Dakota, proposed a lease by application (LBA) for federal coal resources underlying private surface lands in Oliver County, North Dakota. The lease area (referred to herein as LBA Tracts, serial number NDM-105513, Figure 1-1) consists of approximately 630 acres of private surface lands and federal minerals managed by the Bureau of Land Management (BLM) located in the following locations (Figure 1-1):

- S ½ NE ¼ NE ¼ Section 8, Township 141N, Range 83W (20.22 acres)
- E ½ NE ¼, S ¼ SW ¼, and SE ¼ Section 14, Township 141N, Range 84W (319.27 acres)
- NE ¼, E ½ SW ¼, SE ¼ NW ¼, and SE ¼ NE ¼ NW ¼ Section 20, Township 142N, Range 84W (287.62 acres)

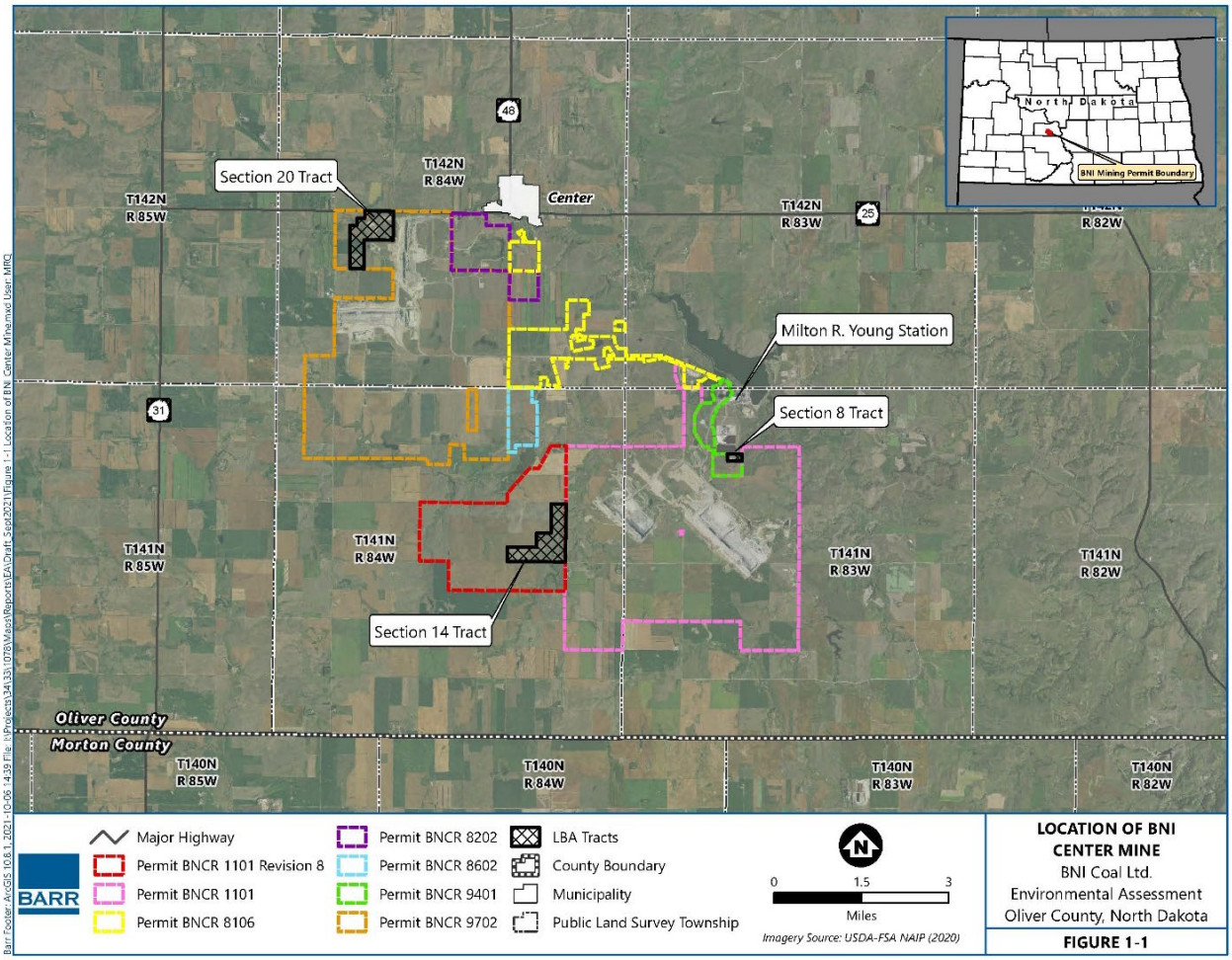

Figure 1-1 Location of BNI Center Mine

BNI's final LBA was submitted to the BLM on February 14, 2017. BNI currently operates the Center Mine under the following permits approved by the North Dakota Public Service Commission (PSC) Permits:

- BNCR-8106
- BNCR-8202
- BNCR-8602
- BNCR-9401
- BNCR-9702
- BNCR-1101

The tracts of the application area (i.e., LBA Tracts) in Sections 8 and 20 are within the permit area of the Center Mine (BNI mining permit boundary in Figure 1-1) that was approved by the PSC (Permits BNCR-9401 and BNCR-9702, respectively). BNI would need to modify permit BNCR-1101 before disturbing the Section 14 tract.

Pursuant to sections 503 and 523 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), the PSC is authorized to regulate surface coal mining operations on private, state and federal lands within North Dakota. The PSC maintains primacy to enforce performance standards and permit requirements and has authority during environmental emergencies, while the Office of Surface Mining Reclamation and Enforcement (OSMRE) retains oversight of this enforcement. The OSMRE is the agency responsible for making a recommendation to the United States Department of the Interior (USDOI) Assistant Secretary for Land and Minerals Management (ASLM) to approve, disapprove, or approve with conditions the proposed mining plan.

The BLM North Dakota Field Office completed an Environmental Assessment (EA) in October 2020 that analyzed the potential environmental impacts of the federal coal lease proposed by BNI (LBA Tracts). The OSMRE Western Region Office and PSC cooperated in the EA preparation (reference (1)). As a federal agency, the OSMRE is subject to the National Environmental Policy Act of 1969 (NEPA), and therefore must conduct an environmental review, in the form of either adoption of a prior NEPA document for the same project, supplementing a prior NEPA document for the same project, or creating a new NEPA analysis, before proceeding with the federal action of making a recommendation to the ASLM regarding the mining plan. The OSMRE determined a supplement to the prior EA was needed.

The OSMRE also determined that the proposed action of mining a new federal coal lease constitutes a mining plan decision requiring approval by the ASLM. The OSMRE's decision was based upon consideration of the federal regulations at 30 C.F.R. §§ 740 and 746. The OSMRE will develop a mining plan decision document (MPDD) recommendation that will be based on compliance with:

- NEPA;
- BLM's Resource Recovery and Protection Plan (R2P2) documentation;
- LBA;
- PSC permit findings;
- Any documentation ensuring compliance with applicable requirements of other federal laws, regulations, and executive orders, including preparing a Biological Assessment (BA) to assess the potential to affect threatened or endangered species as well as proposed and final designated critical habitat that may occur within the designated analysis areas and fulfill the requirements for consultation with the US Fish and Wildlife Service under Section 7(c) of the Endangered Species Act (ESA) of 1973, and consultation on cultural resources.

The analyses regarding the affected environment, environmental impacts and mitigation, and cumulative effects for the following elements were addressed in the BLM's 2020 EA (reference (1)):

- Air Resources
- Climate
- Water Resources
- Cultural Resources

The BLM's 2020 EA eliminated the following resource issues from further analysis:

- Geology/minerals
- Hazardous materials
- Noise and vibrations
- Paleontology
- Public safety
- Recreation
- Soil Resources
- Special plant species
- Transportation
- Visual Resources

- Vegetation
- Socioeconomics

The OSMRE incorporates, by reference, these analyses from the BLM's 2020 EA, and they are not discussed further in this supplemental EA, in accordance with 43 C.F.R. § 46.135. The OSMRE prepared this supplemental EA to: update the climate analysis, further assess potential social cost of greenhouse gases (SC-GHG) impacts, and assess potential mercury and selenium deposition impacts to the Pallid sturgeon and Whooping crane that would be associated with the approval of the federal mining plan.

The OSMRE analyzed the potential environmental consequences of the proposed action, including the effects when combined with reasonably foreseeable future actions and environmental trends.

The OSMRE prepared this supplemental EA and the associated BA to thoroughly examine the potential environmental impacts of the proposed action and alternative actions to support informed decision-making. This supplemental EA is consistent with:

- the purpose and goals of NEPA;
- the requirements of the Council on Environmental Quality's (CEQ's) implementing NEPA regulations at 40 C.F.R § 1500-1508;
- USDOI's NEPA regulations (43 C.F.R. § 46);
- USDOI Departmental Manual Part 516;
- OSMRE guidance on implementing NEPA, including the OSMRE Handbook on Procedures for Implementing the National Environmental Policy Act (reference (2));
- longstanding federal judicial and regulatory interpretations;
- Administration priorities and policies including Secretary's Order No. 3399 requiring bureaus and offices to use "the same application or level of NEPA that would have been applied to a proposed action before the 2020 Rule went into effect."

NEPA requires federal agencies to consider the potential environmental impacts of proposed federal actions and determine whether significant impacts to the human environment would occur. The term "significant" is discussed in 40 C.F.R. § 1501.3(b). If the OSMRE determines that the project would have significant impacts following the analysis in this supplemental EA, then an Environmental Impact Statement (EIS) would be prepared. If the OSMRE determines that the potential impacts would not be significant, the OSMRE would prepare a Finding of No Significant Impact (FONSI) to document this finding, and, accordingly, would not prepare an EIS.

1.2 Background

BNI is the owner and operator of the Center Mine and has been mining coal at the Center Mine since 1970, which typically produces 4.0 to 4.6 million tons of lignite coal per year. The maximum production rate approved in the Center Mine's minor source operating permit is 4.6 million tons of lignite coal per year (reference (3)). Approximately 98 percent of coal from the Center Mine is supplied to the Milton R. Young Station coal-fired power plant located adjacent to the northeast corner of the permit area. Lignite power plants are typically constructed next to the mines that supply them due to the high-moisture content that makes the transportation of lignite coal uneconomic over long distances (reference (4)). As such, there is no rail loadout facility at the Center Mine, nor are there any proximate rail lines that would allow for rail transport of the coal. Minnkota Power Cooperative, Inc. owns and operates the Milton R. Young Station that consists of two generating units. BNI is under contract to supply coal to the Milton R. Young Station through 2037.

BNI would haul coal from the LBA Tracts in trucks via a direct corridor passing through undisturbed areas and the Permit BNCR 9401 area to the Milton R. Young Station's coal crushing facility. As mining progresses, haul roads within the mining disturbance area are rerouted from ahead of the active pit to the reclamation side of the pit. All coal haul traffic occurs within the mining disturbance area. In addition, BNI supplies approximately 60,000 tons of coal per year to Center Coal Co. that is located adjacent to the mine offices. Center Coal Co. is a supplier of small quantities of stoker and lump coal to individual customers, including personal residences, R&D facilities, universities, and manufacturers, in North Dakota, South Dakota, Minnesota, and Canada (reference (5)).

The Center Mine has approximately 63.20 million tons of coal currently under PSC permits. BNI estimates that there are approximately 6.13 million tons of minable coal in the LBA Tracts (bringing the total coal in the LBA tracts under PSC Permits to 69.33 million tons if mining is approved). If the 6.13 million tons of federal coal from the LBA Tracts is mined in a continuous manner, it would represent approximately 16 months of coal production at the Center Mine at the maximum mining rate of 4.6 million tons per year. Given the amount of coal currently under PSC permits, the projected mine life and operating plans of the Center Mine are anticipated to extend through the year 2037, whether or not the ASLM approves the federal mining plan for the LBA Tracts.

Although the Center Mine has sufficient non-federal coal leases to supply the Milton R. Young Station through 2037, access to the federal coal leases would allow for a more efficient mine plan, i.e., less equipment miles traveled, less overburden, and more efficient reclamation. Additionally, Revision 17 is immediately adjacent to the Coal Combustion Residuals (CCR) disposal cells for the Milton R. Young Station. The Center Mine, because of delays in the leasing process, has already bypassed some federal coal adjacent to the CCR disposal cells, resulting in construction of a shallow CCR disposal cell above the bypassed federal coal. CCR disposal space at the Milton R. Young Station is running low. Mining of the federal coal within Revision 17 would allow for construction of a deeper CCR disposal cell with a greater storage

capacity than if the coal within Revision 17 were to be bypassed. The greater storage capacity would decrease the need for additional future CCR disposal cells.

As previously noted, with exception to North Dakota PSC approval for the Section 14 tract, BNI has the appropriate leases and access agreements to conduct surface disturbance and overburden removal on the privately-owned surface overlying the LBA Tracts and, to the extent necessary for conducting mining operations, on the adjoining parcels where the surface and coal is privately owned. However, before coal removal can occur on the LBA Tracts, the ASLM must approve the federal mining plan covering the LBA Tracts, as required by 30 C.F.R. § 746.11.

1.2.1 Milton R. Young Station

The Milton R. Young Station is not considered a connected action to this proposed action. The OSMRE Handbook on Procedures Implementing NEPA defines connected actions as follows:

> *Connected actions are those actions that are "closely related' and should be analyzed in the same NEPA document…Actions are connected if they automatically trigger other actions that may require an EIS; cannot or will not proceed unless other actions are taken previously or simultaneously; or if the actions are interdependent parts of a larger action and depend upon the larger action for their justification.* (reference *(2)*)

The Milton R. Young Station is not considered a connected action to this proposed action because (1) it would not automatically trigger any action at the Milton R. Young Station that would require an EIS; (2) OSMRE approval of the mining plan would not trigger any changes (previous or simultaneous actions) at the Milton R. Young Station; and (3) the OSMRE approval is not an interdependent part of a larger action at the Milton R. Young Station.

The proposed action would not change production levels at the Milton R. Young Station or require changes to its current regulatory permits. If the mining plan is rejected, the Milton R. Young Station would continue to operate and be supplied with coal from other Center Mine production areas. The Milton R. Young Station would operate, as needed, independent of the coal in the LBA Tracts. Although the Milton R. Young Station is not considered a connected action, operating data from the power plant are included in this supplemental EA to provide context and to assist with analyzing the reasonably foreseeable future action of combustion of coal sourced from the LBA Tracts.

1.3 Regulatory Framework and Necessary Authorizations

The following key laws, as amended, establish the primary authorities, responsibilities, and requirements for developing federal coal resources:

- Mineral Leasing Act of 1920 (MLA)
- National Historic Preservation Act of 1966
- NEPA

- Clean Air Act of 1970
- Clean Water Act of 1972
- Endangered Species Act of 1973
- SMCRA

The SMCRA provides the legal framework for the federal government to regulate coal mining by balancing the need for continued domestic coal production with protecting the environment and society, while also ensuring the mined land is returned to beneficial use when mining is finished. The OSMRE implements its responsibilities for the MLA and SMCRA under regulations at 30 C.F.R. §§ 700 through 955.

The SMCRA provides the OSMRE primary responsibility for administering programs that regulate surface coal mining operations in the United States. Pursuant to section 503 of the SMCRA, 30 U.S.C. § 1253, the PSC developed, and the Secretary of the Interior approved, North Dakota's permanent regulatory program authorizing PSC to regulate surface coal mining operations on private and state lands within North Dakota. Pursuant to section 523 of SMCRA, 30 U.S.C. § 1273, and 30 C.F.R. § 934.30, PSC entered into a cooperative agreement with the Secretary of the Interior authorizing the PSC to regulate surface coal mining operations on federal lands within the state.

Pursuant to this cooperative agreement, a federal coal leaseholder must submit a permit application package, which includes the R2P2 and State Mining Permit application, to the OSMRE and PSC for any proposed coal mining and reclamation operations on federal lands located in the state. Federal lands include surface ownership and mineral interests, owned by the federal government. If the permit application complies with the relevant laws and plan, the PSC issues a permit to the applicant to conduct coal-mining operations.

The OSMRE will prepare a MPDD in support of its recommendation to the ASLM, who will decide whether or not to approve the mining plan and whether or not additional conditions are needed. Pursuant to 30 C.F.R. § 746.13, the OSMRE's recommendation will be based on:

- the permit application package, including the R2P2;
- information prepared in compliance with NEPA, including this supplemental EA;
- documentation assuring compliance with the applicable requirements of federal laws, regulations, and executive orders other than NEPA;
- comments and recommendations or concurrence of other federal agencies and the public;
- findings and recommendations of the BLM with respect to the R2P2, federal lease requirements, and the MLA;

- findings and recommendations of the PSC with respect to the permit application and the state program;
- findings and recommendations of the OSMRE regarding additional requirements of 30 C.F.R. §§ 740 through 746.

1.4 Purpose and Need for the Proposed Action

BNI's purpose and need for the proposed action is to mine the approximately 6.13 million tons of minable coal in the LBA Tracts for continued operation of the Center Mine. As previously noted, if the 6.13 million tons of federal coal from the LBA Tracts is mined in a continuous manner, it would represent approximately 16 months of coal production at the Center Mine at the maximum mining rate of 4.6 million tons per year.

The purpose of the OSMRE's federal action is to respond to BNI's need for a federal mining plan that is required before the federal coal contained in the lease tracts can be mined. The OSMRE must recommend to the ASLM to approve, disapprove, or approve BNI's proposed mining plan with conditions as required by the Mineral Leasing Act of 1920 and the SMCRA. 30 C.F.R. §746: 30 U.S.C. § 208(c). The ASLM will use the OSMRE's recommendation to decide whether the mining plan modification is approved, disapproved, or approved with conditions.

1.5 Outreach and Issues Identification

1.5.1 Scoping

The OSMRE Handbook on Procedures Implementing NEPA, Section 9.3.1 states:

> *When evaluating the need for external scoping, consider factors such as: the size or scale of the proposed action; whether the proposal is routine or unique; who might be interested or affected; and whether or not external scoping has been conducted for similar projects and what the results have been. The EA should include the agency's rationale for determining whether or not to conduct external scoping.* (reference *(2)*)

A 30-day Public Scoping period was conducted for the BLM's 2020 EA from June 14 to July 14, 2017. During that period, the BLM received two comment letters and one email. In addition, The BLM's 2020 EA was available for public review from September 8 to October 8, 2020. During that time only one non-substantive comment relating to the proposed leasing action was received from the public. As a cooperating agency, the OSMRE reviewed all public comments received for the BLM's 2020 EA (reference (1)). Given the recent public comment periods for the BLM's 2020 EA, which is incorporated by reference within this supplemental EA, the OSMRE determined it was not necessary to conduct additional public scoping.

1.5.2 Outreach

The OSMRE released this supplemental EA and unsigned FONSI on January 26, 2026, for a 30-day public comment period and notified the public of this comment period by publishing a notice in the Bismarck Tribune and the Center Republican, mailing public outreach letters, as

well as mailing tribal consultation letters to 18 tribal leaders. The public comment period ends on February 25, 2023.

Chapter 2 Proposed Action and Alternatives

2.1 Introduction

This chapter incorporates Chapter 2.0 of the BLM EA by reference and provides only supplemental information regarding the SC-GHG, BA for federal threatened and endangered species, and mercury and selenium deposition where relevant to the analysis presented in this document. Chapter 2.0 of the BLM EA describes the alternatives considered and analyzed in detail (the proposed action and the no-action alternative). In addition, the BLM EA identifies the current operations and continuation of activities under the proposed action and under the no-action alternative. This section presents descriptions of the proposed action and the no-action alternative relative to the SC-GHG and mercury and selenium deposition analysis in Chapter 3.0.

2.1.1 Proposed Action

The location of the LBA Tracts is detailed in Chapter 1.1 and shown on Figure 1-1. The Sections 8 and 20 tracts of the application area (i.e., LBA Tracts [NDM-105513]) are within the permit area of the Center Mine (Figure 1-1) that was approved by the PSC (Permits BCNR-9401 and BNCR-9702, respectively). BNI submitted a request to the PSC to revise Permit BNCR-1101 to include the Section 14 tract. No mining of the federal coal in the LBA Tracts can occur until the PSC approves the modification to Permit BNCR-1101 and the ASLM approves the mining plan.

BNI estimates that there are approximately 6.13 million tons of minable federal coal located in the LBA Tracts. If the 6.13 million tons are mined continuously, it would represent approximately 16 months of coal production at the Center Mine at a mining rate of 4.6 million tons per year. However, the actual time to produce the coal from the LBA Tracts would be longer than 16 months and BNI estimates will occur over the course of seven years. The Center Mine projected mine life and operating plans, whether the LBA Tracts are mined or not, extend through the year 2037. The proposed action is for the OSMRE to submit an MPDD making a recommendation to the ASLM to approve the MPDD.

Mining and reclamation activities would proceed as described in Appendix B of the BLM EA (reference (1)).

2.1.2 No Action

Under the no-action alternative, the OSMRE would not recommend approval of the MPDD to the ASLM. Without ASLM's approval, the PSC's proposed permit would revert to the previous permit. Under the previous permit, the federal coal reserves in the LBA Tracts would not be recovered and mining would continue in other permitted areas until available coal reserves are mined out.

Under the no-action alternative, additional soil removal and stripping would occur on these tracts under the previous state permit in order to support mining the adjoining private coal reserves, as well as additional soil stockpiles being placed on these tracts. Beyond additional

physical disturbances, a no-action alternative would also delay reclamation of the surrounding private lands.

Chapter 3 Affected Environment and Impacts

3.1 Introduction

This chapter describes the existing condition of resources and the findings from the BA and evaluates climate change, SC-GHGs, and mercury and selenium deposition that could be affected by implementation of the alternatives described in Chapter 2.0, as they relate to the MPDD for the Center Mine. This chapter incorporates Chapter 3.0 of the BLM EA by reference and provides only supplemental information regarding climate, SC-GHGs, and mercury and selenium deposition where relevant to the analysis presented in this document.

In accordance with 40 C.F.R. § 1501.3(b), this chapter describes the potential environmental consequences of the proposed action, including the effects when combined with reasonably foreseeable future actions and environmental trends. "Reasonably foreseeable" means sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision. 40 C.F.R. § 1508.1(g) defines "effects or impacts" as:

> *…changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and include the following:*
>
> *(1) Direct effects, which are caused by the action and occur at the same time and place.*
>
> *(2) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.*
>
> *(3) Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.*
>
> *(4) Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial.*

3.2 Past, Present, and Reasonably Foreseeable Future Actions

For the purposes of this analysis, the temporal span of the proposed action represents the time during which mining of LBA Tracts would occur (i.e., 16 months of mining over seven years). For assessing potential mercury and selenium deposition impacts from air emissions, the

geographic extent consists of the area within 50 km of the Milton R. Young Station. The SC-GHGs are considered at the state, national, and global scales.

Past and present actions in the analysis areas that would contribute to cumulative effects include mining activities, power plants, industrial activities, and agricultural activities. Of these activities, surface mining and the associated electrical power generation dominate the emissions of the analysis area. In addition to these sources, agriculture, including row crops, hayfields and grazing lands, is a predominant industry in North Dakota. Although there is significant oil and gas development in northwest North Dakota, notably in the Bakken Region whose southeast portion is about 40 km to the north of the Milton R. Young Station, there is little oil and gas development in the analysis area.

Therefore, the reasonably foreseeable actions for this analysis consist of potential future mining of federal coal at the Center Mine and the coal combustion at the Milton R. Young Station.

Mining operations at Beulah Mine, Coyote Creek Mine, Falkirk Mine, and Freedom Mine are expected to continue for the foreseeable future with current production rates and continued surface disturbances according to individual approved mine plans. The continued operations of the other mines at permitted rates and within their permitted boundaries are not considered a change to existing conditions, therefore are not identified as a reasonably foreseeable action.

3.3 Climate Change and Social Cost of Greenhouse Gases

The BLM's 2020 EA presented an analysis regarding the affected environment, environmental impacts and mitigation, and cumulative effects for climate (reference (1)). This section provides an updated climate analysis in addition to SCC-GHGs.

Table 3-1 summarizes the direct and indirect GHG emissions from the mining and combustion of the 6.13 million tons of mineable federal coal located in the LBA Tracts based on the emissions presented in the BLM EA (reference (1)). Table 3-1 assumes GHG emission global warming potentials published by Intergovernmental Panel on Climate Change (IPCC) in 2014 (reference (6)).

Table 3-1 Proposed Action Summary for Potential GHG Emissions from Mining LBA Tracts and Coal Combusted at an Electric Generating Utility

Parameter Description	Proposed Action
Total Federal Coal Combusted (million tons)	6.13
Number of Years in Operation (years)	7
Annual Federal Coal Combusted (tons)	875,714
Cumulative 100-year CO_2e Mining Emissions (million tons CO_2e)	0.157
Annual 100-year CO_2e Mining Emissions (million tons CO_2e/year)	0.02
Annual 100-year CO_2e Mining Emissions (metric tons CO_2e/year)	22,471
Cumulative 100-year CO_2e Coal Combustion Emissions (million tons CO_2e)	8.516
Annual 100-year CO_2e Coal Combustion Emissions (million tons CO_2e/year)	1.22
Annual 100-year CO_2e Coal Combustion Emissions (metric tons CO_2e/year)	1,216,524

From reference (1)

3.3.1 Trends in Global, United States, and North Dakota Greenhouse Gas Emissions

3.3.1.1 Emission Levels

Preliminary estimates from the Rhodium Group for 2020 show global emissions at 50.1 gigatons (Gt) of CO_2e, representing a 4.4% decline from 2019 levels, by far the largest drop in recorded history. The reduction in emissions in 2020 was primarily due to the COVID-19 pandemic and global recession. In 2020, China accounted for nearly 30% of all global emissions, the United States accounted for approximately 10% of global GHG emissions, while India and the European Union accounted for 6% each. In 2019 (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 (30%); electric power generation (26%); land use, agriculture, and waste (21%); transportation (16%); and buildings (7%) (reference (7)). The proposed action (mining and combustion) annual emissions represent approximately 0.0024% of 2020 global annual GHG emissions.

The Environmental Protection Agency (EPA) tracks GHG emissions in the United States through two complementary programs. First is the *Inventory of U.S. Greenhouse Gases and Sinks*, which is the annual GHG emissions inventory published by EPA that represents all United States emissions (reference (8)). 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 estimates that the FLIGHT data reported by large emitters reflect 85% to 90% of the total United States emissions (reference (9)).

In 2020, total gross United States 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 United States 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 United States 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 United States: transportation (27%), electric power/electricity generation (25%), industry (24%), agriculture (11%) residential homes (7%), and commercial businesses (6%) (reference (8)). The proposed action annual emissions represent approximately 0.02% of 2020 net annual US GHG emissions.

In 2021, total North Dakota GHG emissions were 36.9 MMT CO_2e. GHGs were emitted across the following primary economic sectors in the North Dakota: electric power/electricity generation (76%), chemical producers (10%), petroleum and natural gas systems (6%) mineral mining (3%), refineries (2%), waste management (2%), and other sources (2%) (reference (9)). The proposed action annual emissions represent approximately 3% of 2021 annual North Dakota 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 United States Geological Survey has estimated GHG emissions and carbon sequestration on federal lands for the 10-year period from 2005 to 2014 (reference (10)). GHG emissions (when considering just CO_2) associated with the combustion and extraction of fossil fuels from United States 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 United States (48 contiguous states) ranged from 683 to 783.5 MMT CO_2e from 2005 to 2014, indicating a net carbon emission from federal lands within the conterminous United States. The annual net carbon emissions from North Dakota ranged from 2.5 to 12.4 MMT CO_2e from 2005 to 2014, indicating a net carbon emission from North Dakota federal lands (reference (10)). The proposed action annual emissions represent approximately 10% of North Dakota's federal lands 2014 emissions, and 0.1% of national federal lands 2014 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 448.30 MMt CO_2e from all coal production on federal lands in 2021 and 42.44 MMt CO_2e from all coal production on federal lands in North Dakota in 2021(reference (11)). The proposed action annual emissions represent approximately 0.27% of national 2021 federal coal emissions, and 2.9% of North Dakota's 2021 federal coal emissions.

3.3.1.2 Emission Goals

The IPCC *Special Report Global Warming of 1.5°C* estimates with high confidence that to limit global warming to 1.5 degrees centigrade (°C), global GHG emissions in 2030 would need to be 40% to 50% lower than 2010 emissions (reference (12)). 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 (reference (13)). 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 (reference (14)). Unfortunately, UNEP has estimated that emission reduction pledges from individual nations are anticipated to reduce projected 2030 emissions by only 7.5%, far short of the 55% reduction needed to limit global warming to 1.5°C (reference (13)). Therefore, global temperatures are anticipated to continue to rise well above levels necessary to avoid the worst impacts from climate change.

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 Abroa*d (EO 14008). EO 14008 was issued to facilitate the organization and deployment of a government-wide approach to combat the climate crisis (reference (15)). 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 United States 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 United States government will support research on and implementation of very low- and zero-carbon industrial processes and products, including introducing these products to market. The United States government will also incentivize carbon capture, utilization, and storage (CCUS) and the use of new sources of hydrogen for powering industrial facilities (reference (16)).

The United States NDC established an economy-wide target of reducing net GHG emissions by 50% to 52% below 2005 levels in 2030 (reference (16)). The United States has also established the goal of net-zero emissions no later than 2050 and 100% carbon pollution-free electricity by 2035 (references (17); (18)). In 2020, United States net GHG emissions totaled 5,222 MMT CO_2e, representing a 21% emissions reduction below 2005 level (reference (8)). The United States is broadly on-track to meet the 2025 goal of 26% to 28% emissions reductions below 2005 levels (reference (16)). 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 (reference (19)). 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 United States 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 (reference (20))

The net United States emissions in 2005 were 6,635 MMT CO_2e (reference (16)); 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 United States GHG emissions

must be reduced by 2,037 MMT CO_2e between 2020 and 2030. Under the proposed action, 1.22 MMT CO_2e would be emitted annually from 2023 to 2029, representing approximately 0.06% of the necessary emissions reduction of 2,037 MMT CO_2e to meet the 2030 emissions goals.

North Dakota does not currently have formal GHG emission targets (reference (21)).

3.3.1.3 Carbon Budget

The United States does not currently have a carbon budget with which to compare 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. We are, however, including a discussion of the global carbon budget for background. 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°C (3.6 degrees Fahrenheit [°F]) relative to preindustrial levels. 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 (reference (22)). Since this IPCC report was published, various studies have produced differing estimates of the remaining global carbon budget; some estimates have been larger (reference (23)) and others have been smaller (reference (24)). Most notably, the IPCC Sixth Assessment Report (reference (25)) 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 (reference (22)). 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 (reference (26)). 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) (reference (25)). 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 (reference (13)).

3.3.2 Social Cost of Greenhouse Gases

The social cost of carbon (SC-CO_2), social cost of nitrous oxide (SC-N_2O), and social cost of methane (SC-CH_4) – together, the 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 E.O. 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (reference (27)). Section 1 of E.O. 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 (reference (27)). Section 2 of the E.O. 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 E.O. and to take appropriate action.

Consistent with E.O. 13990, the CEQ rescinded its 2019 *Draft National Environmental Policy Act Guidance on Considering Greenhouse Gas Emissions* and has begun to review for update its *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* issued on August 5, 2016 (2016 GHG Guidance, [reference] (28)). While CEQ works on updated guidance, it has instructed agencies to consider and use all tools and resources available to them in assessing GHG emissions and climate change effects including the 2016 GHG Guidance (reference (29)).

Regarding the use of social cost of carbon or other monetized costs and benefits of GHGs, the 2016 GHG Guidance noted that NEPA does not require monetizing costs and benefits (reference (29)). It also noted that "the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations." (reference (29)).

Section 5 of E.O. 13990 emphasized that federal agencies should "capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account" and established an Interagency Working Group (IWG) on the Social Cost of Greenhouse Gases ([reference (27)]). In February of 2021, the IWG published *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide: Interim Estimates under Executive Order 13990* (reference (30)). This is an interim report that updated previous guidance from 2016.

In accordance with this direction, Sections 3.3.3 and 3.3.4 provide 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 do not constitute a complete cost-benefit analysis, nor do the SC-GHG numbers present a direct comparison with other impacts analyzed in this document. For instance, the 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), SC-CH_4, and SC-N_2O developed by the

IWG on the SC-GHG. Select estimates are published in the Technical Support Document (reference (30)) and the complete set of annual estimates are available on the Office of Management and Budget's website (reference (31)).

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 damages 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% (reference (30)).

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 (reference (30)). 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 in Sections 3.3.3 and 3.3.4 follow the IWG recommendations. Detailed calculations are presented in Appendix A.

3.3.3 Proposed Action

For the proposed action, BNI estimates that there are approximately 6.13 million tons of minable federal coal located in the LBA Tracts. If the 6.13 million tons are mined continuously, the coal would represent approximately 16 months of coal production at the Center Mine at a mining rate of 4.6 million tons per year. However, the actual time to produce the coal from the LBA Tracts would be longer than 16 months, and BNI estimates mining will occur over the course of seven years. The Center Mine projected mine life and operating plans, whether the LBA Tracts is mined or not, extend through the year 2037, so the estimated direct and indirect GHG emission rates for the continued operations at the Center Mine or the Milton R. Young Station would be unchanged by the proposed action. Therefore, Table 3-2 summarizes only the direct and

indirect GHG emissions from the mining and combustion of the 6.13 million tons of mineable federal coal located in the LBA Tracts based on the emissions presented in the BLM EA (reference (1)).

Because (as noted) lignite coal is difficult to transport; because there is no proximate rail line that would, in any event, allow that transport; because the Center Mine provides the overwhelming majority of its Coal to the Milton R. Young Station; and because BNI's purpose in seeking OSMRE approval is to facilitate a more efficient mining and reclamation plan and construction of fewer CCR disposal cells at the Milton R. Young Station, not to increase the supply of its marketable coal for sale, OSMRE is confident, based on the data before it, that the proposed action would not result in increased sales of coal from Center Mine (and associated GHG emissions) over and above the no action alternative.

Table 3-2 summarizes the SC-GHGs associated with estimated emissions from the proposed action. These estimates represent the present value (from the perspective of 2023) 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 (reference (30)) and the OSMRE's estimates of emissions in each year. They are rounded to the nearest $1,000. The estimates assume emissions would start in 2023 and end in 2029, based on the current mining plan.

Table 3-2 SC-GHGs Associated with Mining LBA Tracts and Coal Combustion under the Proposed Action

Social Cost Metric	5% Average Discount Rate	3% Average Discount Rate	2.5% Average Discount Rate	3% Average Discount Rate, 95th Percentile
SC-CO_2	$127,947,441	$447,773,450	$665,980,514	$1,344,568,350
SC-CH_4	$684,014	$1,544,583	$2,028,295	$4,088,395
SC-N_2O	$848,280	$2,703,392	$3,975,569	$7,134,708
Total	$129,479,735	$452,021,425	$671,984,378	$1,355,791,453

3.3.4 No Action

Under the no-action alternative, the OSMRE would not recommend approval of the MPDD to the ASLM. Without ASLM's approval, the PSC's proposed permits would revert to the previous permits. Under the previous permits, the federal coal reserves in the LBA Tracts would not be recovered and mining would continue in other permitted areas until available coal reserves are mined out. Mining of the federal coal would not occur, and the specific direct emissions associated with the federal coal would not occur. However, mining of the equivalent 6.13 million tons of non-federal coal would occur at the exiting rate of 4.6 million tons per year in other permitted areas similar to the proposed action. Furthermore, the Milton R. Young Station would continue to combust coal from other Center Mine production areas at current rates. The Milton R. Young Station would operate, as needed, independent of the coal in the LBA Tracts. Therefore, the no-action alternative would not change the estimated direct or indirect GHG emission rates for existing conditions. Table 3-3 summarizes the direct and indirect SC-GHG

associated with the continued operations at the Center Mine or the Milton R. Young Station under the no-action alternative.

Table 3-3 SC-GHGs for the No-Action Alternative of Coal Combusted at an Electric Generating Utility associated with the No-Action Alternative

Social Cost Metric	5% Average Discount Rate	3% Average Discount Rate	2.5% Average Discount Rate	3% Average Discount Rate, 95th Percentile
SC-CO_2	$127,947,441	$447,773,450	$665,980,514	$1,344,568,350
SC-CH_4	$684,014	$1,544,583	$2,028,295	$4,088,395
SC-N_2O	$848,280	$2,703,392	$3,975,569	$7,134,708
Total	**$129,479,735**	**$452,021,425**	**$671,984,378**	**$1,355,791,453**

Estimated SC-GHG costs for the no-action alternative (Table 3-3) and the proposed action (Table 3-2) are identical because the mining rate, direct mining equipment emissions, and indirect coal combustion rate at the Milton R. Young Station would be the same for both alternatives. Therefore, the proposed action does not result in an incremental direct or indirect increase in the SC-GHGs from the no-action alternative.

3.3.4.1 Unavoidable Adverse, Irretrievable, and Irreversible Effects

The Center Mine 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 some climate change impacts may be irreversible. Impacts on the long-term sustainability of area resources is dependent on the steps taken by the international community to limit GHG emissions, e.g., long-term sustainability of hydrologic resources will depend on the degree to which climate change induces drought and/or flooding which depends on the degree to which the planet warms which is directly related to the degree to which the international community does or does not limit GHG emissions.

3.3.4.2 Conclusion

BNI would haul coal from the LBA Tracts in trucks via a direct corridor passing through undisturbed areas and the Permit BNCR 9401 area to the Milton R. Young Station's coal crushing facility (Section 1.2). The Milton R. Young Station has current operating permits through May 2025, with the ability to renew every 5 years, and the Center Mine is anticipated to operate through the permitted lifetime of the Milton R. Young Station. The Center Mine has non-federal coal leases sufficient to supply the Milton R. Young Station through 2037. While the Center Mine could supply the Milton R. Young Station with non-federal coal sources, BNI has applied to mine coal within federal leases through 2037 because this would make for a more efficient mine plan. The Center Mine is expected to have a mining rate of 4.0 to 4.6 million tons per year and a life of mine through 2037, regardless of whether the proposed action is approved

or not (Section 1.2). As such, annual GHG emissions from the proposed action will be approximately the same as emissions under the no-action alternative. Therefore, regardless of whether the proposed action is approved or not, average annual emissions (primarily indirect) are expected to be approximately, 0.0024% of 2020 global emissions, 0.02% of 2020 United States net emissions, 3% of 2021 North Dakota emissions, 10% of North Dakota's federal lands 2014 emissions, 0.1% of 2014 national federal lands emissions, 0.27% of national 2021 federal coal emissions, and 2.9% of North Dakota's 2021 federal coal emissions. Additionally, the proposed action does not result in an incremental increase in the SC-GHG from the no-action alternative.

The global carbon budget is discussed in Section 3.3.1.3. The United States does not currently have a carbon budget with which to compare this project's potential emissions, however, as discussed in Section 3.3.1.3, the United States has set specific emissions reduction goals. Under the proposed action, 1.22 MMT CO_2e would be emitted annually from 2023 to 2029, representing approximately 0.06% of the necessary emissions reduction of 2,037 MMT CO_2e to meet the 2030 emissions goals. The EPA has not set specific thresholds for GHG emissions. Disapproving the proposed action would not reduce global emissions in any meaningful way because the no-action alternative has a very similar emissions profile. Therefore, while climate change does significantly impact the environment and the proposed action would produce climate changing emissions, there is no indication that the amount of GHG emissions from the proposed action as compared to the no-action alternative would have a significant impact on climate change.

3.4 Biological Assessment

Section 7 of the ESA requires consultation with the U.S. Fish and Wildlife Service (FWS) for projects requesting federal funding and/or regulatory agency authorization to ensure that the proposed federal action(s) do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of designated critical habitat. Barr Engineering Co. prepared a BA on behalf of the OSMRE to support agency coordination with the FWS and compliance with Section 7 of the ESA of 1973, as amended (16 U.S.C. §§ 1531 *et seq*.) for its MPDD recommendation for the LBA Tracts.

The BA analyzed how mining the LBA Tracts could affect threatened and endangered species and designated critical habitat. Two endangered species and four threatened species were identified as having the potential to occur in the action area (a 50-kilometer [(km)] radius area). The species considered in the BA include the following:

- Dakota skipper (*Hesperia dacotae*), threatened
- Northern long-eared bat (*Myotis septentrionalis*), threatened
- Pallid sturgeon (*Scaphirhynchus albus*), endangered
- Piping plover (*Charadrius melodus*) and its critical habitat, threatened
- Red knot (*Calidris canutus rufa*), threatened

- Whooping crane (*Grus americana*), endangered

The OSMRE conservatively (protectively) determined that the proposed action, may affect, but is not likely to adversely affect the species (and critical habitat) listed above.

The "may affect, but not likely to adversely affect" determination for the Pallid sturgeon, Northern long-eared bat, Piping plover, Red knot, and Whooping crane are based on potential indirect impacts to surface waters, including wetlands and riparian corridors, related to mercury and metal (e.g., selenium) emissions from the Milton R. Young Station burning Center Mine coal (Sections 3.4, 3.5, and 3.6).

Surveys conducted for the LBA Tracts where mining would occur in 2023 indicate no suitable habitat present for the Dakota skipper. However, the "may affect, but not likely to adversely affect" determination for the Dakota skipper is based on observations over the last 3 years of individuals in central and eastern Oliver County, with several sightings of Dakota skippers within 5 miles of the Center Mine. There is also the potential for selenium emissions from the Milton R. Young Station to be contributed to Dakota skipper habitat, therefore a may affect but not likely to adversely affect determination is partly due to selenium deposition.

The BA was submitted to the FWS on February 10, 2022, for review and concurrence. The FWS provided informal comments to the OSMRE on April 14, 2022. The OSMRE has been consulting with the FWS to finalize the BA.

3.5 Mercury Deposition

Mercury is a naturally occurring element that is a neurotoxin and therefore a health and environmental concern as it accumulates within the food chain. The primary human exposure to mercury is through fish consumption. Mercury is deposited from the atmosphere to land and into waterbodies. When inorganic mercury enters an aquatic ecosystem, under certain conditions, it can undergo a process known as methylation resulting in methylmercury (MeHg) (reference (32)). Biomagnifying up through the food chain, MeHg ultimately leads to elevated concentrations in the tissue of top predator fish, with exposure to the general public occurring when those fish are consumed. MeHg is a potent toxin because of its high solubility in fatty tissue in animals, resulting in significant potential for bioaccumulation and biomagnification. As a result, MeHg is considered the most hazardous form of mercury.

Coal-fired power plants are one of the main sources of mercury emissions within the United States. There is scientific evidence that shows a positive relationship between mercury emissions from electric generating units in the United States and local mercury deposition and the associated response within ecosystems (reference (33)).

Mercury air emissions generally exist as one of three species: elemental, ionic or oxidized, and particle bound. Understanding which species are present in air emissions is the key to determining mercury's atmospheric pathway, transport, and fate. The majority of anthropogenic mercury emissions and the most common species present in the atmosphere is gaseous elemental mercury (reference (34)). Elemental mercury has an atmospheric lifetime of several months to a year and is transported great distances (reference (35)). Upon emission to air from

combustion sources, very little gaseous elemental mercury is directly deposited to the earth's surface due to its elemental properties and slow reaction with common atmospheric oxidants (reference (34)). Research findings indicate dry deposition of background elemental mercury occurs via vegetation uptake or in throughfall (precipitation passing through a forest canopy and washing off materials deposited on leaf and branch surfaces) being an important pathway for delivery of mercury to boreal forest soils (reference (36); (37); (38); (39)). Terrestrial environments are considered net sinks for elemental mercury (i.e., elemental mercury is retained and stored in the watershed (reference (37)). However, due to known loss mechanisms of elemental mercury (i.e., volatilization), the amount of this dry deposited elemental mercury that is actually retained in a watershed is a fraction of that deposited (reference (37)); (40)), and an even smaller amount is mobilized within a watershed and reaches aquatic systems to become methylated and actually contribute to fish tissue mercury concentrations (reference (37); (41)). Therefore, in regard to fish tissue mercury concentrations, the important pathway for mercury is direct deposition to the water body via precipitation (primarily oxidized mercury), with a small contribution from mercury derived from the watershed (reference (42)). Large lake systems tend to reflect mercury having isotopic signatures reflective of atmospheric precipitation, suggesting that more of the mercury exported to the lake water originated from precipitation (and, hence, from gaseous oxidized mercury or particulate mercury) that fell onto the catchment (reference (42)).

The upper Missouri River system seems to be an exception to the conclusion that large lake systems tend to reflect atmospheric precipitation. For the Missouri River basin, prior research indicates the majority of mercury (~93%) delivered to reservoirs in the upper part of the basin is associated with suspended solids in river water, with atmospheric deposition (wet and dry) only contributing about 4 to 6% (reference (43)). Erosion and scouring that occur during high flow events mobilize mercury (as soil-bound mercury) in the watershed and in surficial river sediments and create a pulse in mercury movement (reference (43)). Land management practices that control erosion and leaching have a large effect on the mercury delivered to the reservoirs in the upper Missouri River basin (includes the Missouri River upstream of Lewis and Clark Lake in South Dakota) (reference (43)).

Atmospheric mercury deposited to water is predominantly in the form of oxidized mercury compounds. These may be gaseous oxidized mercury or oxidized mercury attached to particles, both of which are due to the direct deposition of gas phase species and through wet deposition in precipitation (reference (34)). Further, gaseous oxidized mercury is highly reactive with other environmental constituents and is deposited within a few miles of its emission point (reference (35)). Locally deposited oxidized mercury in waterbodies can interact with microorganisms where they change it into MeHg. MeHg accumulates within fish tissue. Elevated mercury concentrations in fish tissue have been documented in several regions of the United States, for example in the southeast (reference (35)) and in New England (reference (44)). In the evaluation by the Florida Department of Environmental Protection, oxidized mercury accounted for more than 50% of the emissions from the facilities being evaluated (reference (35)). King et al. found that local mercury deposition due to emissions of oxidized mercury was a factor of 4 to 10 times greater than rural background deposition (reference (45)).

Associated with increased local deposition of oxidized mercury, fish tissue mercury concentrations were elevated in nearby water bodies (reference (35); (45)). The available literature clearly concludes that when a significant portion of air emissions are oxidized mercury, there will be increased local mercury deposition.

Particle-bound mercury has a short atmospheric life due to its physical characteristics (mass, increased wind resistance, interaction with precipitation) and is thought to be deposited within a range of 50 to 80 km (30 to 50 miles) from the emission point (reference (35)).

In North Dakota, electric generating stations do not contribute significantly to local or regional mercury deposition due to the predominance of elemental mercury emitted from tall stacks (reference (46)). Sullivan et al. conducted a mercury deposition modeling study of three power plants (reference (47)). Oxidized mercury emissions were estimated at 20% and 60%. They found that less than 2% of total mercury emissions deposited within 15 km (with the highest deposition occurring within 10 km), of the power plants they evaluated. The small percentages of incremental deposition from the respective power plants resulted in minor contributions to background mercury levels and no correlation with vegetation or soil concentrations. Estimated total mercury deposition ranged between 0.3% to 1.7% of background. Sullivan et al. also concluded that their modeling results were consistent with the literature they reviewed that found no “hot spots” of deposition close to power plants (reference (47)). Additionally, a modeling analysis was conducted for a proposed baseload coal-fired power plant with total mercury emissions of approximately 136 pounds per year (lb/yr) after controls (activated carbon and particulate control technology), with primarily elemental mercury emissions (97%). The modeling results identified that the highest estimated deposition was about 2% of background deposition, with the authors concluding that very little deposition of mercury was likely to occur due to the predominance of elemental mercury air emissions (reference (48)).

Atmospheric mercury deposition estimates are available for North and South Dakota that are considered applicable to the Project area. The National Atmospheric Deposition Program (NADP) collects wet deposition concentrations around the United States through the Mercury Deposition Network. The two closest stations to the Milton R. Young Station are the Lostwood National Wildlife Refuge in North Dakota and Eagle Butte in South Dakota. Table 3-4 summarizes the average wet deposition from 2016-2020. Dry deposition values in Table 3-4 are based on results from Engel et al. that conclude dry mercury deposition is approximately 35% of the total deposition and wet deposition is approximately 65% of the total deposition (reference (49)). Estimates for other areas in nearby states indicate dry deposition can be as high as 50 to 80% of total deposition (reference (50); (39); (51)). Therefore, an estimate of dry deposition being approximately 35% of total deposition may be on the low side but is a representative estimate for this analysis.

Table 3-4 Estimated Background Total (wet + dry) Mercury Deposition to the Area

Category	Lostwood National Wildlife Refuge, ND (ID = ND01)[1]	Eagle Butte, SD (ID = SD18)[1]
Distance from Milton R. Young Station (km)	193	225
Average Annual Wet Mercury Deposition [2] (2016-2020), micrograms per square meter per year (µg/m^2/yr)	5.04	6.93
Annual Wet Mercury Deposition Standard Deviation[3] (2016-2020), µg/m^2/yr	1.44	1.25
Calculated Annual Dry Mercury Deposition[2], µg/m^2/yr	2.71	3.73
Annual Total Mercury Deposition (Wet + Dry), µg/m^2/yr	7.75	10.66
Annual Total Mercury Deposition (Wet + Dry) Standard Deviation[3], µg/m^2/yr	2.21	1.92

[1] Wet deposition data from the National Atmospheric Deposition Program, Mercury Deposition Network. http://nadp.slh.wisc.edu/data/sites/siteDetails.aspx?net=MDN&id=ND01

[2] Partitioning of total mercury deposition between wet (65%) and dry (35%) is based on the results from Engle et al. (reference (49)).

[3] The standard deviation of wet deposition based on the reported annual mercury deposition for each site from the National Atmospheric Deposition Program, Mercury Deposition Network. The standard deviation for total (wet + dry) deposition includes the estimated contribution of dry deposition to annual deposition. In this case, dry deposition is 53.8% of wet deposition, and this percentage is used to estimate the dry deposition component of the standard deviation. For example, the standard deviation of wet deposition at Lostwood is 1.44 µg/m^2/yr; 1.44 µg/m^2/yr x 0.538 = 0.77 µg/m^2/yr dry deposition; 1.44 µg/m^2/yr + 0.77 µg/m^2/yr = 2.21 µg/m^2/yr. The standard deviation for total mercury deposition for Eagle Butte was estimated in the same manner as estimated for Lostwood.

Background concentrations of mercury in North Dakota surface waters and wetlands is limited. Data from the Lostwood National Wildlife Refuge indicates total mercury in wetland and lake surface waters are primarily in the dissolved phase, with concentrations in whole-water (data from unfiltered samples) ranging from 0.87 nanograms per liter (ng/L) to 17.2 ng/L (reference (52)). Most whole-water total mercury concentrations (middle 80%) were between 1.60 and 8.71 ng/L (reference (52)). Median whole-water total mercury concentrations ranged from 1.58 to 2.37 ng/L for lake wetlands, 4.52 to 6.48 ng/L for temporary wetlands, 3.95 to 6.99 ng/L for semipermanent wetlands, to 4.52 to 7.92 ng/L for seasonal wetlands. Generally, whole-water total mercury concentrations for the North Dakota lakes and wetland waters are within the range reported for other lakes and wetland waters in rural and agricultural areas (reference (53); (54); (55)).

3.5.1 Proposed Action

A screening assessment for potential deposition of the proposed action direct and indirect mercury air emissions was conducted. Potential direct mercury emissions from the proposed action at the Center Mine are small, related to fuel combustion in mine vehicles, and overall not significant on a local, regional, or national scale. The majority of anthropogenic mercury emissions in North Dakota are from coal combustion (reference (56)).

The Milton R. Young Station, that combusts coal from the Center Mine, has been in operation since 1970 and is estimated to currently emit approximately 178 pounds of mercury per year (5-year average). Mercury emissions for the 2015 to 2019 time period (five years) from the Milton R. Young Station are summarized in Table 3-5. The Milton R. Young Station has a mercury

emission limit of 0.004 lbs/MMBTU for both Boiler 1 and Boiler 2. Applicable Maximum Achievable Control Technology standards described in Section 3.2.5 of the BLM EA restrict emissions of hazardous air pollutants such as mercury.

Table 3-5 Annual Total Indirect Mercury Emissions at Milton R. Young Station, 2015-2019

Emissions	2015	2016	2017	2018	2019	Unit
Mercury, total	179	156	201	180	174	Pounds

Note: Table 3-9 of reference (57)

Total mercury deposition from the Milton R. Young Station's air emissions, considered here to be an incremental or additional deposition, was estimated within a 50-km radius. For this analysis, it is assumed that mercury speciation for elemental (Hg(0)), oxidized (Hg(II)), and particle-bound (Hg-p) are 89%, 10%, and 1%, respectively (reference (58)). Additionally, each mercury species has a different settling velocity based on its physical and chemical attributes, and therefore a different cumulative fraction value is applied to each mercury species based on generic modeling of power plants conducted by Cohen et al. (reference (59)). The cumulative deposition fractions that are applied to the 50-km radius based on the modeling conducted by Cohen et al. (reference (59)) are as follows: 0.2 for Hg(II), 0.01 for Hg-p, and 0.0015 for Hg(0). Table 3-6 summarizes the estimated potential deposition within 50 km of the Milton R. Young Station.

Table 3-6 Potential Incremental Total (wet + dry) Mercury Deposition within 50-Kilometer Radius of the Milton R. Young Station

Item	Value	Unit[1]
50-km radius area[2]	7.85E+09	m^2
MR Young, mercury emissions (5-year average; 2015-2019)	178	lb/yr
Mercury speciation	Not applicable	Not applicable
Hg(0), 89% of total	158	lb/yr
Hg(II), 10% of total	17.8	lb/yr
Hg-p, 1% of total	1.78	lb/yr
Incremental deposition	Not applicable	Not applicable
Hg(II) (0.2 cumulative fraction deposited; over 50-km radius)	1.61E+09	µg/yr
Hg-p (0.01 cumulative fraction deposited; over 50-km radius)	8.07E+06	µg/yr
Hg(0) (0.0015 cumulative fraction deposited; over 50-km radius)	1.08E+08	µg/yr
Total Mercury Deposition (sum for Hg(II), Hg-p, and Hg(0)	1.73E+09	µg/yr
Incremental Annual Total Mercury Deposition Rate over 50-km Radius Area (Deposition Rate = total mercury deposition, µg/yr / area, m^2)	0.22	µg/m^2/yr

[1] Unit conversions:
1 pound = 435.6 grams (g)
1 gram = 1,000 milligrams (mg)
1 milligram = 1,000 micrograms (µg)
1 kilometer (km) = 1,000 meters (m)

[2] Area of a circle = πr^2 (where π = 3.14159; r^2 = radius squared)

If considered an incremental deposition, the estimated deposition rate of 0.22 µg/m^2/yr within 50-km of the Milton R. Young Station is approximately 2.8% of the background total mercury deposition rate of 7.75 µg/m^2/yr estimated for this area based on data from the Lostwood NADP monitoring site. This potential deposition from the Milton R. Young Station is not likely to be discernible from the variability in background mercury deposition. For example, the standard deviation for background total mercury deposition at the Lostwood NADP monitoring site for the most recent 5-year time period (2016 to 2020) is estimated to be 2.21 µg/m^2/yr (when accounting for wet and dry deposition). Therefore, a potential contribution of 0.22 µg/m^2/yr from the Milton R. Young Station is within the variability of background deposition such that it would not likely be a detectable change in deposition.

Atmospheric mercury deposited to terrestrial watersheds can be sequestered and generally only slowly released over time to waterbodies (reference (37); (41)), whereas atmospheric mercury deposited directly to waterbodies can accumulate rapidly within the food chain (reference (41)). Once deposited in waterbodies, some portion can be rapidly changed to MeHg by microorganisms (reference (41)) where it then accumulates within the food chain, with accumulation in fish tissue being of most concern to wildlife and humans.

The largest waterbody within the 50-km radius of the Milton R. Young station is the Missouri River (~13,000 acres), which is a habitat for the Pallid sturgeon fish species, listed as an endangered species under the ESA. There are also several lakes and numerous ponds and wetlands within 50 km of the Milton R. Young Station. Whooping cranes are a migratory bird listed as an endangered species under the ESA, and could use these ponds and wetlands for stopover foraging and roosting habitat on their spring (April to mid-May) and fall (September to early November) migrations. Table 3-7 summarizes the acreages of waterbodies within the 50-km radius area.

Calculations were conducted to estimate a potential change in surface water mercury concentration based on the estimated potential incremental mercury deposition from the Milton R. Young Station to open water areas. A change in mercury surface water concentration is expected to result in a change in fish tissue mercury concentrations (reference (41)). Whooping cranes feed mostly on frogs, fish, plant tubers, insects, crayfish, and waste grains during migration. Because the Whooping crane relies on species that inhabit ponds and wetlands for a portion of their diet (i.e., frogs, fish, and crayfish), assessing the potential change in mercury surface water concentrations provides an indicator of potential effects to the Whooping crane.

The estimated potential change in mercury concentration to surface waters within 50 km of the Milton R. Young Station, including the Missouri River, is small (Table 3-7). For surface waters in general, on an annual basis, the estimated incremental change in surface water total mercury concentration is approximately 0.22 ng/L, compared to median background concentrations ranging from about 1.6 to 9 ng/L.

For the Missouri River, the estimated potential incremental change is 0.07 ng/L, also small compared to median background total mercury concentrations ranging from about 1.6 to 9 ng/L.

Table 3-7 Estimated Incremental Surface Water Mercury Concentrations Associated with Potential Total Mercury Deposition from the Milton R. Young Station

Item	Value	Unit[1]
Estimated Incremental Mercury Deposition within 50-kilometer Radius of the Milton R. Young Station	0.22	µg/m^2/yr
Water Bodies (Lakes, Ponds, or Wetlands) Within 50 Kilometers	Not applicable	Not applicable
Total Surface Area of Waterbodies [2]	236,049,993	m^2
Total Annual Mercury Deposited on Waterbodies (Annual deposition = deposition rate, µg/m^2 * area, m^2)	52,014,370	µg/yr
Average Depth of Water for Lakes and Wetlands	1	meter
Total Volume of Water (volume, m^3 = surface area, m^2 * water depth, m)	2.36E+08	m^3
Estimated Hg Concentration (Hg concentration = Total annual Hg deposition, µg/yr / water volume, m^3)	0.22	µg/m^3/yr
Estimated Hg Concentration per 1 Liter of water	0.22	ng/L
Missouri River Segment Within 50 Kilometers of Milton R. Young Station	Not applicable	Not applicable
Total Surface Area of the River	52,947,082	m^2
Total Annual Hg Deposited on this Stretch of the River	11,667,059	µg/yr
Average Depth of Water in this Stretch of the River	3	meter
Total Volume of Water	1.59E+08	m^3
Estimated Hg Concentration (Hg conc = Total annual Hg deposition, µg/yr / water volume, m^3)	0.07	µg/m^3/yr
Estimated Hg Concentration per 1 Liter of water	0.07	ng/L

Notes: µg/m^2/yr - micrograms per square meter per year; m^2 - square meters; µg/yr - micrograms per square meter per year; m^3 - cubic meters; µg/m^3/yr - micrograms per cubic meter per year; ng/L - nanograms per liter

[1] Unit conversions
1 cubic meter (m^3) = 1,000 liters (L)
1 microgram (µg) = 1,000 nanograms (ng)

[2] Surface water area estimated using the National Hydrography Dataset (reference (60)) and the National Wetland Inventory Data (reference (61)).
Total Waterbodies (not associated with the Missouri River) = 58,329 acres
Missouri River segment within 50 km of the Milton R. Young Station = 13,083 acres

Overall, the potential contribution of mercury from the Milton R. Young Station to surface waters (0.22 ng/L for lakes, ponds, and wetland waters; 0.07 ng/L in the Missouri River) is not significant when compared to the variability in background concentrations (range of about 1 to 17 ng/L). Based on the estimated small potential contribution of the Milton R. Young Station to deposition to lakes/ponds/wetlands and in the Missouri River, mercury deposition may affect, but is not likely to adversely affect, the Whooping crane and Pallid sturgeon (reference (62)).

3.5.2 No Action

Background total mercury deposition in the 50-km analysis area, based on available data from the Lostwood National Wildlife Refuge mercury monitoring site (Table 3-4), will continue to occur at a rate of about 7 to 8 µg/m^2/yr. The year-to-year variability (standard deviation) in mercury deposition, based on wet deposition data (Table 3-4 will likely be about 1.4 to 2.2 µg/m^2/yr (and could be larger depending on variability of dry deposition).

The Milton R. Young station anticipates operating to the same capacity for the reasonably foreseeable future even without the coal mined from the LBA Tracts. Therefore, there is no expected change in facility operations, mercury air emissions (other than the variability associated with year-to-year operations), or speciation of mercury emissions. Under the assumption that indirect mercury air emissions from the Milton R. Young Station result in incremental mercury deposition, the Milton R. Young Station would continue to contribute some amount of mercury to local deposition, as estimated in this analysis, about 0.22 µg/m^2/yr of total (wet + dry) mercury deposition within the 50-km analysis area (Table 3-6). Therefore, no changes are expected to existing total mercury deposition within a 50-km radius of the Milton R. Young Station for a no-action alternative.

If considered an incremental deposition, the estimated deposition rate of 0.22 µg/m^2/yr within a 50-km radius of the Milton R. Young Station (Table 3-6) is approximately 2.8% of the background total mercury deposition rate of 7.75 µg/m^2/yr estimated for this area based on data from the Lostwood NADP monitoring site. This potential deposition from the Milton R. Young Station is not likely to be discernible from the variability in background mercury deposition. For example, the standard deviation for background total mercury deposition at the Lostwood NADP monitoring site for the most recent 5-year time period (2016 to 2020) is 2.21 µg/m^2/yr (when accounting for wet and dry deposition). Therefore, a potential contribution of 0.22 µg/m^2/yr from the Milton R. Young Station is within the variability of background deposition such that it would not likely be a detectable change in deposition.

If considered an incremental deposition, a potential local total mercury deposition of 0.22 µg/m^2/yr from the Milton R. Young Station is estimated to contribute about 0.22 ng/L to surface waters (lakes, ponds, and wetlands) and about 0.07 ng/L of mercury to the Missouri River (Table 3-7). This potential incremental contribution of mercury from the Milton R. Young Station to surface waters (0.22 ng/L for lakes, ponds, and wetland waters; 0.07 ng/L in the Missouri River) is not significant when compared to the variability in background concentrations (range of about 1 to 17 ng/L). Based on the estimated small potential contribution of the Milton R. Young Station to deposition in the Missouri River, mercury deposition may affect, but is not likely to adversely affect, the Pallid sturgeon. Furthermore, this small potential contribution of mercury loading to lakes/ponds/wetlands and the surrounding Missouri River watershed within 50 km may affect, but is not likely to adversely affect, the Whooping crane (reference (62)).

3.6 Selenium Deposition

Selenium is a trace element typically present in surface waters at low concentrations, less than 3 micrograms per liter (µg/L). At slightly higher concentrations, around 5 µg/L, it can bioaccumulate in aquatic food chains and become a concentrated dietary source of selenium that is highly toxic to fish and wildlife (reference (63)).

However, while selenium is considered an environmental contaminant in locations where it occurs in excessive abundance, it is imperative to recognize selenium's role as an essential nutrient that is required to support life. All forms of animal life that have nervous systems require selenium in their diet, to protect against oxidative damage and regulate redox balance in

support of healthy brain, endocrine and immune functions. Although harmful effects accompany exposure to excessively high environmental selenium, it is important to recognize that far more locations have adverse biological consequences because of too little, rather than too much, selenium present in the environment (reference (64)).

The atmosphere is a primary pathway for the distribution, cycling, and deposition of selenium in the environment (reference (65)), with about 40% of selenium originating from anthropogenic sources such as coal combustion, metal smelting, and biomass burning (reference (66). However, selenium, which is found in the soils of the Great Plains, has been derived from geological formations, especially those formations deposited during Cretaceous time (reference (67)). As described by Alvin M. et al., *"… The sedimentary rocks which make up the Cretaceous formations are the most important selenium bearers. They were deposited in a shallow sea which covered the Great Plains area during the Mesozoic era. … The selenium which was laid down in these sedimentary formations has been carried through the soil-forming processes and is found in the soils of certain areas. …".*

Cretaceous formations with high selenium concentrations in the Missouri River watershed include the Pierre Shale and Niobrara Shale (reference (68); reference (69)). Both formations are present in the upper Missouri River watershed with surface exposure of the Pierre Shale occurring south of Fort Yates (reference (70)), with overlying soils tending to also have high selenium concentrations (reference (67)). Selenium concentrations are typically highest in the oxygenated zone of soils (typically the upper 15 to 30 centimeters (~6 to 12 inches), with lower concentrations in the lower part of the soil profile (reference (71)). However, as shown in other studies, the presence of shales with high selenium content can result in higher concentrations of selenium with soil depth (reference (68)).

The Missouri River watershed is described as being prone to erosion, with the primary source of selenium in river water and sediments related to bluff and soil erosion. Studies conducted on the Missouri River in northern Nebraska / southern South Dakota identified erosion of bluffs and subsequent sediment transport by tributary rivers and within the main stem of the river as contributing soil-bound (particle-bound) selenium to river sediment (reference (72)). Selenium concentrations in river sediment were found to be generally low (7 of 9 sites), typically less than 2 milligrams per kilogram (mg/kg or part per million), with the interpretation that potential release of selenium into solution for uptake by biota from these 7 sites would be minimal (reference (72)). Two of the 9 sites had concentrations greater than 4 mg/kg and were in the "high" category for potential food-chain based affects. However, the authors expressed concerns that even though selenium concentrations in sediment were low for 7 of the 9 sites, concentrations may be sufficiently high to cause biological impacts on fish and bird species prior to remobilization of additional sequestered selenium (reference (72)).

Previous studies in the North Dakota portion of the Missouri River have found elevated concentrations of selenium in sediment and in fish, but concentrations were below levels considered toxic to aquatic organisms and/or fish (reference (73)). The conclusion from this study was that selenium is primarily from soil erosion in the watershed and not due to atmospheric deposition of selenium or from point-source water discharges.

A more recent 2019 study by the FWS assessed selenium levels within the Missouri River to identify potential harmful contaminants to the Pallid sturgeon (reference (74)). Samples were collected from river water, sediment, and sturgeon tissues from past studies. The 2019 assessment found that levels of selenium exceeded the benchmarks in 53 of the 496 collected river water samples (~11% of river water samples had selenium concentrations greater than the benchmark). However, none of the sediment samples or samples of Pallid sturgeon tissue exceeded the benchmark values (reference (74)).

3.6.1 Proposed Action

A screening assessment for potential deposition from direct and indirect selenium air emissions originating from the proposed action was conducted because air emissions and atmospheric deposition is the most likely pathway to contribute selenium to the Missouri River. Potential direct selenium air emissions from the proposed action at the Center Mine are small, related to fuel combustion in mine vehicles, and overall not significant on a local, regional, or national scale. For the proposed action, the majority of anthropogenic indirect selenium air emissions are expected to be from coal combustion at the Milton R. Young Station.

Speciation of selenium emissions from the Milton R. Young Station is expected to be primarily particle-bound selenium based on speciation studies. Some gas-phase selenium is likely to be emitted, but this is expected to be a smaller percent of total selenium emissions, ranging from about 20% to possibly as high as 40% (reference (75)). Volatile inorganic selenium is relatively unstable and has a limited lifetime, with the tendency to condense on particulate matter (reference (65)). Therefore, only the volatile organic selenium fraction, a small percent of total emissions from coal combustion, seems to be available for long-range transport, with the majority of selenium emissions being associated with particulates either in flue gas or in the atmosphere shortly after release from a stack (reference (75)).

When assessing the potential deposition of chemicals emitted to the air from a specific facility, researchers have concluded that dry deposition is the primary contributor to local deposition (reference (76)). Dry deposition of particulate metals at the Milton R. Young Station is associated with emissions of particulate matter less than 10 microns in size (PM_{10}) and less than 2.5 microns in size ($PM_{2.5}$). $PM_{2.5}$ are fine particles that can remain airborne for long periods of time and are generally associated with long range atmospheric transport and not associated with local deposition (reference (70)). PM_{10} are coarser particles with a shorter atmospheric residence time and therefore tend to deposit closer to an emission source. The Milton R. Young Station has numerous pollution control systems including an electrostatic precipitator, flue gas desulfurization systems, and activated carbon injection system all of which serve to capture a portion of the pollutants that would otherwise be emitted. Given that the average PM_{10} emissions at the Milton R. Young Station are approximately 300 tons per year, there is some potential for local deposition of particulate metals (reference Evans et al. 2012). However, given the pollution control measures in place at the Milton R. Young Station and its stack height, local deposition of particulate metals is likely very minimal.

To provide additional perspective on the potential for particle-bound pollutants, such as selenium, to affect nearby ecological receptors, particulate metal emissions for the Milton R. Young Station were compared to the lowest available EPA (reference (77)) screening emission rates. Table 3-8 indicates all estimated particulate metal emissions are below the lowest available screening emission rates (per EPA 1980 guidance), including selenium.

As shown in Table 3-8, indirect air emissions of selenium (0.17 tons per year) from the Milton R. Young Station were a factor of 10 below EPA's threshold screening emission rate (1.7 tons per year) (ratio of selenium air emissions to the screening emission rate = 0.1; guideline value for potential significance = 1). The results from the screening emission rate assessment are interpreted to mean that no significant deposition of selenium is expected to occur within the 50-km analysis area, either to receptors close to (i.e., within 3 km), or distant from (> 3 km), the Milton R. Young Station. Similarly, no significant effects are expected to occur from potential deposition of selenium air emissions from the Milton R. Young Station close to, or distant from, the source. Therefore, based on the screening results in Table 3-8, the potential deposition of indirect selenium air emissions from the Milton R. Young Station to the Missouri River watershed is expected to be insignificant and is expected to have no effect on the 2 mg/kg surface water benchmark established by FWS, and therefore no effect on the Pallid sturgeon. Furthermore, the small potential contribution of selenium loading to the lakes/ponds/wetlands and surrounding Missouri River watershed within a 50-km radius is expected to have no effect on the Whooping crane (reference (62)).

Table 3-8 Milton R. Young Station Metal Emissions and Comparison to EPA (1980) Screening Emission Rates

Pollutant	Station Emissions (TPY)	Screening Emission Rate (TPY)(1)	Ratio (Project Emissions / Screening Emission Rate)
Arsenic	0.038	0.24	0.16
Beryllium	0.001	0.057(2)	0.02
Cadmium	0.005	0.037	0.14
Chromium	0.35(3)	1.10	0.32
Cobalt	0.008	1.20	0.01
Copper	NA	0.21	NA
Manganese	0.42	1.13(4)	0.37
Mercury	0.1	61	0.002
Nickel	0.12	67	0.002
Selenium	0.17	1.70	0.1
Vanadium	NA	0.33	NA
Zinc	NA	63	NA

NA = Not applicable/Data not available

(1) Lowest screening emission rate from Table 5.7 of reference (77), unless otherwise noted.

(2) Screening emission rate for beryllium is from Table 5.6 of reference (77).

(3) Emissions are a sum of Chromium III and Chromium VI.

(4) The original EPA (1980) emission rate was adjusted by a factor of 3.43 based on Table 5.8 of reference (77); a 30 m stack, "cold".

3.6.2 No Action

Atmospheric deposition of selenium in the 50-km analysis area will continue to occur and existing conditions watershed processes (e.g., soil erosion) will continue to deliver selenium to the Missouri River surface water and sediments even without coal mined from the LBA Tracts.

The Milton R. Young station anticipates operating to the same capacity for the reasonably foreseeable future even without the coal mined from the LBA Tracts. Therefore, there is no expected change in facility operations, indirect selenium air emissions (other than the variability associated with year-to-year operations), or primarily particle-bound indirect selenium emissions. Under the assumption that selenium air emissions from the Milton R. Young Station result in incremental selenium deposition, the Milton R. Young Station would continue to contribute some amount of selenium to local deposition, but the amount is insignificant given the screening analysis results shown in Table 3-8 (selenium emissions a factor of 10 below the screening emission rate). Therefore, no changes are expected to existing selenium deposition within a 50-km radius of the Milton R. Young Station for a no-action alternative. Based on the screening results in Table 3-8 for selenium, no indirect effects to the Pallid sturgeon or Whooping crane are expected from the no-action alternative.

Chapter 4 List of Preparers

Table 4-1 shows a list of the preparers of this supplemental EA and those who participated in the preparation of this supplemental EA from the OSMRE.

Table 4-1 List of Preparers

Organization	Name	Title/ Project Responsibility
OSMRE	Roberta Martinez Hernandez	Natural Resource Specialist/ Project Manager, internal scoping, review of EA
OSMRE	**Edward Vasquez**	**Ecologist, review of EA**

Table 4-2 shows a list of the preparers of this EA and those who participated in the preparation of this supplemental EA from the third-party consultants Barr Engineering Co.

Table 4-2 Contractors

Organization	Name	Title/ Project Responsibility
Barr Engineering Co.	Rachael Shetka	Senior Environmental Specialist/Project Manager EA author
Barr Engineering Co.	Cliff Twaroski	Vice President and Senior Environmental Scientist, EA author
Barr Engineering Co.	Allison Serakos	Environmental Scientist, mercury deposition analysis/EA author
Barr Engineering Co.	Matthew Metzger	Senior Civil Engineer, Social Cost of Carbon analysis/EA author

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Appendix A

Social Cost of Greenhouse Gasses Calculations

Social Cost of Carbon Dioxide Calculator

Base Year: 2023 (the Base Year is often the current year and can be no later than the first year of emissions)

Year 1: 2023: (the first year of emissions)

Year of emissions	CO_2 emissions (metric tons)[1]	Average, 5%[2,3,4]	Average, 3%[2,3,4]	Average 2.5%[2,3,4]	95th Percentile, 3%[2,3,4]	Average, 5%[5,6]	Average, 3%[5,6]	Average 2.5%[5,6]	95th Percentile, 3%[5,6]
2023	1216367.14	$16	$54	$80	$162	$19,391,325	$66,032,923	$97,721,720	$197,220,552
2024	1216367.14	$16	$55	$82	$166	$19,034,408	$65,370,877	$96,888,093	$195,622,541
2025	1216367.14	$17	$56	$83	$169	$18,666,409	$64,691,378	$96,036,998	$193,949,162
2026	1216367.14	$17	$57	$84	$173	$18,291,346	$63,996,006	$95,169,782	$192,207,308
2027	1216367.14	$18	$59	$86	$176	$17,909,676	$63,287,341	$94,287,739	$190,403,467
2028	1216367.14	$18	$60	$87	$180	$17,522,878	$62,564,618	$93,392,107	$188,540,599
2029	1216367.14	$19	$61	$88	$183	$17,131,399	$61,830,307	$92,484,075	$186,624,721

[1] Annual GHG Estimates from Air Resource Specialist
[2] Per ton SC-CO2 Value (2020$/metric ton CO2)
[3] Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, Interim Estimates under E.O. 13990. Interagency Working Group on Social Cost of Carbon, United States Government. February 2021.
[4] Social Cost estimates for emissions years beyond 2050 are estimated using an annual growth rate equal to the average annual growth in social cost estimates for the last five years of available estimates from the TSD (2046-2050)
[5] Present Value (in Base Year) of Estimated SC-CO2 by emissions year (2020$)
[6] The SCC estimates from the IWG represent the present value of damages from that year's emissions discounted back to the year of emissions. These columns take that value and discount to the base year to facilitate the total NPV calculation.

Present Value (in Base Year) of Estimated SC-CO_2 for all CO_2 emissions, 2020$)

Average, 5%	Average, 3%	Average 2.5%	95th Percentile, 3%
$127,947,441	$447,773,450	$665,980,514	$1,344,568,350

This calculator was developed by Rebecca Moore, Senior Economist, BLM 970-226-9246 rmoore@blm.gov

Social Cost of Methane Calculator

Base Year: 2023 (the Base Year is often the current year and can be no later than the first year of emissions)

Year 1: 2023: (the first year of emissions)

Year of emissions	CH_4 emissions (metric tons)[1]	Average, 5%[2,3,4]	Average, 3%[2,3,4]	Average 2.5%[2,3,4]	95th Percentile, 3%[2,3,4]	Average, 5%[5,6]	Average, 3%[5,6]	Average 2.5%[5,6]	95th Percentile, 3%[5,6]
2023	136.67	$747	$1,626	$2,120	$4,292	$102,143	$222,208	$289,673	$586,526
2024	136.67	$775	$1,673	$2,175	$4,420	$100,823	$221,964	$290,000	$586,481
2025	136.67	$802	$1,720	$2,230	$4,548	$99,397	$221,545	$290,139	$585,941
2026	136.67	$829	$1,767	$2,286	$4,677	$97,879	$220,963	$290,098	$584,935
2027	136.67	$856	$1,814	$2,341	$4,805	$96,279	$220,227	$289,887	$583,490
2028	136.67	$884	$1,861	$2,397	$4,934	$94,610	$219,346	$289,513	$581,633
2029	136.67	$911	$1,908	$2,452	$5,062	$92,882	$218,330	$288,986	$579,390

[1] Annual GHG Estimates from Air Resource Specialist
[2] Per ton SC-CH4 Value (2020$/metric ton CH4)
[3] Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, Interim Estimates under E.O. 13990. Interagency Working Group on Social Cost of Carbon, United States Government. February 2021.
[4] Social Cost estimates for emissions years beyond 2050 are estimated using an annual growth rate equal to the average annual growth in social cost estimates for the last five years of available estimates from the TSD (2046-2050)
[5] Present Value (in Base Year) of Estimated SC-CH_4 by emissions year (2020$)
[6] The SCC estimates from the IWG represent the present value of damages from that year's emissions discounted back to the year of emissions. These columns take that value and discount to the base year to facilitate the total NPV calculation.

Present Value (in Base Year) of Estimated SC-CH_4 for all CH_4 emissions, 2020$)

Average, 5%	Average, 3%	Average 2.5%	95th Percentile, 3%
$684,014	$1,544,583	$2,028,295	$4,088,395

Social Cost of Nitrous Oxide Calculator

Base Year: 2023 (the Base Year is often the current year and can be no later than the first year of emissions)

Year 1: 2023: (the first year of emissions)

Year of emissions	N_2O emissions (metric tons)[1]	Average, 5%[2,3,4]	Average, 3%[2,3,4]	Average 2.5%[2,3,4]	95th Percentile, 3%[2,3,4]	Average, 5%[5,6]	Average, 3%[5,6]	Average 2.5%[5,6]	95th Percentile, 3%[5,6]
2023	20.08	$6,385	$19,717	$28,801	$51,879	$128,240	$395,976	$578,423	$1,041,912
2024	20.08	$6,587	$20,154	$29,358	$53,087	$125,996	$392,965	$575,224	$1,035,114
2025	20.08	$6,789	$20,591	$29,914	$54,295	$123,676	$389,794	$571,836	$1,027,828
2026	20.08	$6,991	$21,028	$30,471	$55,502	$121,290	$386,474	$568,271	$1,020,088
2027	20.08	$7,193	$21,465	$31,028	$56,710	$118,852	$383,017	$564,541	$1,011,927
2028	20.08	$7,395	$21,902	$31,585	$57,918	$116,370	$379,433	$560,654	$1,003,376
2029	20.08	$7,597	$22,339	$32,141	$59,125	$113,856	$375,733	$556,621	$994,465

Present Value (in Base Year) of Estimated SC-NO for all N_2O emissions, 2020$)

Average, 5%	Average, 3%	Average 2.5%	95th Percentile, 3%
$848,280	$2,703,392	$3,975,569	$7,134,708