

DOE/EA-2127D

**Draft Environmental Assessment
Flameless Pressurized Oxy-Combustion
Large-Scale Pilot Test
December 2021**



U.S. Department of Energy



National Energy Technology Laboratory

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Responsible Agency: United States Department of Energy

Title: Flameless Pressurized Oxy-Combustion Large-Scale Pilot Test, Environmental Assessment (DOE/EA-2127D)

Location: Gillette Energy Complex, 13151 Highway 51, Gillette WY, 82718

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Abstract: The United States Department of Energy (DOE) National Energy Technology Laboratory prepared this Environmental Assessment (EA) to analyze the potential environmental, cultural, and social impacts of partially funding a large-scale pilot test facility for flameless pressurized oxy-combustion (FPO) to improve the performance, efficiency, and cost of using a coal-fueled system to generate electricity. The FPO large-scale pilot project (FPO Pilot Project) would be designed, constructed, and operated by the Southwest Research Institute (SwRI) in conjunction with the Electric Power Research Institute, Black Hills Energy, and the University of Wyoming. The FPO Pilot Project would be located at the existing Gillette Energy Complex on lands owned by a Black Hills Energy subsidiary, the Wyodak Resources Development Corporation. This site is approximately 5 miles east of the city of Gillette, Wyoming.

DOE’s proposed action is to provide financial assistance to SwRI. DOE proposes to provide approximately \$60 million of the project’s \$123 million total cost. SwRI and the project partners are required to obtain funding for the remaining project cost. The funding will be used to develop and operate the FPO Pilot Project.

Availability: This EA is being released for public review and comment. Hard copies of the EA are being distributed to Tribal agencies and the Campbell County Public Library in Gillette, with electronic copies sent to the project mailing list and others who requested an electronic copy. The public is invited to provide written or e-mail comments to DOE on the Draft EA during the comment period, from December 20, 2021 to January 26, 2022. Comments should be provided to the National Energy Technology Laboratory M/S:922-273C, P.O. Box 10940, Pittsburgh, PA 15236-0940, Attention: Pierina Fayish or Pierina.Fayish@NETL.DOE.GOV. Comments received after January 26, 2022 will be considered to the extent possible.

TABLE OF CONTENTS

1.0	Introduction/Purpose and Need	1-1
1.1	Introduction	1-1
1.2	Background	1-1
1.3	Purpose and Need.....	1-3
1.4	Regulatory Requirements and Permits Needed	1-3
1.4.1	National Environmental Policy Act and Related Procedures.....	1-3
1.4.2	Federal Laws, Regulations, and Executive Orders	1-4
1.4.3	State and Local Regulations and Requirements	1-4
1.5	Organization of EA	1-4
2.0	Proposed Action and Alternatives	2-1
2.1	DOE’s Proposed Action	2-1
2.2	No Action Alternative	2-1
2.3	Other Alternatives	2-1
2.4	FPO Pilot Project Description.....	2-1
2.4.1	Overview	2-1
2.4.2	Site Information	2-2
2.4.3	Construction	2-5
2.4.4	Operation.....	2-5
2.4.5	Closure	2-9
2.5	SwRI Alternatives Considered.....	2-9
2.5.1	Location Alternatives.....	2-9
2.5.2	Process Alternatives.....	2-9
3.0	Affected Environment and Environmental Consequences	3-1
3.1	Summary of Analysis Criteria	3-1
3.2	Affected Environment and Analysis of Impacts.....	3-2
3.2.1	Air Quality/Climate Change	3-2
3.2.1.1	Affected Environment.....	3-2
3.2.1.2	Environmental Consequences	3-4
3.2.2	Health and Safety (Including Noise)	3-7
3.2.2.1	Affected Environment.....	3-7
3.2.2.2	Environmental Consequences	3-10
3.2.3	Access and Transportation	3-11
3.2.3.1	Affected Environment.....	3-11
3.2.3.2	Environmental Consequences	3-13
3.2.4	Socioeconomics	3-13
3.2.4.1	Affected Environment.....	3-13
3.2.4.2	Environmental Consequences	3-15
3.2.5	Environmental Justice.....	3-16
3.2.5.1	Affected Environment.....	3-16
3.2.5.2	Environmental Consequences	3-17
3.2.6	Vegetation.....	3-18
3.2.6.1	Affected Environment.....	3-18
3.2.6.2	Environmental Consequences	3-18
3.2.7	Wildlife.....	3-19

3.2.7.1	Affected Environment.....	3-19
3.2.7.2	Environmental Consequences	3-20
3.2.8	Water Resources.....	3-21
3.2.8.1	Affected Environment.....	3-21
3.2.8.2	Environmental Consequences	3-23
3.2.9	Visual Resources	3-24
3.2.9.1	Affected Environment.....	3-24
3.2.9.2	Environmental Consequences	3-24
3.2.10	Materials and Waste Management	3-24
3.2.10.1	Affected Environment.....	3-24
3.2.10.2	Environmental Consequences	3-26
3.2.11	Resource Areas Excluded from Detailed Analysis.....	3-26
3.2.11.1	Geology and Paleontological Resources	3-26
3.2.11.2	Soils	3-28
3.2.11.3	Land Use.....	3-28
3.2.11.4	Cultural Resources	3-28
4.0	Consultation and Coordination.....	4-1
4.1	Public Involvement, Agency Coordination, and Tribal Consultation	4-1
4.2	List of Preparers	4-2
5.0	Acronyms and Abbreviations.....	5-1
6.0	References.....	6-1

LIST OF APPENDICES

Appendix A	Categorical Exclusions for FPO Pilot Project Work in Phases I and II
Appendix B	Wyoming State Historic Preservation Office Consultation Response

LIST OF TABLES

Table 3.2-1	Federal and State Ambient Air Quality Standards	3-3
Table 3.2-2	Projected Operational Emissions of the FPO Pilot Plant	3-6
Table 3.2-3	Baseline Noise Measurement Results	3-8
Table 3.2-4	Receiving Facility Operational Noise Levels.....	3-11
Table 3.2-5	Socioeconomic Condition Metrics, 2019	3-14
Table 3.2-6	Employment by Industry, 2019.....	3-14
Table 3.2-7	Engineering, Purchases, Construction, and Labor Expenditures in the Local Economy	3-15
Table 3.2-8	Estimated Operating Costs to be Expended in the Local Economy	3-16
Table 3.2-9	Metrics Related to Minority and Low-Income Populations in Gillette, Campbell County, Wyoming, and the United States in 2019	3-16
Table 3.2-10	Federally Listed Animal Species Potentially Occurring within the Project Area.....	3-20
Table 3.2-11	Materials Used in the FPO Pilot Plant.....	3-27

LIST OF FIGURES

Figure 1 Project Location 1-2
Figure 2 Mining in the South Pit Wyodak Mine and South Pit Reclamation 2-2
Figure 3 Pilot Plant Location 2-3
Figure 4 Proposed Site Plan 2-4
Figure 5 Simplified Flowsheet of the FPO Pilot System and Equipment 2-6
Figure 6 Baseline Noise Survey Locations..... 3-9
Figure 7 FPO Pilot Project Operations Noise Contours..... 3-12
Figure 8 FPO Pilot Site Building Heights 3-25
Figure 9 One-Mile Radius Around Project Area..... 3-30

1.0 INTRODUCTION/PURPOSE AND NEED

1.1 Introduction

The United States Department of Energy (DOE) National Energy Technology Laboratory prepared this Environmental Assessment (EA) under the National Environmental Policy Act (NEPA). This EA analyzes the potential environmental, cultural, and social impacts of partially funding a large-scale pilot test facility for flameless pressurized oxy-combustion (FPO) to improve the performance, efficiency, and cost of using a coal-fueled system to generate electricity. The FPO large-scale pilot project (FPO Pilot Project) would be designed, constructed, and operated by the Southwest Research Institute (SwRI) in conjunction with the Electric Power Research Institute, Inc., Black Hills Energy, and the University of Wyoming. The FPO Pilot Project would be located at the existing Gillette Energy Complex on lands owned by a Black Hills Energy subsidiary, the Wyodak Resources Development Corporation (WRDC). This site is approximately 5 miles east of the city of Gillette, Wyoming (Figure 1).

1.2 Background

In 2017, Congress directed the DOE's Office of Fossil Energy to develop large-scale pilot projects for potentially transformational coal technologies aimed at enabling improvements in coal-powered system performance, efficiency, and cost of electricity. These technologies include post-combustion carbon dioxide (CO₂) capture systems. The technologies are at various stages of development, but some are ready to proceed to large-scale pilot testing. Large-scale pilots are necessary to reduce the technical and financial risk associated with the adoption of a new technology in the marketplace.

To implement the Fossil Fuel Large-Scale Pilot program, DOE issued Funding Opportunity Announcement DE-FOA-0001788 on September 28, 2017, requesting proposals for large-scale pilot projects. DOE conducted a competitive merit review of the proposals and selected projects for the planning phase of project development in January 2018.

The Fossil Fuel Large-Scale Pilot program consists of three phases: feasibility, design, and construction/operation. To select the optimal projects for implementation, the proposed projects undergo competitive down-selections at critical points in the project. In Phase I (feasibility), the objective was to demonstrate that the team is fully committed and able to implement Phases II and III, update the budget and schedule, and complete an environmental information volume. Phase I was completed for all selected projects in April 2019, and DOE competitively assessed each project location for technical merits and potential environmental impacts prior to selecting six projects to proceed to Phase II (design). During Phase II, the selected project participants will complete a Front-End Engineering Design study, secure funding for Phase III, and complete the NEPA process. These six projects, including the FPO Pilot Project, have proceeded through the multi-step selection process and are the only projects available to be selected for construction and operation. The other five projects will be analyzed for potential impacts separately and will not be discussed further in this EA.

The proposed FPO Pilot Project is in the final stage of research and development prior to commercial demonstration. The technical success of its integrated components has already been demonstrated in the small-scale pilot; the FPO Pilot Project was selected by DOE to proceed to Phase II, requiring completion of an assessment under NEPA.

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DOE assessed previous phases of the FPO large-scale pilot project, as required by NEPA implementing procedures and regulations. DOE issued a Categorical Exclusion (CX) to the project prior to work being conducted for Phase I and again prior to work being conducted for Phase II. Copies of CXs for the previous phases of the proposed project are included in Appendix A.

1.3 Purpose and Need

The purpose and need for DOE action is to advance the commercial readiness development of potentially transformative coal technologies that can improve system performance, efficiency, and the cost of electricity.

Congress directed DOE to complete pilots of this size to enable step-change improvements in coal-powered system performance, efficiency, and cost of electricity. A large-scale pilot is the final step in the research and development process and would demonstrate the scalability and commercial potential of FPO technology using domestically produced coal. This would mitigate the risks associated with adopting this technology at full scale, creating a pathway for commercial deployment in the United States. SwRI proposed the Gillette Energy Complex as the site for this project because it is a preexisting facility with the space and coal type needed to complete the project.

This EA will analyze the potential environmental impacts of the FPO Pilot Project, focusing on those that are most significant and probable.

1.4 Regulatory Requirements and Permits Needed

1.4.1 National Environmental Policy Act and Related Procedures

DOE prepared this EA in accordance with NEPA, as amended (42 United States Code [U.S.C.] 4321), the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR 1021). This statute and the implementing regulations require that DOE, as a federal agency:

- Assess the environmental impacts of its proposed action;
- Identify any adverse environmental effects that cannot be avoided, should the proposed action be implemented;
- Propose mitigation measure for adverse environmental effects, if appropriate;
- Evaluate alternatives to the proposed action, including a no action alternative; and
- Describe the cumulative impacts of the proposed action together with other past, present, and reasonably foreseeable future actions.

These provisions must be addressed before a final decision is made to proceed with any proposed federal action that has the potential to cause impacts to the natural or human environment, including providing federal funding to a project. This EA is intended to meet DOE's regulatory requirements under NEPA and provide DOE with the information needed to make an informed decision about providing financial assistance. In accordance with the above-listed regulations, this EA allows for public input into the federal decision-making process; provides federal decision-makers with an understanding of potential environmental effects of their decisions; and documents the NEPA process.

1.4.2 Federal Laws, Regulations, and Executive Orders

The following federal laws, regulations, and Executive Orders (EOs) were also considered in the evaluation of the FPO Pilot Project.

- Clean Air Act (CAA)
- Clean Water Act
- Protection of Wetlands (EO 11990)
- Floodplain Management (EO 11988)
- Endangered Species Act (ESA)
- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act (BGEPA)
- The Noise Control Act of 1972, as amended
- Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)
- Pollution Prevention Act of 1990
- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- Toxic Substances Control Act
- Occupational Safety and Health Act

1.4.3 State and Local Regulations and Requirements

To implement the proposed FPO Pilot Project, the following permits or licenses would likely be required from state and local agencies.

- New Source Review Construction Permit from the Wyoming Department of Environmental Quality (Wyoming DEQ) Air Quality Division for construction activities
- Minor Source Operation Permit from the Wyoming DEQ Air Quality Division for operations
- Wyoming Pollutant Discharge Elimination System (WYPDES) authorization of coverage under the Small Construction General Permit from the Wyoming DEQ Water Quality Division for construction activities
- Amendment of the WYPDES permit for the Gillette Energy Complex to allow use of the existing wastewater ponds for containment of the new wastewater streams

Project emissions are not expected to exceed prevention of significant deterioration (PSD) levels and would not require a PSD Permit.

1.5 Organization of EA

The DOE has prepared this EA in compliance with NEPA and other relevant federal and state laws and regulations. This EA discloses the direct, indirect, and cumulative environmental effects that would result from the proposed action and alternatives. The document is organized into four parts:

- Chapter 1: Introduction – This chapter includes information on the purpose of and need for the project, the agency’s proposal for achieving that purpose and need, applicable laws and regulations, and other permits that may be required.
- Chapter 2: Proposed Action and Alternatives – This chapter provides a more detailed description of the agency’s proposed action and evaluates the no action alternative. Alternatives considered by the applicant are also discussed in this chapter.
- Chapter 3: Affected Environment and Environment Consequences – This chapter contains a description of current resource conditions in the project area and the environmental effects of the proposed action and no action alternatives.
- Chapter 4: Consultation and Coordination – This chapter provides a detailed discussion of the consultation and coordination that has occurred for the EA. The chapter also includes a list of preparers for the EA.
- Chapter 5: Acronyms and Abbreviations – This chapter includes a listing of all acronyms and abbreviations used in the EA.
- Chapter 6: References – This chapter provides references for literature and data cited throughout the document.
- Appendices – The appendices provide information on previous NEPA actions, consultation efforts, and other information to support the analyses presented in the EA.

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2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter provides a more detailed description of the FPO Pilot Project and sets the stage for consideration of the affected environment and environmental consequences discussions.

2.1 DOE's Proposed Action

DOE's proposed action is to provide financial assistance to SwRI and other project partners. DOE proposes to provide approximately \$60 million of the project's \$123 million total cost. SwRI and the project partners are required to obtain funding for the remaining project cost. The funding will be used to develop and operate the FPO Pilot Project.

2.2 No Action Alternative

Under the no action alternative, DOE would not provide cost-shared funding to the proposed project. The project may be delayed if SwRI opts to search for other funding sources. More likely, the FPO Pilot Project would not be constructed. DOE assumes, for the purposes of NEPA, that the recipient would not pursue the project. Consequently, the FPO technology would not be tested as a large-scale pilot using domestically produced coal, and the level of commercial readiness for this technology would not be advanced because of the proposed project.

2.3 Other Alternatives

NEPA requires DOE to assess the range of reasonable alternatives to the proposed action. DOE's proposed action is limited to providing financial assistance, sharing costs with selected applicants who respond to a competitive funding opportunity. Accordingly, DOE's decision is limited to either accepting or rejecting the FPO Pilot Project as proposed by the proponent, including its proposed technology and selected site. DOE's consideration of reasonable alternatives to this project under NEPA is therefore limited to the no action alternative. DOE will use the completed NEPA documents to provide environmental information when deciding whether to fund the FPO Pilot Project.

2.4 FPO Pilot Project Description

2.4.1 Overview

FPO is a proven technology that was developed to recover energy from low-rank coal, other brown fuels, and wastes. FPO is achieved by mixing coal with water and injecting it into a combustor at elevated pressure. The combustor performs oxy-combustion, utilizing oxygen cryogenically separated from air (for the proposed project, the oxygen will be delivered to the site and stored in a tank) mixed with the fuel and recirculated flue gas that controls combustion temperatures. The hot gases boil water and generate steam to move a turbine and produce power. Some of the gases are subsequently looped back into the combustor for a more complete combustion environment that produces even more power. The remaining gases flow through a turboexpander, a device that extracts additional power from a portion of these gases by dropping the elevated pressure to near-ambient. The combustor is designed to coalesce the molten ash particles so that they settle to the chamber walls and drain to the outlet, significantly reducing the particulate content in the exhaust gas and allowing the use of coals with up to 40 percent alkaline ash content. FPO is a low-emission technology that minimizes overall nitrogen oxides and converts organic nitrogen to elemental nitrogen. Due to its oxy-combustion nature where most of the nitrogen in air has been removed in the process, the resultant flue gas is primarily CO₂ and water, which allows for a relatively simple and cheap CO₂ capture process. Total organic content at combustor

exit is hundreds of times lower than for traditional combustion processes, with dioxin and furans close to zero (SwRI 2018).

2.4.2 Site Information

The FPO Pilot Project site would be approximately 5 miles east of Gillette, Wyoming, at an elevation of 4,425 feet above mean sea level. The site is owned by WRDC and was previously part of an open-pit coal mine, the Wyodak Mine. It is believed that the Wyodak Mine is the oldest continually operated surface coal mine in the United States, with operations since 1923. The area of the FPO Pilot Project was mined in 1950 through 1980, followed by backfilling of the mine pits, replacement of topsoil, and revegetation. Figure 2 shows the mined area before and after mining, highlighting the proposed location of the FPO Pilot Project. Current active mining is to the north of the FPO Pilot Project and Gillette Energy Complex (Figure 3).

The WRDC property is approximately 5,750 acres in area, with a mixture of industrial and undisturbed land use. The FPO pilot plan would include approximately 2 acres of previously graded land, measuring approximately 400 feet from north to south and 300 feet from east to west (Figure 4). An existing office and warehouse building for the Gillette Energy Complex is immediately north of the proposed FPO site (Figure 4). The proposed project would use existing transmission lines and an existing natural gas line that are present at the site. The existing transmission line would have new conductors installed, but the alignment into the FPO Pilot Plant site would not change. The FPO Pilot Project site is bordered to the north by Wyoming State Highway 51 (WY 51) and the Gillette Energy Complex. The FPO Pilot Project site and vicinity have been previously disturbed, and vegetation and soils are not representative of undisturbed areas.



Figure 2 Mining in the South Pit Wyodak Mine and South Pit Reclamation



Approximate FPO Pilot Project location shown in red.

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community




-  FPO Plant Location
-  Interstate Highway Symbol
-  State Highway Symbol

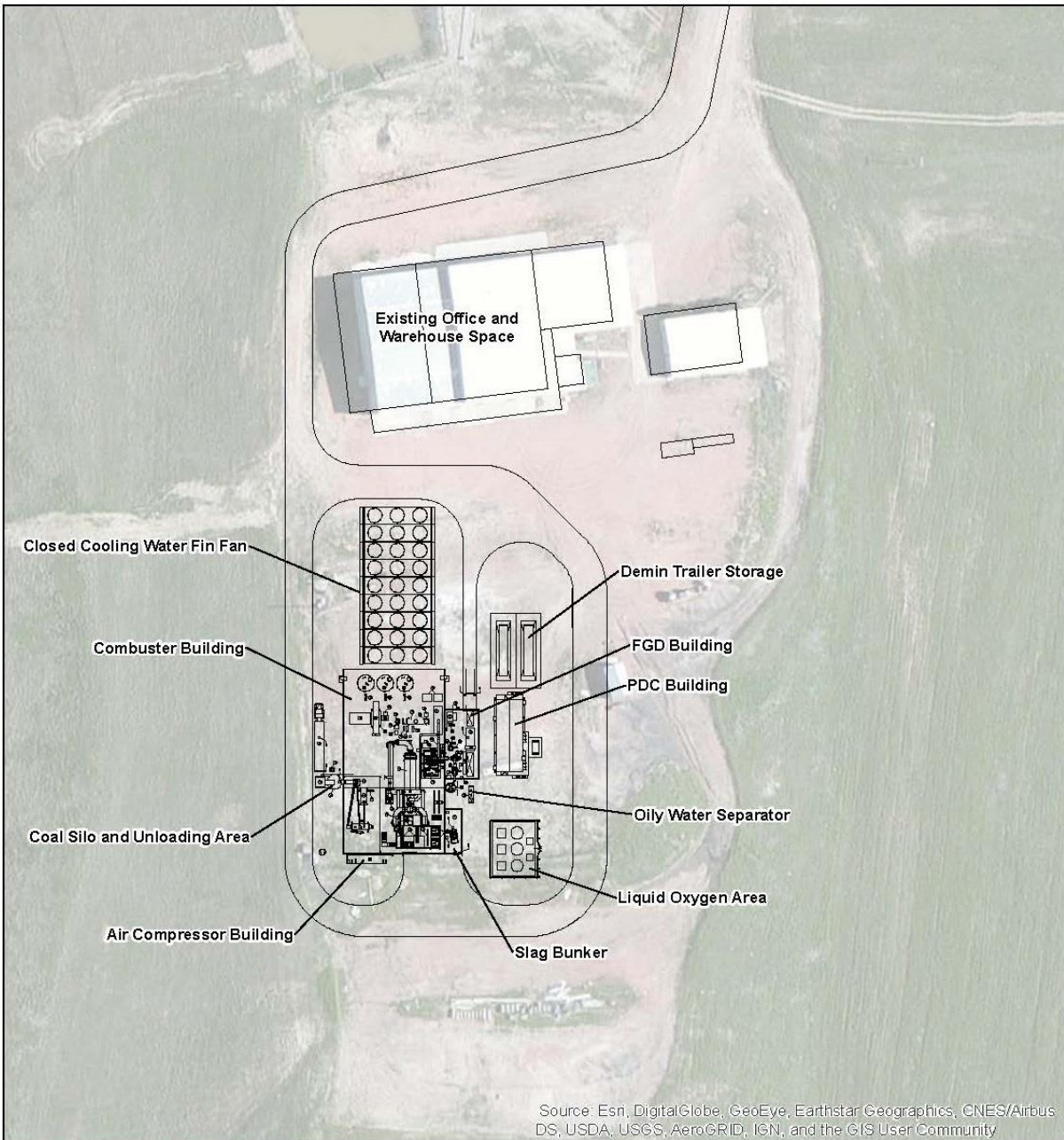
FPO Pilot Project

Figure 3
Pilot Plant Location

0 250 500 Meters
0 500 1,000 Feet



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



— Site Component

FPO Pilot Project	
Figure 4 Proposed Site Plan	

2.4.3 Construction

Construction of the FPO Pilot Project would occur once all approvals are received and would take approximately 1.5 years to complete. A construction materials and equipment staging area would be established within the boundaries of the FPO Pilot Project site, including parking and storage. The plant location would be prepared to prevent erosion, manage stormwater, and mitigate dust control concerns. Appropriate soil erosion and sediment control best management practices would be put into place and maintained prior to and during construction. SwRI would apply for coverage under Wyoming's Small Construction General Permit for construction-related stormwater discharges.

Minimal site disturbance and dirt work would be necessary to prepare foundation elevations and utility installation. Minimal on-site assembly would be performed to construct and erect modular buildings, skids, and infrastructure to the extent practical. Steel structural supports would be connected to concrete pier foundations. Buildings, support steel, process equipment, tanks, and equipment skids would be set onto and anchored to poured-in-place reinforced concrete foundations. Certain project pipelines and electrical raceway infrastructure would be installed underground via open-cut trenches, to be connected to existing Black Hills infrastructure at the warehouse and office facilities north of the FPO Pilot Plant site. All utilities at the Gillette Energy Complex would remain in operation during construction, with minimal outages for final tie-ins to the new facilities.

2.4.4 Operation

A simplified flowchart of the FPO process is shown on Figure 5. The step-by-step process is described in the following paragraphs.

The FPO Pilot Plant would use low- and high-sulfur Powder River Basin coal trucked a short distance from the coal stockpile at the Gillette Energy Complex. Coal from the Kemmerer Mine would also be trucked in for a high British thermal unit coal test.

The test period for the FPO Pilot plant would run for 6 months and would be conducted at a primary rate of 25 megawatts thermal (MWth), with short-term testing intervals up to 50 MWth. Short-term tests would be performed in 8 hour durations Monday through Friday. Continuous testing at 25 MWth near the end of the planned campaign will run for 24 hours per day, every day of the week.

The coal would be stored in a coal storage silo designed to hold 80 tons of coal. The silo would be 12 feet in diameter and 32 feet tall. The coal silo would have a dust collection system, monitoring and detection equipment, and instrumentation. The FPO pilot project would consume 5 tons of coal per hour for continuous operation at 25 MWth, so that 40 tons of coal would be required for each 8-hour day of operation. The need would be double (80 tons per day) during test periods for 50 MWth operation.

The coal slurry bar mill would reduce the size of the coal particles, using bars to crush the coal. The coal would be slurried, or mixed with water, to achieve an ultimate mix of 65 percent coal to 35 percent water by weight ratio. Twenty percent of the water would be added at the bar mill, with the remaining water added downstream to achieve the appropriate ratio. Coal would be crushed to an average 0.03-inch particle size. Testing would also be completed at varying particle sizes to evaluate how coal size affects the operation of the combustor.

The combustor requires oxygen in addition to the coal slurry. Oxygen would be delivered and stored as liquid oxygen with a minimum of 90 percent purity. The liquid oxygen would be delivered in 5,000-gallon tanker trucks. Three 13,000-gallon storage tanks would be provided for storage. One tank would provide

a one-day supply of oxygen. Each tank would have an oxygen vaporizer to convert the liquid oxygen to oxygen gas. Oxygen would then be pre-heated in the oxygen heat exchanger to avoid formation of mist at the combustor inlet.

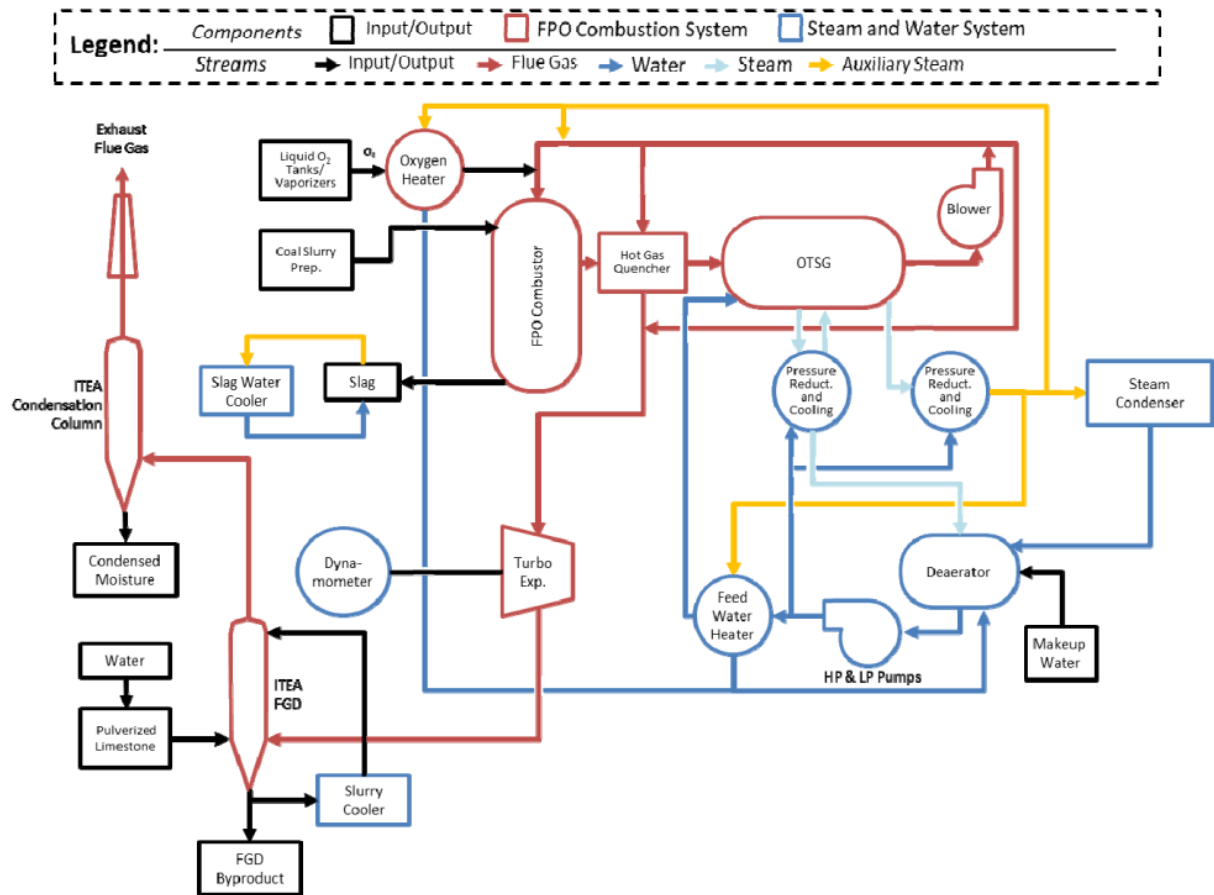


Figure 5 Simplified Flowsheet of the FPO Pilot System and Equipment

Source: Sargent & Lundy 2020a

The coal slurry and heated oxygen would then be supplied to the combustor. With the addition of heat and pressure, the FPO process would convert the coal to gas. Once the gas exits the combustor, it would be cooled through the flue gas quenchers to reduce the temperature. A portion of the flow would be directed to the once-through steam (OTSG) generator and a portion to the turboexpander. The OTSG is a reheat steam generator. The flue gas quenchers would use a portion of the flue gas recirculated from the OTSG flue gas outlet to cool the internal combustor flue gas and to quench the hot gas leaving the combustor. The remainder of the flue gas exiting the OTSG would be directed to either the OTSG for cooling the shell or to the turboexpander and flue gas desulfurization (FGD) systems.

The turboexpander would convert flue gas to mechanical energy. The turboexpander would be designed to handle gas flow corresponding to the 25 MWth combustor operations. For operation beyond 25 MWth, the turboexpander would be bypassed. The bypass would direct flue gas from the combustor loop to the FGD systems.

Slag from the combustor (the leftover heated rock material) would be quenched and sent to one of two slag dewatering settlers to dewater the slag for disposal. Slag particles would have an average size of 0.2 inch and could be as large as 0.4 inch during system upset conditions. The settlers would be designed to handle approximately 24 operating hours of slag, operating at 25 MWth and using Powder River Basin coal with an ash content of 4.5 percent.

After the slag is dewatered, it would be drained by gravity to a concrete bunker and subsequently loaded on trucks with an end loader for final disposal at the Gillette Energy Complex, Peerless Pit. The concrete bunker would include a sump to collect any residual water runoff and a pump to carry the water to the reclaimed water tank for reuse.

The process would result in minimal residual ash suspended in flue gas being discharged, and the use of water sprays would further reduce particulate emissions. Emissions are expected to be significantly less than 0.03 pound per million British thermal unit, and particulate emissions control systems would not be required or included.

To demonstrate that the FPO process can readily accommodate a CO₂ purification and liquefaction process that will enable the flue gas to supply pipeline-quality CO₂, a wet FGD system would be included, which will achieve an outlet sulfur dioxide (SO₂) concentration of less than or equal to 5 parts per million. The project would use ITEA's wet FGD process. The process would be designed to achieve at least 95 percent SO₂ removal. The FGD system and ancillary equipment would be sized for 50 MWth FPO Pilot Plant operation while firing the low-sulfur Powder River Basin coal. The FGD system would also be capable of operation when firing high-sulfur coal. Use of high-sulfur coal would result in increased reagent and water consumption, increased FGD byproduct production, and an increased need for dewatering system operation.

The FGD system would require up to approximately 250 pounds per hour of pulverized limestone at 50 MWth and 125 pounds per hour when operating at 25 MWth. Pulverized limestone would be delivered in bags of 2,200 pounds. Less than one bag would be required each day of 8 hour short-term operation at 25 MWth or 50 MWth. For continuous operation at 25 MWth a little more than one bag per day would be needed. The limestone would be delivered by truck on pallets, which would be off-loaded to the FGD building. Limestone would be mixed with water at the limestone slurry tank to create a slurry of approximately 25 percent solids and to break up large particles. The slurry tank would have a capacity of 300 gallons, providing 1 hour of retention.

The FGD column would be 64 inches in diameter and 43 feet, 4 inches tall (excluding outside support and duct work). It would consist of a counter-flow design with flue gas flowing upward through a packed bed (23 feet, 10 inches tall) and limestone slurry being sprayed downward. The SO₂ gas and lime would primarily react to form gypsum (calcium sulfate).

The FGD column would also include a condensation column, which would remove a large portion of the entrained liquid droplets and water vapor from the saturated flue gas prior to exhausting to the atmosphere via the main FPO Pilot Plant stack. The FGD column would be designed to achieve 98 percent removal of moisture from the flue gas so no moisture plume would be generated at the stack.

The gypsum decant tank would dewater the FGD gypsum slurry by gravity. The slurry, with approximately 10 percent solids, would enter the top of the tank; the denser heavier solids would settle to the conical bottom and the water would collect via a weir channel at the top. The tank would be sized

for 2 hours of slurry retention for 25 MWth operations, based on 7,500 pounds per hour of estimated slurry flow (1 hour for 50 MWth). The tank would be 5 feet in diameter and 9 feet, 8 inches tall.

A gypsum decant liquid pump would draw water from the weir for recycling. The slurry (at approximately 25 percent solids) would be drawn from the bottom of the tank and sent to the filter press for further dewatering. The filter press would reduce water content to 15 to 20 percent. The resultant gypsum waste would be directed to a chute for collection in roll-off containers delivered and removed by truck. The roll-off containers would hold 8 tons of material or approximately 106 hours of operation at 25 MWth using low-sulfur coal. The roll-off containers would be hauled to the Gillette Energy Complex for disposal. Wastewater from the filter press would be collected in the wastewater tank for disposal.

The FPO Pilot Plant would add a branch connection to the existing natural gas header downstream of the existing metering and regulation station east of the new FPO Pilot Plant. New underground supply piping and a new metering and regulation station would be provided for the FPO Plant. The fuel gas would preheat the combustor and maintain the heat.

Some water would be demineralized for use in the OTSG. This water would be demineralized through the use of a rental demineralizer system on portable trailers. The short-term use of the pilot plant does not justify the capital expenditure to build an on-site demineralization plant. The demineralized water tank would be sized for 40 hours of storage, or one full week of 25 MWth operations. The tank would have a capacity of 20,000 gallons. The rental equipment would be brought on site once a week to fill the tank. More frequent demineralization would be required during tests of the 50 MWth operations. An average flow of 6.9 gallons per minute (gpm) of demineralized water would be required during 25 MWth operations and 8.2 gpm during 50 MWth operations.

Service water would come from an existing line south of WY 51, approximately 800 feet north of the FPO Pilot Plant site. The total water need is estimated at 21.3 gpm for the 25 MWth operations and 37 gpm for the 50 MWth operations. This would include the water going to the demineralization unit. The numbers represent an overall average. There would be some variation, and this number would not be continuous. For example, when demineralization operations are occurring, the demineralization system would need a higher constant feed for a short period of time.

Ammonium hydroxide would be used to control pH of the condensate and feedwater. Five percent ammonium hydroxide would be brought to the site in 275-gallon totes for use at a rate of 0.9 gallon per hour.

The reclaimed water tank would store reclaimed FPO process water, including water from the slag settlers, slag bunker, excess FGD condensation column recycle water, and FGD gypsum decant liquid. A 20,000-gallon tank would be used for the reclaimed water tank. The expected normal volume of water in the tank would be approximately 15,000 gallons. If the rate of water reclamation exceeds the rate of reclaimed water reuse and fills the tank, the reclaimed water pump would direct the overflow water to the wastewater tank for disposal.

The wastewater tank would store wastewater from the operations. The tank would be sized to handle 2 weeks of storage. For a 40 hour per week operation at 25 MWth, a 20,000-gallon tank would provide adequate storage and freeboard. Wastewater would consist of liquid water (i.e., no slurries). The wastewater would be pumped from the wastewater tank to a truck and hauled to the Gillette Energy Complex Peerless Pit process water ponds for disposal. Wyoming DEQ Land Quality Division approval

would be required for process water discharges to the Peerless Pit process water ponds. The WYPDES permit would also need to be amended to include the new wastewater streams.

Potable water would be provided by tying into an existing line to the north, adjacent to the office and warehouse building of the Gillette Energy Complex. Potable water would be used for an eyewash and shower system near the chemical feed system.

The entire site would have equipment and instrumentation that allows monitoring of the performance of the FPO Pilot Plant. Continuous emissions monitoring would occur for SO₂, nitrogen oxides, CO₂, and total particulate matter.

Water for firefighting would be provided through a line extending from the office and warehouse space to the FPO Pilot Plant. The water main and fire hydrants would be positioned around the pilot plant area. Additional fire monitoring and detection would be installed throughout the pilot plant.

2.4.5 Closure

In accordance with SwRI's agreement with Black Hills Energy, the property used for the pilot plant would be returned to its original state at the conclusion of the testing. Usable equipment would be salvaged and transported to a storage facility. Other materials with scrap value would be sold. All other materials would be discarded at the appropriate licensed disposal facility.

The proposed site has been previously disturbed. Utilities exist at the property lines; however, trenching would occur to bring the utilities into the FPO Pilot Project site. Soils disturbed by the construction and excavation activities would be ripped, conditioned, and recompacted.

2.5 SwRI Alternatives Considered

2.5.1 Location Alternatives

The University of Wyoming Central Energy Plant site was initially selected during Phase I because it was considered to have the highest opportunity for cost sharing in the event the project proceeds to Phase III. However, the Central Energy Plant site location would require a public comment period on the permit application, which could cause delays that might hinder the project and/or prevent the project altogether. The Central Energy Plant site also required several design aspects that would add costs to the project, including extreme noise mitigation due to its proximity to public places, limitations on stack heights for visual impacts, building material selection to match existing Central Energy Plant facilities, and required approval from the University of Wyoming architect of record. Therefore, it was concluded that the Gillette Energy Complex would be used.

2.5.2 Process Alternatives

A conventional wet FGD system—to be provided by an established, domestic FGD original equipment manufacturer—was initially considered to provide SO₂ removal for the Central Energy Plant location. However, when a lower stack height was required to minimize visual architectural impacts at the Central Energy Plant site, it was found that moisture mitigation (i.e., water removal) would be required to ensure that the surrounding areas would not be impacted by a moisture vapor cloud (i.e., concerns existed regarding icing, ground level fog, etc.). A process of wet FGD followed by moisture mitigation is similar to ITEA's wet, pressurized FGD process, which consists of an alkali scrubbing tower and a direct

contact cooler/demister tower. It was therefore determined by SwRI that the ITEA process would also be used for the pilot.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Summary of Analysis Criteria

This section provides relevant environmental, cultural, and socioeconomic baseline information and identifies and evaluates the individual or cumulative environmental, cultural, and socioeconomic changes likely to result from constructing and operating the FPO Pilot Project.

The methodology used to identify the existing conditions and to evaluate potential impacts on the physical and human environment involved the following: review of documentation and project information provided by DOE, SwRI, Black Hills Energy, and their consultants; searches of various environmental and agency databases; agency consultations; and data collection conducted on May 24, May 25, and July 7, 2021. References are cited, where appropriate, throughout this EA.

The analyses presented in this chapter quantify the potential impacts associated with the proposed action and the no action alternative. Where it is not possible to quantify impacts, the analyses present a qualitative assessment of the potential impacts. The subsections that comprise the remainder of this chapter provide a concise summary of the current affected environment in the region of influence, and an analysis of the potential effects to each resource area considered from implementation of the no action alternative and the proposed action.

CEQ regulations encourage NEPA analyses to be as concise and as focused as possible, consistent with 40 CFR Part 1500.1(b) and 1500.4(b): "...NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail . . . prepare analytic rather than encyclopedic analyses." Consistent with the NEPA and CEQ Regulations, this EA focuses on those resources and conditions potentially subject to effects. Section 3.2.11 describes those resources not likely to be affected by the FPO Pilot Project.

This EA analyzes effects or impacts from DOE's funding of the FPO Pilot Project and from no funding of the project. Effects are defined in 40 CFR 1508.1(g) as "changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action and alternatives and may include effects that are later in time or farther removed in distance from the proposed action or alternatives." The regulation goes on to state that "Effects should generally not be considered if they are remote in time, geographically remote, or the product of a lengthy causal chain. Effects do not include those effects that the agency has no ability to prevent due to its limited statutory authority or would occur regardless of the proposed action." Effects are discussed under the environmental consequences discussion for each resource.

Cumulative Effects

Based on a review of the potential for other nearby projects that could create cumulative impacts to resources, there are no planned projects in the vicinity of the FPO Pilot Project at the Gillette Energy Complex or on WY 51 that could create cumulative effects. Black Hills Energy has no plans for updates to the Gillette Energy Complex (Black Hills Energy 2021). The Wyoming Department of Transportation's State Transportation Improvement Program lists no planned improvements to Highway 51 in the six-year timeframe of the most recent plan (WDOT 2021a). Therefore, a discussion of cumulative effects by resource has not been provided.

3.2 Affected Environment and Analysis of Impacts

3.2.1 Air Quality/Climate Change

3.2.1.1 Affected Environment

Regional Climate

The project area is in the high plains in northeastern Wyoming. The area experiences a wide range of temperatures: summers are hot, with rain, thunderstorms, and hail; winters are cold, with strong winds. Generally, the climate has low humidity and plentiful sun (WRCC 2021). May is typically the wettest month, with an average precipitation of 3.27 inches. February receives the most snowfall, with an average of 9 inches. Overall, the area receives an average of 17.59 inches per year of precipitation. The coldest month is January, with an average low temperature of 16 degrees Fahrenheit (°F); the warmest month is July, with an average high temperature of 86°F (NWS 2021). Wind speeds are strongest in the winter when the winds tend to come from the southwest. In the summer, the winds tend to come from the south (WSCO 2021). The topography in the region is mostly flat, with a north-south oriented mountain range about 75 miles to the west.

Regulatory Status

The United States Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare in 40 CFR 50 as part of the CAA. NAAQS are required to be met and maintained through control of air pollution emission sources by the individual states. Criteria air pollutants—nitrogen dioxide, carbon monoxide, SO₂, particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀), particulate matter with an aerodynamic diameter of 2.5 microns or less, ozone, and lead—are regulated with maximum acceptable concentrations (EPA 2021a). The state of Wyoming Ambient Air Quality Standards (WAAQS) are equivalent to, or more stringent than, the NAAQS (Table 3.2-1). Air quality is assessed by comparing the criteria pollutant ambient concentrations to the WAAQS. In addition to specifying standards for criteria air pollutants for Wyoming, the WAAQS also include standards (not shown) for hydrogen sulfide (H₂S), suspended sulfites (SO₃), and fluorides.

Air pollutant concentrations must be kept below WAAQS/NAAQS to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly (Wyoming DEQ 2018). The CAA requires that all areas of a state be designated as having air quality conditions that are in attainment, maintenance, nonattainment, or unclassifiable with respect to the WAAQS/NAAQS. Established under the CAA (Section 176(c)(4)), the General Conformity Rule plays an important role in helping states and tribes improve air quality in those areas that do not meet the NAAQS (i.e., nonattainment areas). Under the General Conformity Rule, federal agencies must work with state, tribal, and local governments in nonattainment or maintenance areas to ensure that federal actions conform to the air quality plans established in the applicable state or tribal implementation plan.

Table 3.2-1 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS	WAAQS	Form
CO	8-hour	9 ppm	9 ppm	Not to be exceeded more than once per year
	1-hour	35 ppm	35 ppm	Not to be exceeded more than once per year
NO ₂	Annual	53 ppb	53 ppb	Annual mean
	1-hour	100 ppb	100 ppb	98 th percentile of the annual distribution of the maximum daily 1-hour concentrations averaged over 3 years
PM _{2.5}	Annual	12 µg/m ³	12 µg/m ³	Annual mean, averaged over 3 years
	24-hour	35 µg/m ³	35 µg/m ³	98 th percentile, averaged over 3 years
PM ₁₀	Annual		50 µg/m ³	Annual mean
	24-hour	150 µg/m ³	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
SO ₂	1-hour	75 ppb	75 ppb	99 th percentile of the annual distribution of the maximum daily 1-hour concentrations averaged over 3 years
Ozone	8-hour	0.070 ppm	0.070 ppm	3-year average of the fourth-highest daily maximum of the 8-hour average concentration
H ₂ S	½ hour		70 mg per cm ²	Not to be exceeded more than twice per year
	½ hour		40 mg per cm ²	Not to be exceeded more than 2 times in any five consecutive days
SO ₃	Daily		0.25 mg per 100 cm ²	Maximum annual average
	Daily		0.50 mg per 100 cm ²	30-day maximum

Sources: EPA 2021a, Wyoming DEQ 2018

cm² = square centimeter

CO = carbon monoxide

H₂S = hydrogen sulfide

mg = milligram

µg/m³ = micrograms per cubic meter

NAAQS = National Ambient Air Quality Standards

NO₂ = nitrogen dioxide

PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 microns or less

PM₁₀ = particulate matter with an aerodynamic diameter of 10 microns or less

ppm = parts per million

ppb = parts per billion

SO₂ = sulfur dioxide

SO₃ = suspended sulfites

WAAQS = Wyoming Ambient Air Quality Standards

The FPO Pilot Project area is in a county defined as an attainment and/or unclassifiable area for all pollutants, so a general conformity analysis is not required (EPA 2021b). The closest nonattainment area is for PM₁₀ in Sheridan, Wyoming, which is more than 200 miles north of the project area. The nearest nonattainment areas for ozone include Upper Green River Basin, Wyoming (approximately 330 miles from the project area) and the Fort Collins-Denver-Boulder-Greeley-Loveland, Colorado area (more than 220 miles from the project area).

Along with regulating criteria pollutants, the EPA and local governments also regulate hazardous air pollutants (HAPs) such as asbestos, benzene, naphthalene, toluene, and xylenes. EPA regulates 187 HAPs that are known or suspected to cause health effects in small doses (EPA 2017).

Greenhouse gases (GHGs) are compounds that trap heat in the portion of the earth's atmosphere closest to the surface, causing heating at the surface of the earth. The main long-lived anthropogenic GHGs are CO₂, methane, nitrous oxide, and fluorinated gases. CO₂ and other GHGs are emitted from combustion of fuel by stationary and mobile sources, and from certain manufacturing industries and activities, including leaked and vented gas (EPA 2021d). GHG emissions are discussed further in Section 3.2.2.3.

Minor New Source Review

The minor New Source Review permitting program regulates pollutants from sources that do not require PSD or Nonattainment New Source Review permits. The purpose of minor New Source Review permits is to prevent the construction of sources that would interfere with attainment or maintenance of a NAAQS or violate the control strategy in nonattainment areas. Also, minor New Source Review permits often contain permit conditions that limit the source emissions to avoid the need for PSD analysis or Nonattainment New Source Review. The Wyoming minor source permitting program does not include de minimis emission levels below which facilities or projects are exempted from permitting. If the proposed action is approved, it is anticipated that the FPO Pilot Project will require a minor source permit because the emissions are not expected to reach the major source permit threshold.

3.2.1.2 Environmental Consequences

Proposed Action

The construction, operation, decommissioning, and removal of the FPO Pilot Project would not result in significant air quality impacts. The construction activities associated with the project are temporary and would only impact the immediate area at and around the FPO Pilot Plant, resulting in minimal, short-duration, localized impacts. While the FPO Pilot Plant is operating, the area around the plant would experience minor air quality impacts. Given the relatively low project-related emissions and background air pollutant concentrations, it is anticipated that the air quality impacts would be minor. The minor impacts would cease once the plant has undergone decommissioning and removal.

Temporary construction activities under the proposed action alternative that would generate pollutant emissions include but are not limited to:

- Storage of excavated and imported materials in stockpiles;
- Windblown dust from the use of unpaved areas;
- Site preparation activities (e.g., clearing and grading);

- Operations of heavy-duty, diesel-powered trucks and equipment at the site during construction activities;
- Operations of heavy-duty, diesel-powered trucks traveling to and from the site to dispose of or deliver materials during construction activities; and
- Vehicles for workers commuting to and from FPO Pilot Plant.

The emissions generated by the temporary construction activities would occur at the emission source. Unless the winds are particularly strong, the emissions are unlikely to drift outside of the project area.

The operational activities of the FPO Pilot Plant that would generate pollutant emissions generally including:

- Material handling emissions generated by delivery truck traffic, waste disposal truck traffic, and loading and unloading trucks;
- Material handling emissions generated by slag, coal, limestone, and FGD byproduct handling;
- Plant-related emissions generated by firing coal (low-sulfur Powder River Basin coal, high-sulfur Powder River Basin coal, and/or coal from the Kemmerer Mine); and
- Plant-related emissions generated by firing natural gas during startup and standby, and during the testing period.

The estimated operation emissions are presented in Table 3.2-2. Project-related emissions would be vented from two stacks: the main stack and the startup stack. Emission calculations are based on a maximum natural gas fuel usage for standby operations of 0.176 million standard cubic feet per hour and are estimated using vendor-supplied data, previous pilot test data, and EPA AP-42 emission factors (EPA 1997).

Based on the estimated operational emissions, it is anticipated that the project would only require a minor new source review permit. Given that likely only a minor source permit would be required for the project, the relatively low project emissions, and overall good background air quality concentrations, it is anticipated that the project would have minor air quality impacts at and near the proposed FPO Pilot Plant during the 6 months the plant is operational.

Additionally, it is expected that the decommissioning air quality impacts would be similar to or less than those that occurred during construction. The decommissioning air quality impacts would be temporary and localized to the project area.

As shown in Table 3.2-2, the project's operational CO₂ emissions are 50,564 tons per year or 0.045 million metric tonnes. For the FPO Pilot Project, CO₂ emissions make up almost all the GHG emissions, with other GHGs providing insignificant amounts. As previously stated, it is expected that the FPO Pilot Plant would only be operational for 6 months. However, given that GHG emissions from construction sources are not quantified, a full year of operational CO₂ emissions have been used to estimate life-of-project GHG emissions. Hence, the project is estimated to emit only 0.081 percent of the total Wyoming GHG emissions relative to the total of 55 million metric tonnes carbon dioxide equivalent (CO_{2e}) in 2019 (EPA 2021e). Note that state emissions are represented in EPA's database as CO_{2e}, which includes other GHGs, such as methane, but follows a conversion equation using the global warming potential of the other gas as compared to CO₂. Compared to the emissions from the nearby Gillette Energy Complex and Wyodak Mine as reported in 2019 (including reporting data from Wyodak, Wyogen I, Wyogen II, Wyogen III, Neil Simpson II, and Neil Simpson II [CT2]), the project would represent approximately 0.80 percent of the approximately 5.6 million metric tonnes emitted from other nearby sources in 2019 (EPA 2021e). As discussed further in Section 3.2.1.3, GHG emissions and their

relationship to climate change are complex and cannot be easily quantified. However, given the project’s small contribution to the state’s total GHG, it is expected that the project’s GHG emissions impacts would be negligible.

Table 3.2-2 Projected Operational Emissions of the FPO Pilot Plant

Pollutant	Material Handling Emissions (tons per year)	Coal Emissions (tons per year)	Natural Gas Emissions (tons per year)	Total Annual Emissions (tons per year)¹
NO _x	-	18.0	12.3	30.3
CO	-	2.3	7.4	9.6
VOC	-	0.65	0.48	1.1
SO ₂	-	15.8	0.13	15.9
H ₂ SO ₄	-	0.29	0.0077	0.30
PM	0.17	6.1	0.67	6.9
PM ₁₀	0.088	6.1	0.67	6.9
PM _{2.5}	0.070	6.1	0.67	6.8
CO ₂	-	39,807	10,757	50,564
HAPs	-	0.60	0.17	0.77

Source: Sargent & Lundy 2020b

¹ Note that the FPO Pilot Project is expected to be operational for approximately 6 months. Emissions data are presented on an annual basis but would be approximately one half of that listed based on the operational period.

CO = carbon monoxide

CO₂ = carbon dioxide

H₂SO₄ = sulfuric acid

HAP = hazardous air pollutant

NO_x = nitrogen oxides

PM = particulate matter

PM₁₀ = particulate matter with an aerodynamic diameter of 10 microns or less

PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 microns or less

SO₂ = sulfur dioxide

VOC = volatile organic compounds

No Action

Under the no action alternative, DOE would not provide cost-shared funding to the proposed project. The project may be delayed if SwRI opts to search for other funding sources. More likely, the FPO Pilot Project would not be constructed. Therefore, no impacts to air quality would occur.

Impacts Related to Climate Change

Climate change is caused by releases of GHGs from human activities and natural processes around the world. Climate change analyses consider several factors including GHG emissions, land use management practices, and the albedo effect. Climate change analysis for the purpose of this document focuses on accounting for and disclosing of GHG emissions that may contribute to anthropogenic climate change.

Considering the difficulties in attributing specific climate effects to individual projects, the projected direct GHG emissions are used as a proxy for assessing the FPO Pilot Project's potential climate change effects. The project would result in direct GHG emissions associated with the construction, operation, decommissioning, and removal of the FPO Pilot Plant.

GHG emissions from the FPO Pilot Project may influence climate change in the region. Given the FPO Pilot Project emissions are small relative to nearby sources, the influence from the Project would likely be less than those other sources. However, the currently available information about GHGs and climate change does not permit an assessment of the relationship between the project's GHG emissions and its specific effects on climate change, because climate change operates on a regional and global scale. The emission sources beyond the Project area also are affecting regional and global changes. Assessing the impacts of GHG emissions on regional and global climate change likewise requires modeling on a global scale, which would not be sensitive to the comparatively minor contribution of emissions from the FPO Pilot Project. Potential effects on climate change are influenced by GHG emission sources from around the globe, and current methodologies cannot distinguish global climate change impacts associated with GHG emissions originating from a discrete, and relatively small area, such as the FPO Pilot Project area. Because minor FPO Pilot Project GHG emissions are of short duration and regionally transported, implementation of the FPO Pilot Project would be expected to have negligible long-term regional adverse effects to climate change in and near the project area.

3.2.2 Health and Safety (Including Noise)

3.2.2.1 Affected Environment

Health and Safety

The affected environment for health and safety includes the Project site. The FPO Pilot Project is located in a rural area approximately 5 miles from the city of Gillette, with the closest residence approximately 1.8 miles from the site. The location is part of the Gillette Energy Complex with industrial activities occurring 24-hours per day and 365 days per year. Workforce health and safety would be governed by the Occupational Safety and Health Administration regulations. Current activities at the Gillette Energy Complex are also governed by policies and procedures of the WRDC and Black Hills Energy Corporation. These policies require all contractors to follow the same safety standards that WRDC employees follow.

Noise

Health and safety also includes noise-related health and safety. The nearest noise sensitive receptor is a single-family residence approximately 1.8 miles to the west with agricultural uses occurring within 1.25 miles to the east. The proposed Project site is separated from noise sensitive receptors (e.g., residents or schools) by vegetation, including shrubs and grasslands, and hilly topography.

The state of Wyoming does not have any laws, ordinances, regulations or standards that would apply to noise levels at the FPO Pilot Project during construction or operation. Campbell County also does not have any laws, ordinances, regulations, or standards that would apply to noise levels associated with the proposed Project construction and operations.

The EPA has published guidance that specifically addresses issues of community noise (EPA 1974). This guidance, commonly referred to as the "levels document," contains goals for noise levels affecting noise-sensitive land uses. These noise level limit goals are a day-night sound level (L_{dn}) of ≤ 55 A-weighted decibels (dBA) for exterior areas and ≤ 45 dBA L_{dn} for interior areas.

In the absence of a quantified noise threshold from local regulations, 55 dBA L_{dn} would be considered a guidance-based noise level threshold for determining potential noise impacts at noise-sensitive receptors.

Baseline noise levels were evaluated to determine changes that would occur with operation of the FPO Pilot Project. Baseline noise measurements were conducted from May 24 to May 25, 2021 near to sensitive receptors to collect baseline noise data. A total of 9 short term measurements and one long term measurement were collected at seven locations (Figure 6). Four representative receiver locations were chosen at which measurements were conducted in areas surrounding the FPO Pilot Project location but outside the Gillette Energy Complex. It was expected that the environmental noise surrounding the project area would be dominated by the existing power plants, therefore an additional 3 measurement locations were chosen near these facilities.

The primary noise sources were vehicular traffic and operational noise from the Gillette Energy Complex. Table 3.2-3 summarizes the results of the background ambient noise measurements.

Table 3.2-3 Baseline Noise Measurement Results

Measurement Location ID	Type	Measurement Period	Date (mm/dd/yy)	Time (hh:mm)	Duration (hh:mm)	Measured L_{eq} , dBA	Calculated Existing L_{dn} , dBA
ST-R1	R	Daytime	05/25/21	10:42	00:15	61	59
	R	Nighttime	005/25/21	01:10	00:20	44	
LT-R2	R	Daytime	05/24/21	07:00–22:00	15:00	59	58
	R	Nighttime	05/24/21	22:00–07:00	09:00	48	
ST-R3	R	Daytime	05/25/21	11:20	00:15	63	64
	R	Nighttime	05/25/21	01:48	00:15	54	
ST-R4	R	Daytime	05/25/21	10:45	04:58	60	59
	R	Nighttime	05/25/21	--	--	48 ¹	
ST-PL1	PL	Daytime	05/25/21	11:50	00:15	60	N/A
	PL	Nighttime	05/25/21	02:14	00:15	62	
ST-PL2	PL	Daytime	05/25/21	08:53	00:20	60	N/A
	PL	Nighttime	--	--	--	--	
ST-PL3	PL	Daytime	08/25/21	08:23	00:15	56	N/A
	PL	Nighttime	--	--	--	--	

Source: AECOM 2021

Notes:

1. Nighttime data was estimated using the average day-night differences at other noise-sensitive measurement locations.

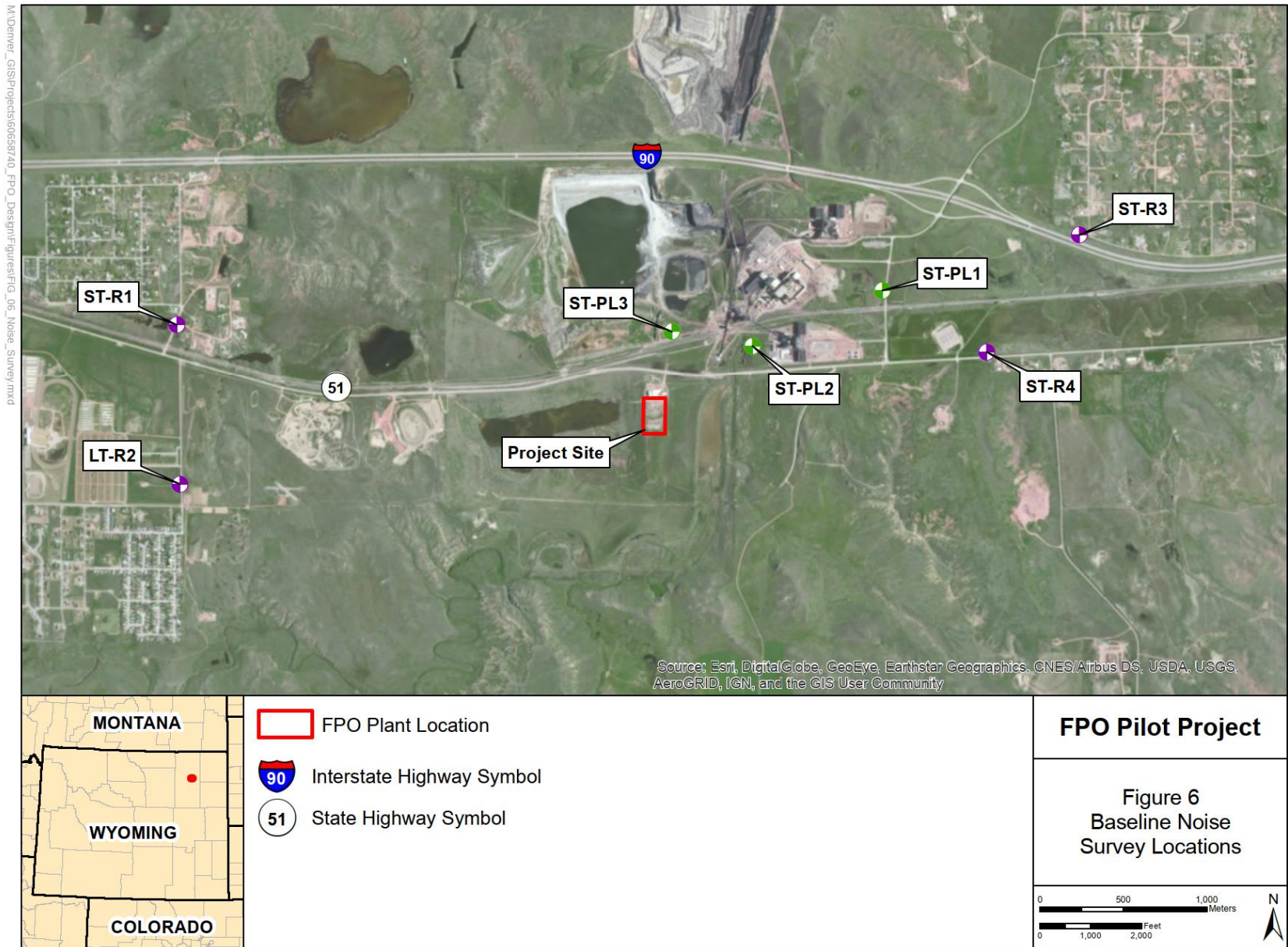
PL = Property Line (Existing Plants)

L_{eq} = Day/Night Sound Level

R = Noise-Sensitive Receptor

dBA = A-Weighted Decibels

For sites ST-R1 and LT-R2 the dominant noise was traffic from nearby roadways; the Gillette Energy Complex was not audible. Daytime noise measurements at ST-R3 were primarily vehicular traffic from nearby I-90, but nighttime noise was dominated by the Gillette Energy Complex. For the remaining locations (ST-R4, ST-PL1, ST-PL-2, and ST-PL3), the dominant noise source was the Gillette Energy Complex with lesser noise from nearby traffic.



3.2.2.2 Environmental Consequences

Proposed Action Alternative

Health and Safety

Construction and operation of the proposed FPO Pilot Project would result in the potential for health and safety impacts to workers at the Project site, workers at the Gillette Energy Complex, and members of the general public. Workplace injuries could occur to employees at the FPO Pilot Project during construction and operations through both bodily injuries such as trips, falls and vehicular accidents, and injuries as a result of exposure to chemicals used on site. Employees at the Gillette Energy Complex would be subject to increased traffic at the warehouse and office facility located south of Highway 51 and within the same area as the proposed Project site. Employees at the Gillette Energy Complex would also see increased traffic from vehicles hauling materials from the Complex to the FPO Pilot Project and wastes from the Project back to the Complex. Members of the public would experience increased traffic from hauling of materials and supplies on Highway 51 to the proposed Project and added vehicular crossings of Highway 51 which runs between the main portion of the Gillette Energy Complex and the FPO Pilot Project site.

SwRI would conduct construction and operation of the FPO Pilot Project in accordance with applicable health and safety regulations and guidelines, including applicable Occupational Health and Safety Administration regulations, equipment and chemical manufacturer's safety standards and procedures of WDRC and Black Hills Energy Corporation that are applicable to the Gillette Energy Complex. FPO Pilot Project construction and operations employees and contractors would receive training in the safety standards applicable to their position. The test facility would also be equipped with eye wash stations and emergency showers for chemical exposure. As a result of these procedures, health and safety impacts would be minor.

Noise

The CadnaA® Noise Prediction Model (Version 2021 MR2) was used to estimate the propagation of sound from aggregate Project operations, and predict the sound pressure level at various distances from the project area, including representative receptors selected for the baseline noise survey. CadnaA is a Windows-based software program that predicts and assesses sound levels near industrial sound sources. The calculations account for sound wave divergence plus attenuation factors resulting from air absorption, basic ground topographic effects, and barriers or shielding. CadnaA can handle three-dimensional sound propagation complexity by considering realistic intervening natural and human-made topographical barrier effects, including those resulting from terrain features and structures, such as multi-story buildings.

Noise from the existing power generating facilities was included in the predictive noise model to demonstrate the effect of adding the new power generation facility to an acoustic environment already dominated by power plant noise when traffic noise is absent.

Noise from the proposed FPO Pilot Project facility was also included in the model. The plant is expected to feature several types of noise-producing equipment and processes. Noise sources representing the noisiest equipment were placed at their expected location and elevation, based on site plans. Reference sound power levels were obtained from the client and industry literature for the discrete pieces of equipment, using conservative assumptions wherever applicable.

Future project noise levels were predicted at the seven closest noise-sensitive receptors, roughly aligning with the baseline noise level measurements discussed in Section 3.2.2.1). Table 3.2-4 summarizes the predicted noise level results at these seven studied nearest noise-sensitive receptors to the proposed project facility. Figure 7 shows the location of the seven noise receptors with sound contours for the FPO Pilot Project and existing noise contours for the Gillette Energy Complex.

Table 3.2-4 Receiving Facility Operational Noise Levels

Receptor ID	Existing Noise Level (L _{dn} , dBA)	Predicted Unmitigated Project Noise Level (L _{dn} , dBA)	Predicted Level Compliant with EPA 55 dBA Limit?	Combined Existing + Project Noise Level (L _{dn} , dBA)	Increase Above Existing Noise Level
R1	59	26	Yes	59	0
R2	58	24	Yes	58	0
R3	64	25	Yes	64	0
R4	59	28	Yes	59	0
R5	59	27	Yes	59	0
R6	53	24	Yes	53	0
R7	53	23	Yes	53	0

Source: AECOM 2021

Table 3.2-4 shows that future operation of the FPO Pilot Project would result in noise levels below 55 dBA, L_{dn} at all nearest receptors. In addition, when combining the FPO Pilot Project noise levels with existing noise from the Gillette Energy Complex, noise levels would not change by any perceptible amount. No noise impacts would occur from the FPO Pilot Project at nearby receptors.

No Action Alternative

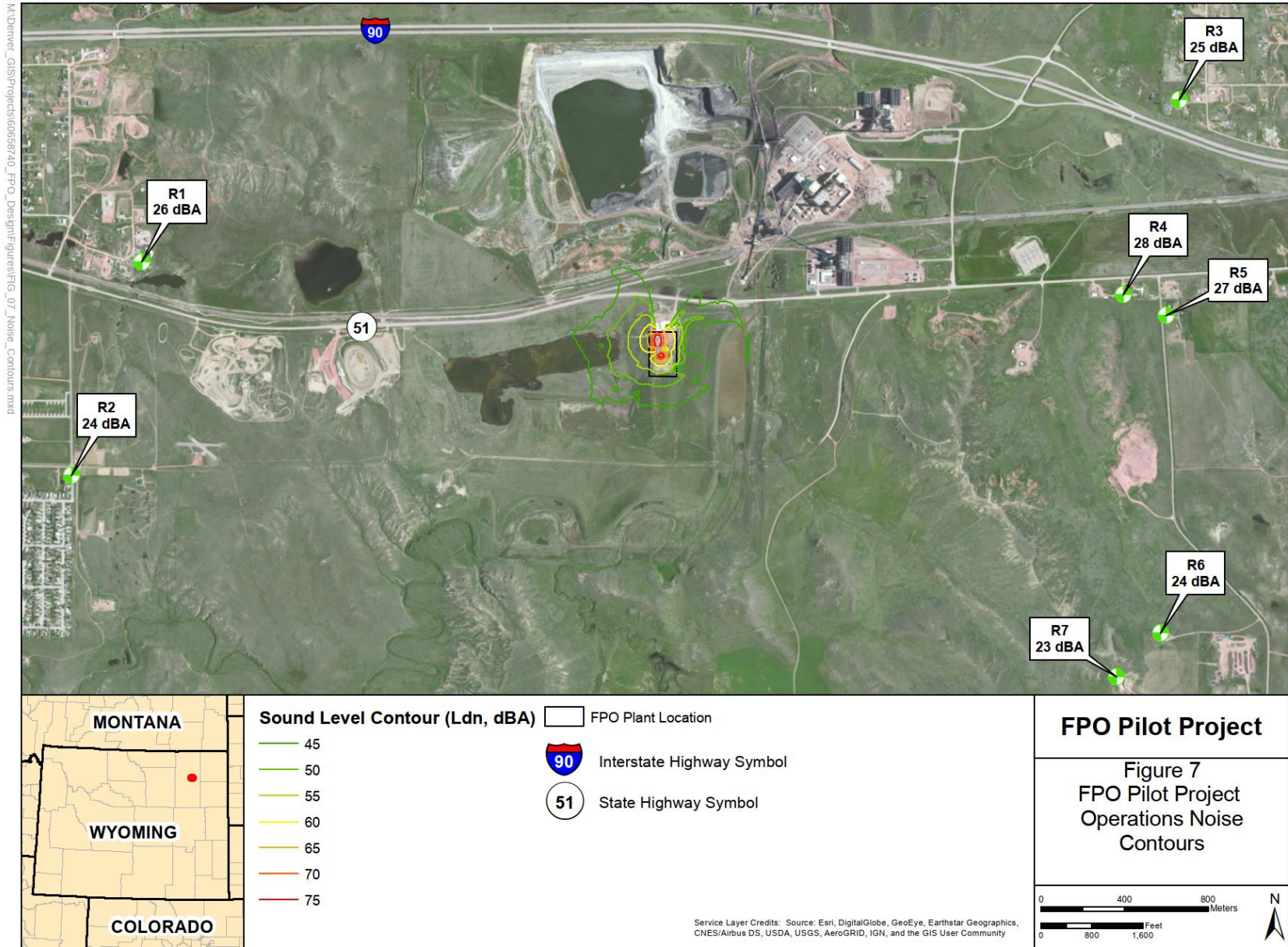
There would be no construction or operation of the FPO Pilot Project under the no action alternative and no changes to existing health and safety including noise.

3.2.3 Access and Transportation

3.2.3.1 Affected Environment

There are several public roads in the FPO Pilot Project area (Figure 1). Interstate 90 (I-90) is aligned in an east-west direction north of the Gillette Energy Complex. Exit 132 from I-90 allows access to the complex. WY 51 runs east to west south of the Gillette Energy Complex between the FPO Pilot Plant and the complex. Both of these highways are paved roads. There is an existing access road, which is also paved, from WY 51 northeast to the Gillette Energy Complex. There is also an existing access road south to the warehouse and office space used by the Gillette Energy Complex, which is on the same pad as the proposed FPO Pilot Project. The access road from WY 51 to the warehouse and office space is packed dirt.

No traffic count data are available from the Wyoming Department of Transportation for WY 51. For I-90, the most recent traffic count data from July of 2021 show a monthly average daily traffic count of 6,938 vehicles (WDOT 2021b).



3.2.3.2 Environmental Consequences

Proposed Action

Project-related traffic would reach the FPO Pilot Project site using the existing packed dirt access road from WY 51 to the warehouse and office complex north of the proposed site. The traffic for the FPO Pilot Project would be directed to the west around the existing buildings, as shown on Figure 4. No traffic increases are expected on local roads in the City of Gillette.

Traffic would increase on WY 51, on the warehouse/offices access road, and from the Gillette Energy Complex to the FPO Pilot Plant site (crossing WY 51) during construction, operations, and decommissioning. Traffic would occur on existing roads and be directed to the west of the existing warehouse and office buildings north of the project site. No information is available on potential construction and decommissioning traffic. Based on construction activities at other sites, a moderate increase in vehicle traffic for materials deliveries and foundation and infrastructure construction would occur in the project vicinity on WY 51 and the access road to the FPO Pilot Project site during the 1.5-year construction timeframe and the decommissioning activities. The traffic increases would not impact the City of Gillette due to the distance from Gillette and the availability of the nearby I-90 corridor, which would be used for larger equipment, bypassing Gillette.

During the 6 months of operations, approximately 12 employees would travel to and from the site in passenger vehicles every day of operations. Deliveries of materials and supplies would include an estimated three to five trucks per day for off-site supplies and two trucks per day trucking coal from the Gillette Energy Complex to the FPO Pilot Project site, crossing WY 51. Wastewater would be shipped once every 2 weeks from the FPO Pilot Project site to the Peerless Pit process water ponds at the Gillette Energy Complex. Slag would be hauled to the Gillette Energy Complex Peerless Pit at a rate of once every two weeks. Gypsum would also be shipped to the Gillette Energy Complex Peerless Pit at a rate of once every 2 weeks. During the 6 months of operations, minor long-term traffic impacts are expected on WY 51 and crossing over WY 51 between the FPO Pilot Project site and the Gillette Energy Complex, resulting from material deliveries and waste removal.

Decommissioning traffic would be expected to be similar to construction traffic.

No Action Alternative

Under the no action alternative, the FPO Pilot Project would not be constructed, and no changes would occur to traffic or transportation.

3.2.4 Socioeconomics

3.2.4.1 Affected Environment

The proposed project site is approximately 5 miles from the City of Gillette, Wyoming. Gillette is the county seat and the most populous city in Campbell County. The median household income in both Gillette and Campbell County was notably higher than in the state of Wyoming and the United States in 2019; housing costs in 2019 were comparable across these geographic areas. Table 3.2-5 presents a comparison of socioeconomic condition metrics between the city of Gillette, Campbell County, Wyoming, and the United States in 2019.

Employment in Gillette is strongly associated with the extraction of fossil fuels (coal, oil, and coalbed methane gas). In 2019, 21.2 percent of working-age individuals in Gillette and 25.1 percent of working-age individuals in Campbell County were employed in the extraction industry (agriculture, forestry, fishing/hunting, and mining), with the majority of that total likely consisting of fossil-fuel-related employment. This is much higher than the percentage of employment in the extraction industry in Wyoming as a whole (11.0 percent) and the entire United States (1.8 percent).

Table 3.2-6 presents employment by industry in 2019.

Table 3.2-5 Socioeconomic Condition Metrics, 2019

Population Metric	Gillette	Campbell County	Wyoming	United States
Total Population	32,857	47,409	581,024	324,697,795
Median Household Income ¹	\$80,746	\$83,651 ²	\$64,818	\$63,597
Median Home Value ¹	\$218,997	\$225,372	\$223,146	\$220,110
Median Mortgage Cost (Monthly) ¹	\$1,573	\$1,626	\$1,477	\$1,614
Median Rent (Monthly) ¹	\$909	\$947	\$865	\$1,075

Source: United States Department of Commerce 2020a, 2020b.

Notes:

¹ Values in 2020 dollars.

² Values should be interpreted with caution (coefficients of variation, the extent of variability in relation to the mean of the population, are between 12 percent and 40 percent).

Note that these metrics are likely to have changed to an unknown degree in the time between 2019 and the present day due to economic changes associated with the COVID-19 (SARS-CoV-2) pandemic and the current highly competitive housing market. However, comparable population and housing data are not yet available from the United States Census Bureau for 2021.

Table 3.2-6 Employment by Industry, 2019

Industries	Gillette	Campbell County	Wyoming	United States
Education, health care, and social assistance	3,788 (22.7%)	4,953 (20.2%)	70,043 (24.3%)	35,840,954 (23.1%)
Agriculture, forestry, fishing/hunting, and mining	3,537 (21.2%)	6,164 (25.1%)	31,842 (11.0%)	2,743,687 (1.8%)
Retail trade	1,625 (9.7%) ¹	2,333 (9.5%)	31,619 (11.0%)	17,267,009 (11.2%)
Construction	1,577 (9.4%) ¹	2,432 (9.9%)	23,531 (8.2%)	10,207,602 (6.6%)
Arts, entertainment, recreation, accommodation, and food	1,533 (9.2%) ¹	2,432 (7.9%) ¹	30,434 (24.3%)	14,962,299 (9.7%)
Transport, warehousing, and utilities	943 (5.6%) ¹	1,341 (5.5%) ¹	17,795 (6.2%)	8,305,602 (5.4%)
Manufacturing	696 (4.2%) ¹	772 (3.1%) ¹	11,833 (4.1%)	15,651,460 (10.1%)
Professional, management, administration, and waste management	615 (3.7%) ¹	1,107 (4.5%) ¹	19,641 (6.8%)	17,924,655 (11.6%)
Other services, except public administration	608 (3.6%) ¹	910 (3.7%) ¹	13,195 (4.6%)	7,522,777 (4.9%)
Wholesale trade	575 (3.4%) ¹	843 (3.4%) ¹	5,536 (1.9%)	4,016,566 (2.6%)

Industries	Gillette	Campbell County	Wyoming	United States
Finance, insurance, and real estate	549 (3.3%) ¹	885 (3.6%) ¹	11,760 (4.1%)	10,151,206 (6.6%)
Public administration	526 (3.1%) ¹	682 (2.8%) ¹	16,877 (5.8%)	7,134,146 (4.6%)
Information	146 (0.9%) ¹	205 (0.8%) ¹	4,397 (1.5%)	3,114,222 (2.0%)

Source: United States Department of Commerce 2020a, 2020b.

Note:

¹ Values should be interpreted with caution (coefficients of variation, the extent of variability in relation to the mean of the population, are between 12 percent and 40 percent).

The population in Gillette is tied to fluctuations in the fossil fuel industry. A fossil fuel boom period resulted in 39.3 percent population growth between 2000 and 2010. The end of the mining boom has resulted in a notable reduction in fossil-fuel-related employment since the mid-2010s (Richards 2018; Baragona 2019). Diversification of the employment sector in Gillette and Campbell County is key to long-term economic viability of the area (Baragona 2019).

3.2.4.2 Environmental Consequences

Proposed Action

The construction, operation, decommissioning, and removal of the project would positively contribute to the economic activity in Gillette and Campbell County during the project timeframe.

Up to an estimated \$38 million would be expended in the local economy during the 2-year construction and operations timeframe. Project construction and operational spending estimates in the local economy are presented in Table 3.2-7. Anticipated expenditures in the local economy for materials and supplies used for operation are presented in Table 3.2-8.

Table 3.2-7 Engineering, Purchases, Construction, and Labor Expenditures in the Local Economy

Category	Estimated Amount
Direct construction labor	\$8,977,374
Direct materials	\$8,773,565
Construction equipment	\$2,190,697
Facility construction and other facility costs	\$25,374,132
Engineering, operation labor, and other costs ¹	\$19,546,509
Total capital and labor costs	\$64,862,277

Note:

¹ An estimated total of \$48,866,273 would be spent on engineering, operation labor, and other costs. It is assumed for the purpose of this analysis that 40 percent of this total would be spent in the local area, with the remaining 60 percent spent outside the local area (SwRI 2021).

Table 3.2-8 Estimated Operating Costs to be Expended in the Local Economy

Category	Estimated Amount
Natural gas fuel cost	\$164,328
Solid fuel cost	\$152,600
Oxygen supply cost	\$515,240
Water supply cost	\$90,000
Auxiliary power cost	\$479,864
Limestone reagent cost	\$4,320
Pilot waste disposal cost (including trucks)	\$619,369
Total operating costs	\$2,025,631

Source: SwRI 2021

Note: Local sources of materials and supplies would be used to the maximum extent possible; the analysis assumes that all materials are locally sourced.

No Action Alternative

If the FPO Pilot Project was not constructed or operated, there would be no local spending for materials or supplies, and no employment during construction, operations, or decommissioning. No change would occur in the employment and demographics for the area, and therefore there would be no impacts to socioeconomic conditions.

3.2.5 Environmental Justice

3.2.5.1 Affected Environment

Environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

Relevant 2019 population metrics for the City of Gillette, Campbell County, Wyoming, and the United States are presented in Table 3.2-9.

Table 3.2-9 Metrics Related to Minority and Low-Income Populations in Gillette, Campbell County, Wyoming, and the United States in 2019

Population Metric	Gillette, Wyoming	Campbell County, WY	Wyoming	U.S.
White (including Hispanic ethnicity)	93.0%	94.0%	91.4%	72.5%
Hispanic ethnicity	11.0%	8.7%	9.9%	18.0%
Non-Hispanic ethnicity	89.0%	91.3%	90.1%	82.0%

Population Metric	Gillette, Wyoming	Campbell County, WY	Wyoming	U.S.
All other races	7.0% ¹	6.0% ¹	8.6% ¹	27.5%
People in poverty	14.3% ¹	12.2%	11.0%	13.4%
People in “deep poverty” ²	5.9% ¹	5.4% ¹	4.8%	6.0%
People in poverty and over 65	0.8% ¹	0.9% ¹	1.3%	1.4%
Families in poverty	10.9% ¹	9.1% ¹	6.8%	9.5%
Households receiving Supplemental Security Income	3.7% ¹	2.9% ¹	3.4%	5.3%
Households receiving cash public assistance income	0.8% ¹	1.2% ¹	1.6%	2.4%
Households receiving food stamps/SNAP	4.9% ¹	4.1% ¹	5.4%	11.7%
People between 16 and 64 years in age who did not work	18.7%	17.6%	17.6%	23.2%
Households with mortgages costing >30% of household income	17.5% ¹	19.0% ¹	23.3%	27.7%
Rental households with rent >30% of household income	38.3% ¹	35.2% ¹	37.0%	46.0%

Source: United States Department of Commerce 2020a, 2020b.

Notes:

¹ Values should be interpreted with caution (coefficients of variation, the extent of variability in relation to the mean of the population, are between 12 percent and 40 percent).

² Deep poverty is defined as living in a household with a total cash income below 50 percent of its poverty threshold.

In 2019, Gillette had a slightly higher proportion than the greater Campbell County and the state of Wyoming of the following population metrics: individuals with Hispanic ethnicity, individuals in poverty, people between 16 and 64 years in age who did not work, households receiving Supplemental Security Income (SSI), and rental households with rent greater than 30 percent of household income. However, these values are lower than the average for the entire United States. A slightly higher proportion of Black/African American, Native American, and other non-White, non-Hispanic ethnicity individuals live in Gillette than in Campbell County as a whole, though the percentage of all non-White, non-Hispanic individuals is lower than in Wyoming and much lower than in the rest of the United States. However, most of these comparisons rely on data values that should be interpreted with caution (i.e., coefficients of variation, the extent of variability in relation to the mean of the population, are between 12 and 40 percent); therefore, no strong conclusions can be drawn about the presence of low-income or minority populations in the city of Gillette.

3.2.5.2 Environmental Consequences

Proposed Action

The FPO Pilot Project is approximately 5 miles from the City of Gillette, and the closest occupied structure (a single-family home) is more than 1.8 miles from the site. As described in the other resource

area analyses, the proposed project is not expected to have significant adverse impacts on any resource. Given the distance of the proposed project location from Gillette and nearby residences, and the low to negligible level of adverse impacts from construction and operation outside the immediate project area, no disproportionate adverse impacts on low-income or minority populations are anticipated.

No Action Alternative

The no action alternative would result in no change to minority, low-income, or disadvantaged populations.

3.2.6 Vegetation

3.2.6.1 Affected Environment

Most of the FPO Pilot Project site has been previously cleared and graded. As much as 3 acres of existing reclaimed grassland could be disturbed to accommodate construction and operations. This reclaimed area appears to have been planted as a monoculture of crested wheatgrass (*Agropyron cristatum*), with native and nonnative plant species having been established after reclamation. Based on site observations, approximately 85 percent of the plant cover is crested wheatgrass. Native and non-native plant species comprising about 15 percent of the plant cover include big sagebrush (*Artemisia tridentata*), spear-leaf rabbitbrush (*Chrysothamnus linifolius*), winterfat (*Krascheninnikovia lanata*), fringed sage (*Artemisia frigida*), prairie sage (*Artemisia ludoviciana*), bottlebrush squaretail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), slender wheatgrass (*Elymus trachycaulus*), cheatgrass (*Bromus tectorum*), cicer milkvetch (*Astragalus cicer*), Canada thistle (*Cirsium arvense*), and annual sunflower (*Helianthus annuus*). There are no sensitive or natural vegetation communities in or near the FPO Pilot Project area.

The range for Ute Ladies'-tresses (*Spiranthes diluvialis*), a federally designated threatened species, overlaps the project site. This species is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams, where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet, with no occurrences in Wyoming above 5,400 feet.

3.2.6.2 Environmental Consequences

Proposed Action

Most of the FPO Pilot site location has been previously cleared of vegetation and graded. In addition, no natural plant communities are present at the site or in the project vicinity. Impacts of the project on vegetation would be negligible, with no impacts to natural vegetative communities.

No suitable habitat or occurrences of Ute Ladies'-tresses exist in or near the project area. Therefore, the project would not impact this threatened species.

No Action Alternative

Under the no action alternative, the FPO Pilot Project would not be constructed; hence, there would be no changes to the project site and no impacts to vegetation.

3.2.7 Wildlife

3.2.7.1 Affected Environment

Information for analysis of impacts to wildlife comes from data managed through the Wyoming Natural Diversity Database (WNDD 2021), United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation database (USFWS 2021a), and a reconnaissance field survey of the proposed project site.

No sensitive ecological resources are present at the project area, and construction and operation of the project would disturb approximately 3 acres of reclaimed grassland.

General Wildlife

Common urban or regional wildlife would visit the project area. With the active power plant to the north, the development in the project area, and the Highway 51 next to the project area, species likely to occur in the proposed project area would be those accustomed to human environments such as the raccoon (*Procyon lotor*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), western meadowlark (*Sturnella neglecta*), and house finch (*Carpodacus mexicanus*). Pronghorn or mule deer droppings, a raccoon carcass, and a nesting killdeer (*Charadrius vociferous*) were observed during the site visit. The killdeer was likely nesting on or near the vehicle yard around the existing buildings. Cliff swallows (*Petrochelidon pyrrhonota*) and a great blue heron (*Ardea herodias*) flew over the project area during the visit, but these were not using the site itself. Overall use of the site is likely casual, with wildlife likely passing through the area instead of using habitat for food or shelter. The Wyoming Game and Fish Department categorizes the region surrounding the project area as a year-round pronghorn range (WNDD 2021).

Migratory Birds

The USFWS has statutory authority and responsibility for enforcing the MBTA (16 U.S.C. 703-712). Most native bird species (birds naturally occurring in the United States) are protected under the MBTA, and the list of protected species is identified in 50 CFR 10.13, which is reviewed and updated regularly. MBTA species have low potential to occur in the project area due to the lack of vegetation around the existing buildings and the lack of resources in the reclaimed crested wheatgrass.

A nesting killdeer was observed during the site visit. The killdeer was likely nesting on or near the vehicle yard around the existing buildings. This species prefers to nest in areas with little plant cover (WNDD 2021). The project area is unlikely to support other nesting migratory bird species due to the lack of suitable nesting sites or adequate food resources.

Special-Status Animal Species

The ESA, 16 U.S.C. 1531 et seq., provides protection and programs to recover imperiled species and the ecosystems upon which they depend. It is administered by the USFWS and the Commerce Department's National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms; the responsibilities of NMFS are mainly marine wildlife. Under Section 7 of the ESA, any federal agency authorizing, funding, or carrying out any action must ensure that the action is not likely to jeopardize the continued existence of any species listed as endangered or threatened, or result in the destruction or adverse changes to designated critical habitat of such species.

Under the ESA, species may be listed as either endangered or threatened. “Endangered” means a species is in danger of extinction throughout all or a significant portion of its range. “Threatened” means a species is likely to become endangered in the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and distinct population segments of vertebrate species.

Special-status species are those that state or federal agencies afford an additional level of protection by law, regulation, or policy. Species identified in this section are federally listed species protected under the ESA or the BGEPA. There are three federally protected animal species with potential to occur or be affected by disturbances near the project area. These species are the bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), and northern long-eared bat (*Myotis septentrionalis*) (USFWS 2021a; WNDD 2021). Table 3.2-10 presents the regulatory status and habitat description for these three species.

Table 3.2-10 Federally Listed Animal Species Potentially Occurring within the Project Area

Common Name Scientific Name	Status	Habitat
Bald eagle <i>Haliaeetus leucocephalus</i>	BGEPA	Breeding habitat along rivers, lakes, reservoirs, or other large bodies of water with large fish and mature trees for nest placement. Winter roost sites typically are in similar habitats. Bald eagles usually avoid areas with human activity and development.
Golden eagle <i>Aquila chrysaetos</i>	BGEPA	Golden eagles occur in open and semi-open lands in canyonlands, rimrock terrain, and riverside cliffs and bluffs. Golden eagles usually nest on cliffs, trees, and steep escarpments. They typically avoid developed environments.
Northern long-eared bat <i>Myotis septentrionalis</i>	FT	Bat roosts in are generally in trees greater than 3 inches diameter at chest height that have exfoliating bark, cracks, or crevices. Maternity colonies typically are in larger trees. Trees can be in the interior or forest edge and are used from April through August. The northern long-eared bat hibernates in caves and mines – swarming in surrounding wooded areas in autumn. During late spring and summer, the northern long-eared bat roosts and forages in upland forests.

Sources: USFWS 2021a; WNDD 2021

Notes:

BGEPA = Bald and Golden Eagle Protection Act

FT = Federally Threatened

3.2.7.2 Environmental Consequences

Proposed Action

General Wildlife

Due to the extensive amount of surrounding reclaimed vegetation and existing development in the project area, wildlife use of the project area appears to be infrequent. Overall, the food and habitat

resources are minimal. Impacts from the new development, construction noises, increased numbers of people on site, and operation of the facility could deter some individuals from passing through the project area or its surroundings. It is highly unlikely that the development of the FPO Pilot Project would lead to wildlife mortality, loss of important food resources, or degradation of quality habitat. The FPO Pilot Project would not reduce the quality of year-round pronghorn habitat in the region. Impacts to wildlife likely would be negligible and would not have population-level impacts.

Migratory Birds

Few migratory bird species are likely to inhabit the project area or its vicinity. Due to the lack of suitable nesting and foraging habitat in the project area, direct impacts to migratory birds would be minimal from the proposed action. A nesting pair of killdeer may have decreased reproductive potential in the project area due to the increased human activity associated with the construction and operation of the FPO Pilot Project. Mortality due to vehicular collisions with project-related vehicles or construction equipment would not be likely because few individual birds inhabit the project area.

Indirect impacts could occur to migratory bird species residing in habitats adjacent to the project site due to increased noise, fugitive dust, and human presence associated with construction and operation of the facility. This could result in degraded habitat because of an avoidance response outside the project area. However, the surrounding area, with reclaimed vegetation dominated by crested wheatgrass, has few resources to attract migratory birds. Impacts to migratory birds would be negligible and would not result in population-level impacts.

Based on habitat requirements, the project area does not support suitable habitat for any federally listed species. Because the project area lacks suitable habitat for special-status animal species, no impacts to populations of these species would occur due to the FPO Pilot Project.

No Action Alternative

Under the no action alternative, the FPO Pilot Project would not be constructed. Consequently, there would be no changes to the project site and no impacts to wildlife.

3.2.8 Water Resources

3.2.8.1 Affected Environment

Surface Waters and Wetlands

The FPO Pilot Project site is in the Belle Fourche River watershed and drains to the east. Donkey Creek is approximately 1,400 feet east of the site (SwRI and Black Hills Energy 2020). There are no surface waters or wetlands in the proposed project area. However, small lakes with surface water and freshwater herbaceous wetlands around the edges occur at the bottoms of reclaimed coal mine pits (USFWS 2021b), including the Peerless Pit and the South Pit. The Peerless Pit and associated process water ponds are approximately 2,000 feet north, and the South Pit Pond is approximately 600 feet west of the FPO Pilot Project site (SwRI and Black Hills Energy 2020).

Donkey Creek was monitored by the United States Geological Survey (USGS) from July 2007 through November 2016 at a location west (upstream) of the FPO Pilot Project site near Gillette (USGS 06426130). The USGS monitored stream flow. The flow measurements at this location show perennial flows, with an average monthly high flow of 8.1 cubic feet per second in May and an average monthly low flow of 0.37 cubic foot per second in December. No water quality parameters were measured (USGS 2021).

Donkey Creek is subject to water quality and quantity influences from urban activities, particularly in the City of Gillette; industrial activities from mining and coal-bed methane recovery; and agricultural activities, mainly livestock production. Key water quality concerns relate to sediment from stormwater runoff and bacteria, specifically *Escherichia coli*. Discharge permits issued under the WYPDES program by the Wyoming DEQ control pollutants from industrial activities along Donkey Creek. The Campbell County Conservation District and Donkey Creek Watershed Steering Committee have developed a comprehensive natural resource management plan to address water quality issues in the Donkey Creek watershed (Campbell County Conservation District and Donkey Creek Watershed Steering Committee 2016).

EPA requires that Wyoming DEQ make designated use support determinations and that surface waters in the state be placed in one of five categories for national reporting. Donkey Creek has been listed as Category 4A in the most recent report by the Wyoming DEQ on water quality conditions in the state (Wyoming DEQ 2020). Category 4A indicates that at least one designated use is not being supported or is threatened, but that a Wyoming total maximum daily load (TMDL) has been approved by EPA or a TMDL has been established by EPA. In the case of Donkey Creek, the *Escherichia coli* values do not support use of the creek for recreation. The Wyoming DEQ developed TMDLs for the Belle Fourche River watershed, including *Escherichia coli* values for Donkey Creek, in 2013 (Wyoming DEQ 2013).

Floodplains

Floodplains are defined as any land area susceptible to being inundated by waters from any source (44 CFR 59.1) and are often associated with surface waters and wetlands. Floodplains are valued for their natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions. For human communities, however, floodplains can be considered a hazard area because buildings, structures, and properties in floodplains can be damaged during floods.

The Federal Emergency Management Agency (FEMA) develops Flood Insurance Rate Maps, the official maps on which FEMA delineates special flood hazard areas for regulatory purposes under the National Flood Insurance Program. Special flood hazard areas are also known as 100-year floodplains, or areas that have a 1 percent annual chance of flooding. FEMA also maps 500-year floodplains, or areas that have a 0.2 percent annual chance of flooding.

The project is in a FEMA-mapped Zone A (no base flood elevation determined) Special Flood Hazard Area (FEMA 2021). Zone A areas are subject to rising waters and are usually near a lake, river, stream, or other body of water. Potential flooding would be associated with Donkey Creek, which flows south to north, approximately 1,400 feet east of the project site.

Groundwater

Groundwater in the area occurs in the permeable layers of the coal-bearing Fort Union Formation and in alluvium associated with surface water streams. Both the Fort Union Formation and the alluvium have been highly disturbed by mining operations in the project area. In reclaimed areas that were mined below the water table, the water-bearing rock layers have been removed and groundwater moves through unconsolidated pit backfill materials. The backfill includes rock of varying sizes, which are placed back in the open pit without compaction, except by equipment moving over the surface to grade the material. Because of the unconsolidated nature of the pit backfill, groundwater moves through this material faster than the native rock aquifers and may pool in the former mine pits.

No information is available on current groundwater levels or quality in the vicinity of the proposed FPO Pilot Project.

3.2.8.2 Environmental Consequences

Proposed Action Alternative

Surface Waters and Wetlands

Surface waters and wetlands do not occur in the project's construction footprint; therefore, these resources would not be affected by direct excavating or clearing. It is unlikely that any construction or operations activity would indirectly impact waters or wetlands in the vicinity of the project site because the nearest wetlands are 600 feet west of the project area and are unlikely to receive sediment due to the distance from the project area. Prior to construction, the FPO Pilot Project would apply to the Wyoming DEQ Water Quality Division for coverage under the Wyoming Small Construction General Permit. The WYPDES permit for the Gillette Energy Complex would also be amended to allow use of the existing wastewater ponds to dispose of the wastewater streams from the FPO Pilot Plant. Additionally, best management practices would be implemented to control stormwater runoff and contain any leaks or spills in the pilot plant area. Therefore, impacts on surface waters or wetlands from the project would be negligible.

Floodplains

All project construction and operation activities would occur in a FEMA-mapped Zone A (no base flood elevation determined) Special Flood Hazard Area (FEMA 2021). This means that the site lies within the 100-year floodplain with a 1 percent chance each year of flooding. Due to the 1,400-foot distance from Donkey Creek, the risk of actual flooding at the FPO Pilot Plant site would be minor.

Groundwater

The depth to groundwater in the vicinity of the FPO Pilot Project is not known. However, the buildings would be constructed on and anchored to poured-in-place reinforced concrete foundations. Steel structural supports would be connected to concrete pier foundations. Both are expected to be relatively shallow and are not expected to encounter groundwater. Best management practices would be put into place before construction, and would continue throughout the operations to manage stormwater runoff and capture and contain any spills and leaks. These best management practices would be designed to avoid contamination of groundwater. The containment and disposal of wastewater and wastes from the operations would provide further protection for groundwater. The disposal locations for process wastes at the Gillette Energy Complex, which are currently approved for use for wastes from the Gillette Energy Complex and would be used in accordance with additional approval from the appropriate regulatory authority for the FPO Pilot Project waste disposal and would include appropriate monitoring of the disposal site, would further minimize the potential for groundwater impacts. Therefore, negligible impacts on groundwater are anticipated.

No Action Alternative

Under the no action alternative, the proposed action would not occur; therefore, implementation of the no action alternative would result in no changes to the project site or nearby surface waters, wetlands, or groundwater.

3.2.9 Visual Resources

3.2.9.1 Affected Environment

Because the site is near the Gillette Energy Complex and the site of a former open-pit coal mining operation, the visual quality of the area surrounding the proposed project is characterized by industrial development and past landform manipulation. The FPO Pilot Plant site is a vacant portion of a previously cleared and graded industrial facility adjacent to WY 51.

3.2.9.2 Environmental Consequences

Proposed Action Alternative

Under the proposed action, the pilot facility would be constructed on the southern side of the existing Gillette Energy Complex. The main viewpoint of the pilot facility would be via vehicle traffic on WY 51, which has a speed limit of 55 miles per hour. The site may also be viewable from an unnamed road that runs north to south from WY 51 to the east and Gillette Thunder Speedway to the west. The project site would not be visible from the City of Gillette and points to the south of the project due to distance from possible viewing locations.

Construction of the site would result in new buildings that range from 50 to 85 feet in height. The existing warehouse/office building is 35 to 40 feet in height (Figure 8). The facility would have a visual quality similar to that of existing structures at the Gillette Energy Complex north of WY 51; therefore, the project would be compatible with the general visual character of the area for viewers driving on WY 51. Because only low-growing vegetation that is not visible from WY 51 would be removed for the project, there would be no impacts to the visual quality of vegetation at the project site. Construction equipment would be visible in this area briefly during project work, but it would not obstruct views of the surrounding area. The new buildings would be noticeably higher than the existing warehouse and offices, but the overall visual character is one of an industrial facility on both sides of WY 51, and the added buildings would not change this overall visual character.

The property used for the FPO Pilot Plant would be returned to its original state at the conclusion of the testing. Therefore, visual impacts would be confined to the duration of the project and, when compared to the existing visual character in the vicinity, would result in minor changes to the visual character.

No Action Alternative

Implementation of the no action alternative would result in no construction of the FPO Pilot Project and no changes in the existing visual character of the area.

3.2.10 Materials and Waste Management

3.2.10.1 Affected Environment

No materials are currently stored or used and no waste is currently generated from the FPO Pilot Project site. The site has been cleared and graded but is not currently used. The surrounding area consists of the Gillette Energy Complex, with materials used and stored for the existing power plant operations and wastes generated from the existing operations. The materials and wastes are managed in accordance with the Gillette Energy Complex's material storage practices, solid and hazardous waste management procedures, applicable local and state standards for managing these materials; and in accordance with federal and state regulations for management of materials and wastes. Wastewater from the power plant is sent to Peerless Pit and associated process water ponds for disposal.



Figure 8 FPO Pilot Site Building Heights

Source: Sargent & Lundy 2021

3.2.10.2 Environmental Consequences

Proposed Action Alternative

Table 3.2-11 lists the materials that would be used for the FPO Pilot Project, along with the amount to be stored on site, the use of the material, and final disposal if applicable.

All materials and supplies would be stored in areas designed to collect and contain any leaks or spills and prevent runoff. A spill response plan would be developed for the site, and appropriate spill response equipment would be available to respond to leaks and spills.

Solid and hazardous wastes would be disposed of at approved facilities at the Gillette Energy Complex, as shown in Table 3.2-9. Wastewater would be hauled to the wastewater ponds at the Gillette Energy Complex Peerless Pit for disposal. Gillette Energy Complex permits, such as the WYPDES discharge permit, would be amended to allow disposal of wastes from the FPO Pilot Project at the Gillette Energy Complex. Impacts from storage, use, and disposal of materials, supplies, and wastes would therefore be negligible.

No Action Alternative

Under the no action alternative, there would be no FPO Pilot Plant and no need for storage of materials for pilot plant operations. There would be no solid or hazardous waste generated from the pilot plant activities. The Gillette Energy Complex would continue to operate and handle materials and solid wastes as they are currently handled.

3.2.11 Resource Areas Excluded from Detailed Analysis

This section describes the resources that were excluded from the detailed analysis because the resource is not present, would not be impacted, or would be only negligibly impacted by the proposed project. These resource areas are Geology and Paleontological Resources, Soils, Land Use, and Cultural Resources. Each of these resources are briefly described below, along with the rationale for exclusion from detailed analysis.

3.2.11.1 Geology and Paleontological Resources

Geologic and paleontological resources at the project site have been disturbed by the previous open-pit mining operations and associated facilities for the Wyodak Mine. Specifically, geology and paleontology have been disrupted by blasting and material movement, grading, building placement, and other activities. Consequently, geology and paleontology are not in their native condition and the project would not result in further impacts to these resources.

Table 3.2-11 Materials Used in the FPO Pilot Plant

Material	Amount Stored on Site	How Stored	Usage	Material Use	Material Disposal
Coal	80 tons	Coal storage silo	40 tons/day for 25 MWth; 80 tons/day for 50 MWth	Crushed, slurried, and combusted	Slag hauled off site for disposal at local landfill; minimal emissions of particulates, sulfur capture
Liquid oxygen 90% purity	39,000 gallons	Three 13,000-gallon tanks	13,000 gallons/day at 25 MWth	In combustion process	Consumed in combustion process
Service water	No on-site storage	No on-site storage	Average of 21.3 gallons/minute	Coal slurry preparation, makeup water for demineralizer, fluid gas desulfurization slurry preparation, and dust control	Consumed, reused, or disposed in Peerless Pit
Mineralized water	20,000 gallons	20,000-gallon storage tank	16,560 gallons/40 hour week for 25 MWth operation	Turned to steam for use in a one-time steam generator	Sent to atmosphere through stacks
Wastewater	20,000 gallons	20,000-gallon storage tank	2 weeks storage based on 40-hour week and 25 MWth operation	From the FGD, coal slurry, and steam cycle blowdown	Trucked to Peerless pond
Ammonium hydroxide	275 gallons	275-gallon tote	0.9 gallon/hour	Treating condensate and pH control	Consumed in process
Pulverized limestone	20 tons	2,200-pound bags	2,200 pounds/day for 25 MWth	Create gypsum to retain sulfur	Roll-off containers of 8 tons (104 hours of operation at 25 MWth for periodic off-site disposal)

Notes:

FGD = flue gas desulfurization

MWth = megawatts thermal

3.2.11.2 Soils

Soils at the project site and in the vicinity are classified as Pits-Dumps complex (USDA NRCS 2020), indicating that the native soils in the area have been completely displaced by anthropogenic disturbance from mining operations at the Wyodak Mine. Therefore, the project would not result in impacts to native soils because these resources have been previously disturbed at the site.

3.2.11.3 Land Use

The current land use of the proposed project site is a vacant portion of an existing industrial facility. The property surface owner is WRDC; the property was previously part of a surface coal mine, which has been reclaimed. The proposed project site lies within the previous disturbance. It is part of the Gillette Energy Complex and would not expand the footprint of the existing facility. Because the proposed project would not change the existing land use, no impact to land use would occur.

3.2.11.4 Cultural Resources

The proposed project site lies within a previously heavily disturbed mine area. Previous mining operations are shown on Figure 2. A search was conducted through the Wyoming State Historic Preservation Office (SHPO) WyoTrack application to identify previously documented cultural resources and previous cultural resource studies in the proposed FPO plant site and within a 1-mile radius of the site (Figure 9).

Two cultural resource studies were conducted in the project area in 1999:

1. Scott, Robert F. and Karen Bridger, "A Cultural Resource Survey of the Wyodak Mine Permit Area." Report on file with the Wyoming SHPO, Cheyenne.
2. Office of the Wyoming State Archaeologist, "A Preliminary Report of an Archaeological Survey for Wyodak Resources Development Corporation, Campbell County, Wyoming." Report on file with the Wyoming SHPO, Cheyenne.

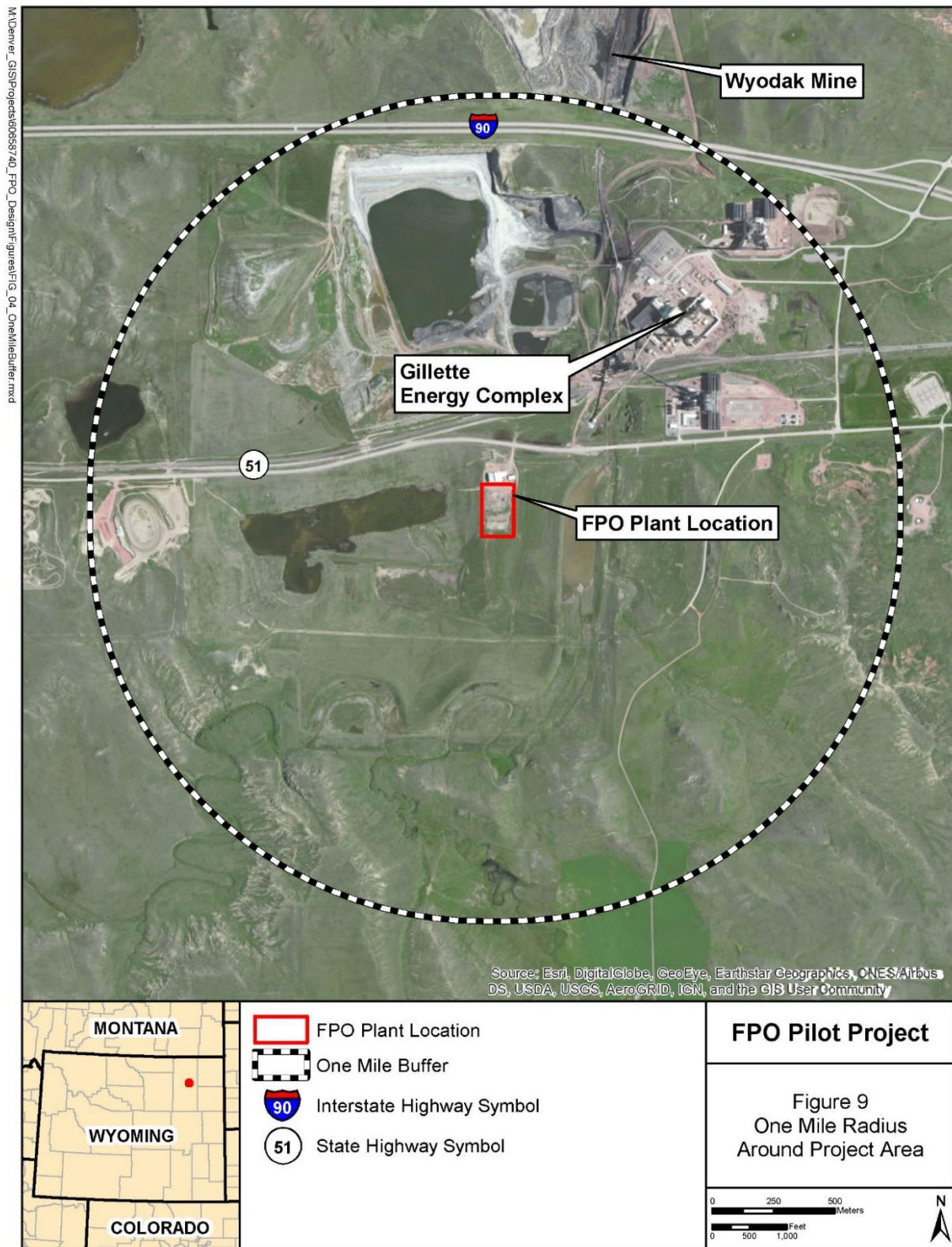
An additional 26 cultural resources studies were conducted within an approximate 1 mile radius of the proposed FPO plant site. Eleven cultural resources were documented within 1 mile of the site, but none of these were in the FPO plant site. Of the previously documented resources, five were recommended as not eligible for listing in the National Register of Historic Places (NRHP), five were not evaluated, and one was recommended as eligible for listing in the NRHP. The one eligible resource was identified near, but not in, the FPO Pilot Project area. The Chicago, Burlington, and Quincy Railroad line was determined to be eligible for the NRHP, but was not listed. None of these resources would be impacted by the proposed project.

Based on the extensive previous disturbance at the site, there is a very low probability that there are any intact and undocumented cultural resources eligible for listing on the NRHP in the proposed project site. No previously documented historic or cultural resources eligible for or listed in the NRHP were identified in the project area based on the aforementioned database searches. Based on the proposed disturbance limits, the project would not have an impact on the NRHP-eligible Chicago, Burlington, and Quincy railroad line.

Due to the previous disturbance at the site and because no cultural resources eligible for listing in the NRHP were identified in previous cultural resource surveys that encompassed the site and surrounding area, no impacts are expected to occur to cultural resources from the FPO Pilot Project, and cultural resources can be dismissed from further analysis.

Section 106 of the National Historic Preservation Act requires consultation with the State Historic Preservation Office. The Wyoming State Historic Preservation Office was consulted on the potential for cultural resources in the proposed project area. The Wyoming State Historic Preservation Office concurred that there was a low probability of disturbance to historic properties due to previous disturbance in the area (Appendix B). The agency's concurrence letter requested that a mitigation measure be added in the event the project uncovered cultural materials during construction. The following mitigation measure would be applied to the FPO Pilot Project construction:

If any cultural materials are discovered during construction, work in the area should halt immediately. The DOE and Wyoming SHPO staff should be contacted, and the materials should be evaluated by an archaeologist or historian meeting the Secretary of the Interior's Professional Qualification Standards (48 Federal Register 22716, September 1983).



4.0 CONSULTATION AND COORDINATION

4.1 Public Involvement, Agency Coordination, and Tribal Consultation

DOE coordinated with the following agencies, tribes, and nongovernmental agencies through agency consultation letters and/or notification of the availability of the EA.

- Federal, state, and local government agencies:
 - Bureau of Indian Affairs
 - United States Department of the Interior Regional Environmental Officer
 - USFWS
 - EPA, Region 5
 - Wyoming DEQ
 - Wyoming Office of Governor Mark Gordon
 - Wyoming SHPO
 - Campbell County
- Tribal governments:
 - Apache Tribe of Oklahoma
 - Arapaho Tribe of the Wind River Reservation, Wyoming
 - Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation
 - Blackfeet Nation
 - Cheyenne and Arapaho Tribes, Oklahoma
 - Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
 - Chippewa Cree Tribe of the Rocky Boy's Reservation
 - Comanche Nation of Oklahoma
 - Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota
 - Crow Tribe of Montana
 - Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
 - Kiowa Tribe of Oklahoma
 - Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
 - Nez Perce Tribe
 - Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
 - Oglala Sioux Tribe
 - Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota
 - Santee Sioux Nation, Nebraska
 - Shoshone Tribe of the Wind River Reservation, Wyoming
 - Sisseton Wahpeton Oyate Tribe
 - Standing Rock Sioux Tribe of North and South Dakota
 - Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota
 - Yankton Sioux Tribe
- Nongovernmental Organizations:
 - Alliance to Save Energy
 - American Coal Ash Association
 - American Public Power Association
 - Center for Biological Diversity
 - Clean Water Action
 - Ducks Unlimited, Inc.

- Earthjustice
- Electric Power Research Institute, Inc.
- Environmental Defense Fund
- Environmental Defense Institute
- Friends of the Earth
- Greenaction for Health and Environmental Justice
- Institute for Energy and Environmental Research
- National Audubon Society
- National Wildlife Federation
- Natural Resources Defense Council
- The Nature Conservancy
- Sierra Club
- Trout Unlimited
- Utilities Technology Council
- The Wilderness Society
- Western Governors' Association
- Western Interstate Energy Board
- Western Resource Advocates

4.2 List of Preparers

United States Department of Energy – National Energy Technical Laboratory

<p>Pierina N. Fayish – DOE NEPA Document Manager B.S., Marine Science; M.S., Environmental Science and Management 17 years of experience</p>

AECOM Technical Services

<p>Anne Baldrige – Project Manager, Senior Environmental Planner B.S., Geology; M.B.A., Finance and Accounting 42 years of experience</p>
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<p>Jan Reed – Senior NEPA Planner/Biologist B.A., Environmental Studies; M.S., Ecology 16 years of experience</p>
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<p>Chris Kaiser – Deputy Project Manager, Noise Specialist B.A., Acoustics 10 years of experience</p>
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<p>Robert DeBaca – Senior Biologist B.A., Environmental Conservation; B.A., Ecology and Evolutionary Biology; M.S., Biology; Ph.D., Biology 32 years of experience</p>

<p>Lucy Harrington – Archaeologist B.A., Interdisciplinary Archaeology; M.S., Anthropology/Archaeology 7 years of experience</p>
<p>Barker Farris – Associate Vice President, Tribal Relations B.A., Anthropology/Ecology; M.A., Archaeology; Ph.D., Anthropology 20 years of experience</p>
<p>Caitlin Shaw – Senior Air Quality Specialist M.S., Geosciences; B.S., Meteorology 10 years of experience</p>
<p>Ben Tracy – GIS Analyst B.A., Film Studies; B.S., Natural Resources with a minor in GIS 10 years of experience</p>

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5.0 ACRONYMS AND ABBREVIATIONS

ATSDR	Agency for Toxic Substances and Disease Registry
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm ²	square centimeter
CO	carbon monoxide
CO ₂	carbon dioxide
CX	Categorical Exclusion
dBA	Weighted Decibels
DOE	Department of Energy
EA	Environmental Assessment
EPA	Environmental Protection Agency (U.S.)
EO	Executive Order
ESA	Endangered Species Act
°F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FGD	flue gas desulfurization
FPO	flameless pressurized oxy-combustion
FPO Pilot Project	FPO large-scale pilot project
GHG	greenhouse gas
gpm	gallons per minute
HAP	hazardous air pollutant
H ₂ S	hydrogen sulfide
H ₂ SO ₄	sulfuric acid
I-90	Interstate 90
L _{dn}	Day-Night Sound Level
MBTA	Migratory Bird Treaty Act
mg	milligram
µg/m ³	micrograms per cubic meter
MWth	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides

NRHP	National Register of Historic Places
NWS	National Weather Service
OTSG	once-through steam generator
PM	particulate matter
PM _{2.5}	particulate matter with an aerodynamic diameter of 2.5 microns or less
PM ₁₀	particulate matter with an aerodynamic diameter of 10 microns or less
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
SHPO	State Historic Preservation Office
SO ₂	sulfur dioxide
SO ₃	suspended sulfites
SwRI	Southwest Research Institute
TMDL	total maximum daily load
UCAR	University Corporation for Atmospheric Research
U.S.C.	United States Code
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compounds
WAAQS	Wyoming Ambient Air Quality Standards
WHO	World Health Organization
WNDD	Wyoming Natural Diversity Database
WRCC	Western Regional Climate Center
WRDC	Wyodak Resources Development Corporation
WSCO	Wyoming State Climate Office
WY 51	Wyoming State Highway 51
Wyoming DEQ	Department of Environmental Quality
WYPDES	Wyoming Pollutant Discharge Elimination System

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APPENDIX A

CATEGORICAL EXCLUSIONS FOR FPO PILOT PROJECT WORK IN PHASES I AND II

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U.S. DEPARTMENT OF ENERGY - NETL

CATEGORICAL EXCLUSION (CX) DESIGNATION FORM

Project No.: DE-FE0031580 Recipient Name: SwRI Project Location: San Antonio, TX

Sub-recipient(s) and Locations:

Sargent & Lundy - Chicago, IL; ITEA - Gioia Del Colle, Italy; EPRI - Charlotte, NC and Palo Alto, CA; GE Global Research - Niskayuna, NY; Peter Reineck Associates - York, UK

NETL Sponsoring Org.: FE/TDIC/Coal/AES Team NETL Contact: Greg O'Neil

Brief Title of Proposed Action: Flameless Pressurized Oxy-Combustion Large Pilot Design, Constr&Operation-Phase I

Brief Description of Activities:

The project is a 16-month effort aimed at team formation and establishing technical readiness to begin a Front-End Engineering Design study for a large-scale pilot plant. No experimental work is planned.

THE PROPOSED ACTION FALLS WITHIN THE FOLLOWING CATEGORICAL EXCLUSION(S) FROM APPENDICES A AND B TO SUBPART D OF DOE NEPA IMPLEMENTING PROCEDURES (10 CFR 1021):

General Administration/Management

- A1 – Routine business actions
- A9 – Info gathering, analysis, documentation, dissemination, and training
- A11 – Technical advice and planning assistance

Facility Operations

- B1.3 – Routine maintenance and custodial services
- B1.7 – Communication system and data processing equipment acquisition, installation, operation, removal
- B1.15 – Support building or structure, non-waste storage, construction/operation

Safety and Health

- B2.1 – Modifications to enhance workplace habitability
- B2.2 – Installation/improvement of building/equipment instrumentation
- B2.3 – Installation of equipment for personnel safety and health

General Research

- B3.1 – Site characterization/environmental monitoring
- B3.6 – R&D or pilot facility construction/operation/decommissioning
- B3.7 – New infill exploratory, experimental oil/gas/geothermal well construction and/or operation
- B3.9 – Certain CCT demonstration activities, emissions unchanged
- B3.11 – Outdoor tests, experiments on materials and equipment components

Electrical Power and Transmission

- B4.4 – Power management activities (storage, load shaping, and balancing)
- B4.6 – Transmission support addition/modifications at developed facility site
- B4.11 – Construction of power substations and interconnection facilities
- B4.13 – Upgrading and rebuilding existing power lines (< 20 miles)

Conservation, Fossil, and Renewable Energy Activities

- B5.1 – Actions to conserve energy, no indoor air quality degradation
- B5.3 – Modification/abandonment of wells
- B5.5 – Short crude oil/gas/steam/geothermal/carbon dioxide pipeline const/oper within an existing right-of-way (< 20 miles) between existing facilities
- B5.13 – Experimental wells for injection of small quantities of carbon dioxide (< 500,000 tons)
- B5.15 – Small scale renewable energy research/development/pilot projects
- B5.22 – Alternative fuel vehicle fueling stations
- B5.23 – Electric vehicle charging stations

Other

- Specify category:
- Specify category:
- Specify category:

This action (1) would not present any extraordinary circumstances such that the action might have a significant impact upon the human environment; (2) is not connected to other actions with potentially significant impacts; (3) is not related to other actions with cumulatively significant impacts; and (4) is not inconsistent with 10 CFR 1021.211 - Interim Actions or 40 CFR 1506.1 - Limitations during the NEPA process.

SELECT ONE OF THE FOLLOWING:

- This Categorical Exclusion includes all tasks and phases in the Statement of Work or Statement of Project Objectives for this project.
- This Categorical Exclusion is only valid for the following tasks/phases . The DOE initiator acknowledges the responsibility to obtain a NEPA determination prior to initiating any activities outside the scope of this Categorical Exclusion.

SELECT ONE OF THE FOLLOWING:

- This Categorical Exclusion includes all locations and activities for this project.
- Additional sites, sub-recipients, or activities cannot be identified at this time. The DOE initiator acknowledges the responsibility to obtain a NEPA determination prior to initiating any activities outside the scope of this Categorical Exclusion.

NOTE: ANY CHANGE(S) TO THE PROJECT SCOPE OR LOCATIONS MAY REQUIRE A NEW NEPA DETERMINATION.

DOE Initiator Signature: GREGORY O'NEIL Digitally signed by GREGORY O'NEIL
Date: 2018.03.08 10:43:53 -0500

Date: 3 / 8 / 2018

NEPA Compliance Officer: Jesse Garcia Digitally signed by Jesse Garcia
Date: 2018.03.09 17:06:19 -0800

Date: 03 / 09 / 2018
month day year

The following special condition is provided for the consideration of the Contracting Officer:

CX covers activities to be conducted within existing office sites. Field work is not covered under this CX.

U.S. DEPARTMENT OF ENERGY - NETL

CATEGORICAL EXCLUSION (CX) DESIGNATION FORM

Project No.: DE-FE0031580 Recipient Name: Southwest Res. Inst. Project Location: San Antonio, TX

Sub-recipient(s) and Locations:

Sargent & Lundy - Chicago, IL; EPRI - Palo Alto, CA; EPRI - Charlotte, NC; GE Global Research - Niskayuna, NY; University of Wyoming - Laramie, WY; ITEA - Gioia Del Colle, Italy

NETL Sponsoring Org.: FE/TDIC/Coal/AES Team NETL Contact: Erik Albenze/Diane Madden

Brief Title of Proposed Action: Flameless Pressurized Oxy-combustion Large Pilot Design, Const., and Operation

Brief Description of Activities:

Complete a FEED study for the FPO pilot plant. Complete the NEPA and permitting process. Secure commitments of project partners. Update TEA for FPO technology.

THE PROPOSED ACTION FALLS WITHIN THE FOLLOWING CATEGORICAL EXCLUSION(S) FROM APPENDICES A AND B TO SUBPART D OF DOE NEPA IMPLEMENTING PROCEDURES (10 CFR 1021):

General Administration/Management

- A1 – Routine business actions
- A9 – Info gathering, analysis, documentation, dissemination, and training
- A11 – Technical advice and planning assistance

Facility Operations

- B1.3 – Routine maintenance and custodial services
- B1.7 – Communication system and data processing equipment acquisition, installation, operation, removal
- B1.15 – Support building or structure, non-waste storage, construction/operation

Safety and Health

- B2.1 – Modifications to enhance workplace habitability
- B2.2 – Installation/improvement of building/equipment instrumentation
- B2.3 – Installation of equipment for personnel safety and health

General Research

- B3.1 – Site characterization/environmental monitoring
- B3.6 – R&D or pilot facility construction/operation/decommissioning
- B3.7 – New infill exploratory, experimental oil/gas/geothermal well construction and/or operation
- B3.9 – Certain CCT demonstration activities, emissions unchanged
- B3.11 – Outdoor tests, experiments on materials and equipment components

Electrical Power and Transmission

- B4.4 – Power management activities (storage, load shaping, and balancing)
- B4.6 – Transmission support addition/modifications at developed facility site
- B4.11 – Construction of power substations and interconnection facilities
- B4.13 – Upgrading and rebuilding existing power lines (< 20 miles)

Conservation, Fossil, and Renewable Energy Activities

- B5.1 – Actions to conserve energy, no indoor air quality degradation
- B5.3 – Modification/abandonment of wells
- B5.5 – Short crude oil/gas/steam/geothermal/carbon dioxide pipeline const/oper within an existing right-of-way (< 20 miles) between existing facilities
- B5.13 – Experimental wells for injection of small quantities of carbon dioxide (< 500,000 tons)
- B5.15 – Small scale renewable energy research/development/pilot projects
- B5.22 – Alternative fuel vehicle fueling stations
- B5.23 – Electric vehicle charging stations

Other

- Specify category:
- Specify category:
- Specify category:

This action (1) would not present any extraordinary circumstances such that the action might have a significant impact upon the human environment; (2) is not connected to other actions with potentially significant impacts; (3) is not related to other actions with cumulatively significant impacts; and (4) is not inconsistent with 10 CFR 1021.211 - Interim Actions or 40 CFR 1506.1 - Limitations during the NEPA process.

SELECT ONE OF THE FOLLOWING:

- This Categorical Exclusion includes all tasks and phases in the Statement of Work or Statement of Project Objectives for this project.
- This Categorical Exclusion is only valid for the following tasks/phases Phase 2. The DOE initiator acknowledges the responsibility to obtain a NEPA determination prior to initiating any activities outside the scope of this Categorical Exclusion.

SELECT ONE OF THE FOLLOWING:

- This Categorical Exclusion includes all locations and activities for this project.
- Additional sites, sub-recipients, or activities cannot be identified at this time. The DOE initiator acknowledges the responsibility to obtain a NEPA determination prior to initiating any activities outside the scope of this Categorical Exclusion.

NOTE: ANY CHANGE(S) TO THE PROJECT SCOPE OR LOCATIONS MAY REQUIRE A NEW NEPA DETERMINATION.

DOE Initiator Signature: ERIK ALBENZE Digitally signed by ERIK ALBENZE
Date: 2019.07.01 15:33:52 -0400

NEPA Compliance Officer: Pierina Fayish Digitally signed by Pierina Fayish
Date: 2019.07.09 14:45:11 -0400

Date: 7 / 1 / 2019

month day year
Date: 07 / 09 / 2019
month day year

The following special condition is provided for the consideration of the Contracting Officer:

Note: Project activities will be carried out by ITEA in Italy which is not covered under this CX. ITEA should follow applicable Italian laws. This CX applies to Phase 2 only. If this project is selected for Phase 3 work, a separate NEPA determination will be required.

APPENDIX B

WYOMING STATE HISTORIC PRESERVATION OFFICE CONSULTATION RESPONSE

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November 10, 2021

Pierina Fayish
National Energy Technology Laboratory M/S:922-273C
P.O. Box 10940
Pittsburgh, PA 15236-0940

Re: Southwest Research Institute, Installation of a Pilot Unit at Wyodak Resources Development Corporation Property, Campbell County, WY (DBPR_WY_2020_1075)

Dear Ms. Fayish,

Thank you for consulting with the Wyoming State Historic Preservation Office (SHPO) regarding the above referenced undertaking. Following 36 CFR Part 800, we find that the proposed undertaking is in an area of previous disturbance and has a low probability of containing historic properties, as defined in 36 CFR § 800.16(l)(1). No further identification efforts are warranted.

There is a possibility that buried prehistoric or historic materials may be discovered during the undertaking and we recommend the Department of Energy incorporate the following stipulation in the project permit:

If any cultural materials are discovered during construction, work in the area should halt immediately, the federal agency and SHPO staff be contacted, and the materials be evaluated by an archaeologist or historian meeting the Secretary of the Interior's Professional Qualification Standards (48 FR 22716, Sept. 1983).

This letter should be retained in your files as documentation of a SHPO concurrence with your finding of no historic properties affected. Please refer to DBPR_WY_2020_1075 on any future correspondence regarding this undertaking. If you have any questions, please contact me at 307-777-5497.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Richard L. Currit'.

Richard L. Currit
Senior Archaeologist

Mark Gordon | Governor
Darin J. Westby, P.E. | Director
Sara Needles | SHPO Officer



**ARTS. PARKS.
HISTORY.**
State Parks & Cultural Resources