DOE/EA-1886D

DRAFT ENVIRONMENTAL ASSESSMENT

For The

Big Sky Regional Carbon Sequestration Partnership – Phase III: Kevin Dome Carbon Storage Project

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

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COVER SHEET

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Title: Draft Environmental Assessment for the Big Sky Regional Carbon Sequestration Partnership – Phase III: Kevin Dome Carbon Storage Project (DOE/EA-1886D)

Contact: For additional copies or more information about this Environmental Assessment, please contact:

Mr. Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Facsimile: (304) 285-4403
Email: william.gwilliam@netl.doe.gov

Abstract: U. S. Department of Energy (DOE) prepared this draft Environmental Assessment (EA) to evaluate the potential environmental consequences of providing financial assistance in a cooperative agreement with Big Sky Regional Carbon Sequestration Partnership (BSCSP). If DOE decides to provide funding, in accordance with the terms of the cooperative agreement, BSCSP plans to test the injection of 1 million metric tons of carbon dioxide (CO_2) over a four-year project injection period into the Duperow formation in Kevin Dome. BSCSP would drill up to five production wells, one injection well, and four wells for monitoring. The project would also involve construction of a compressor station, five miles of roads, and six to ten miles of stainless steel pipeline, as well as various monitoring activities. Two activities, a three-dimensional, nine-component seismic survey and some air and water baseline sampling, were allowed to proceed before this document was completed under an interim action request. However, the seismic survey work ceased after the seismic crews caused inadvertent adverse effects to cultural resources, and inclement weather caused postponement of the environmental monitoring. Under the terms of the financial assistance agreement, BSCSP has also initiated some desktop studies and administrative work that would have no effect on the environment (BSCSP, 2012a).

DOE's proposed action evaluated in this draft EA is to provide approximately $63.8 million in financial assistance in a cost-sharing arrangement to BSCSP. The total cost of the proposed project would be approximately $81.4 million. This EA evaluates the environmental resource areas DOE commonly addresses in its EAs and identifies no significant adverse environmental impacts for the proposed project after mitigation.

Availability: The draft EA is available on DOE's National Energy Technology Laboratory website at http://www.netl.doe.gov/publications/others/nepa/ea.html and at:
Toole County Library
229 2nd Ave. S.
Shelby, MT 59474
(406) 424-8345

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

%	Percent
°C	Degrees Celsius
°F	Degrees Fahrenheit
^{14}C	Carbon 14 or Radiocarbon
3-D	Three-Dimensional
9C	Nine Component
AADT	Average Daily Traffic Counts
ACEC	Area of Critical Environmental Concern
ADNL	A-weighted Day-night Average Sound Level
APE	Area of Potential Effect
AQCR 141	Great Falls Intrastate Air Quality Control Region
AQCR	Air Quality Control Region
ARM	Administrative Rules of Montana
ATV	All Terrain Vehicles
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMPs	Best Management Practices
BSCSP	Big Sky Carbon Sequestration Partnership
btu	British Thermal Units
CAA	Clean Air Act
CAPS	Crucial Areas Planning System
CCSP	U.S. Climate Change Science Program
CCUS	Carbon Capture, Utilization, and Storage
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CF	Correction Factor
CFR	Code of Federal Regulations
CH_4	Methane
cm	Centimeters
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
CRABS	Cultural Resources Annotated Bibliography System Report
CRIS	Cultural Resource Information Systems Report
CRP	Conservation Reserve Program
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted Decibel
de minimis	Of Minimal Importance
DNFA	Determination of Non-competitive Financial Assistance
DNL	Day-night Average Sound Level
DOE	U.S. Department of Energy
DOT	Department of Transportation

EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EOR	Enhanced Oil Recovery
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
et seq.	Abbreviated Latin meaning “and the following”
FAA	Federal Aviation Administration
FOA	Funding Opportunity Announcement
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
ft	Feet or Foot
ft^3	Cubic Feet
FTE	Full-time Equivalent
GHG	Greenhouse Gas
GT	Gigatonnes
GWP	Global Warming Potential
hp	Horsepower
HWC	Hazardous Waste Combustion
Hz	Hertz
I	Interstate
IBDP	Illinois Basin – Decatur Project
IJC	International Joint Commission
IPCC	Intergovernmental Panel on Climate Change
kg	Kilogram
km	Kilometer
km^2	Square Kilometers
kW	Kilowatt
kWh	Kilowatt Hour
LANL	Los Alamos National Laboratory
lbs	Pounds
L_{eq}	Equivalent Sound Level
LIDAR	Light Detection and Ranging
LUSTs	Leaking Underground Storage Tanks
Lw	Sound Power Levels
m	Meter(s)
MBOG	Montana Board of Oil and Gas
MBTA	Migratory Bird Treaty Act
MCA	Montana Code Annotated
MDEQ	Montana Department of Environmental Quality
MDNRC	Montana Department of Natural Resources and Conservation
MDT	Modular Formation Dynamics Testing Tool
MEPA	Montana Environmental Policy Act
MGSC	Midwest Geological Sequestration Consortium
MHWA	Montana Hazardous Waste Act
MIT	Mechanical Integrity Test

mmbtu	Million British Thermal Units
mmcf	Million Cubic Feet
MPDES	Montana Pollutant Discharge Elimination System
MSCA	Montana Safety Culture Act
MSU	Montana State University
MTFWP	Montana Department of Fish, Wildlife, and Parks
MTNHP	Montana National Heritage Program
MVA	Monitoring, Verification, and Accounting
N_2O	Nitrous Oxide
NA	Not Available
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRA	Nuclear Regulatory Agency
NRC	National Research Council
NRHP	National Register of Historic Places
NSA	Noise Sensitive Areas
NSPS	Standards of Performance for New Stationary Sources
NWI	National Wetland Inventory
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PFT	Perfluorocarbons Tracer
PIG	Pipeline Inspector Gauges
PM_{10}	Particulate Matter Less Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns in Diameter
ppm	Parts per Million
psi	Per Square Inch
PWL	Power Level
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RCSP	Regional Carbon Sequestration Partnership
RM	Risk Management
RMP	Resource Management Plan
ROI	Region of Influence
ROW	Right-of-Way
RST	Reservoir Saturation Tool
SCS	Schlumberger Carbon Services
SDWA	Safe Drinking Water Act
SF_6	Sulfur Hexafluoride

SHPO	State Historic Preservation Office (Officer)
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOC	Species of Concern
SO_x	Sulfur Oxides
SPA	Stream Protection Act
SRMA	Special Recreation Management Area
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
THPO	Tribal Historic Preservation Officer
TL	Transmission Loss
TPI	Total Personal Income
tpy	Tons per Year
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USTs	Underground Storage Tanks
VOC	Volatile Organic Compounds
VSP	Vertical Seismic Profiling
w/o	Without

USE OF SCIENTIFIC NOTATION

Very small and very large numbers are sometimes written using scientific notation rather than as decimals or fractions. This notation uses exponents to indicate the power of 10 as a multiplier (i.e., 10^n, or the number 10 multiplied by itself n times; 10^{-n}, or the reciprocal of the number 10 multiplied by itself n times).

For example: $10^3 = 10 \times 10 \times 10 = 1{,}000$

$$10^{-3} = \frac{1}{10 \times 10 \times 10} = 0.001$$

In scientific notation, large numbers are written as a decimal between 1 and 10 multiplied by the appropriate power of 10:

4,900 is written $4.9 \times 10^3 = 4.9 \times 10 \times 10 \times 10 = 4.9 \times 1{,}000 = 4{,}900$.
0.049 is written 4.9×10^{-2}.
1,490,000 or 1.49 million is written 1.49×10^6.

A positive exponent indicates a number larger than or equal to one; a negative exponent indicates a number less than one.

1.0 INTRODUCTION

1.1 Summary

High concentrations of carbon dioxide (CO_2) in the atmosphere can exert a "greenhouse" effect that traps heat and increases temperature. Global emissions of CO_2 from human activity increased from an insignificant level two centuries ago to over twenty-one billion metric tons per year by 2003 (DOE, 2007a). The most notable human activity responsible for the generation of CO_2 is the combustion of carbon-based fuels (including oil, natural gas, and coal). Many scientists, including the Intergovernmental Panel on Climate Change (IPCC), believe there is a danger from an even modest increase in the Earth's temperature (called "global warming") as it could alter the global climate and cause significant adverse consequences for human health and welfare (DOE, 2007a).

In one of many governmental efforts to address the concerns outlined above, the U.S. Department of Energy (DOE) established the Carbon Sequestration Program in 1997 to conduct research and development (R&D) activities to evaluate and develop carbon storage technologies. Carbon capture and storage involves capturing and storing CO_2 emissions to prevent release into the atmosphere, as well as enhancing natural carbon uptake and storage processes. Geologic storage involves the permanent storage of CO_2 in various formations, such as saline formations, depleted oil and gas reservoirs, or unmineable coal seams. Confining zones with multiple confining intervals or cap rocks and other geologic structures retain the CO_2 in these storage types. As a part of the Carbon Sequestration Program, DOE formed the Regional Carbon Sequestration Partnership (RCSP) Initiative, a nationwide network of regional partnerships to help determine the best approaches for capturing and permanently storing gases that can contribute to global climate change. Geographical differences in fossil fuel use and available carbon sinks across the United States dictate regional approaches to the storage of CO_2 and other greenhouse gases. The RCSP Initiative is a government and industry effort to determine the most suitable technologies, regulations, and infrastructure needs for carbon capture and storage in different areas of the country. DOE is implementing the RCSP Initiative in three phases:

- Phase I, Characterization (2003-2005): Characterized opportunities for carbon storage, including potential geologic storage formations and trapping mechanisms;
- Phase II, Validation (2005-2011): Conducting small scale field tests to verify the injection rates, storage media, and trapping mechanisms; and
- Phase III, Deployment (2008-2018+): Conducting large volume carbon utilization and storage validation tests.

Phase I projects were competitively selected under Funding Opportunity Announcement DE-PS26-03NT41713, which closed April 1, 2003. DOE selected seven Partnerships to identify and characterize the geology of their geographic regions.

Phase II projects were competitively selected under Funding Opportunity Announcement DE-PS26-05NT42255, which closed March 15, 2005. DOE selected seven partnerships to begin validation (through field verification testing) of utilization and storage technologies and corresponding infrastructure approaches related to regulatory requirements, permitting, and outreach. These field verification tests were initiated (some projects are ongoing) at appropriate

locations within each region that represented the best source, utilization, and storage opportunities for large reductions in regional greenhouse gas emissions.

Phase III projects were selected using a non-competitive process because DOE determined that the public's best interest would be served by using the resources already developed through the small-scale field projects. The seven regional partnerships selected in Phase II were required to submit project continuation applications that proposed a test within their region that would geologically sequester a large volume of CO_2 over a period of several years. Phase III projects were awarded as Amendments to the Phase II projects pursuant to a Determination of Non-competitive Financial Assistance (DNFA).

The seven partnerships that currently form this network include over 400 state agencies, universities, and private companies, spanning 43 states and 4 Canadian provinces. In addition, agencies from six member countries of the Carbon Sequestration Leadership Forum are participating in the Validation Phase field tests.

The Big Sky Carbon Sequestration Partnership (BSCSP), as highlighted in dark green in Figure 1.1, is one of these regional partnerships. The BSCSP was established through a Cooperative Agreement between DOE's National Energy Technology Laboratory (NETL) and Montana State University (MSU). BSCSP comprises a partnership among the states of Montana, Wyoming, Idaho, South Dakota, and the eastern part of Washington and Oregon. BSCSP members comprise universities, national laboratories, private companies, state agencies, and Native American Tribes (BSCSP, No date). BSCSP is in Phase III of its investigations and this Environmental Assessment (EA) focuses on its proposed project in Toole County, Montana.

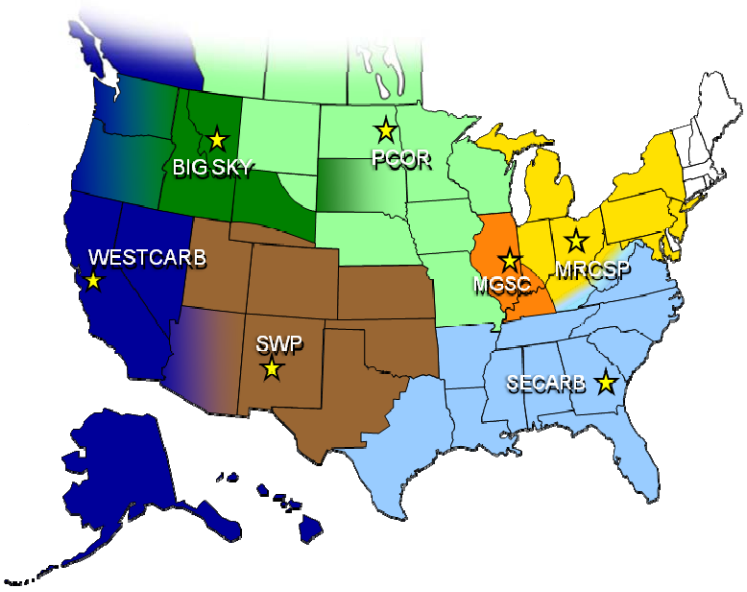


Figure 1.1. Map of Regional Carbon Sequestration Partnerships

DOE's proposed action evaluated in this EA is to provide $63.8 million in financial assistance in a cost sharing arrangement with the project proponent, BSCSP. The proposed action would extract up to 1 million tons of naturally occurring CO_2 from the upper gas filled portion of Kevin Dome, a geologic structural trap in Toole County, in northwestern Montana. These same volumes would be re-injected, over a four year period, into saline formations in the lower brine filled portion of the dome. These experimental efforts would serve to characterize the ultimate storage capacity of Kevin Dome for future study. The total cost of the project is estimated at $81.4 million.

1.2 Purpose and Need

DOE has a mission to implement a research, development, and demonstration program to resolve the environmental, supply, and reliability constraints of producing and using fossil energy sources. One aspect of that mission, the resolution of environmental constraints to producing and using fossil fuels, is to review and, where possible, mitigate potential global climate effects caused by the use of fossil fuels. One possible mitigation technique under review is the capture and long-term storage of CO_2 to prevent release to the atmosphere through a process called carbon storage. NETL is implementing the DOE Carbon Storage Program to evaluate and develop carbon utilization and storage technologies. The principal goal of the Carbon Storage Program is to gain a scientific understanding of carbon utilization and storage options and to provide cost-effective, environmentally-sound technology options that ultimately may lead to a reduction in greenhouse gas intensity and stabilization of atmospheric concentrations of CO_2 (DOE, 2007a). One of those options, geologic storage, is the placement of CO_2 or other greenhouse gases into subsurface porous and permeable rocks in such a way that they can remain isolated from the atmosphere permanently or be retrieved for reuse at some point in the future.

The purpose of the Development Phase of the RCSP Initiative is to test the application of large volume utilization and storage of CO_2 in regionally significant geological formations in North America (DOE, 2007a).

The RCSP Initiative will increase scientific understanding of geological carbon storage and help validate monitoring, verification, and accounting (MVA) technologies for sequestered CO_2. Reliable modeling and monitoring are required to demonstrate that geologic storage is an effective method for reducing atmospheric concentrations of CO_2 (DOE, 2008).

Although the general processes of geologic storage are relatively well known, a large-scale injection project would advance and fill gaps in our scientific understanding of carbon storage; demonstrate permanent storage for the protection of human health and the environment; reduce costs; and facilitate the full-scale deployment of this technology. Extensive laboratory investigations, modeling studies, and limited small-scale field studies have been completed to assess how CO_2 geologic storage would work in the subsurface. Comparing predictions from bench scale tests and numerical models with field results is necessary to validate the models and demonstrate that scientific understanding is correct (DOE, 2008).

The overall goal of the RCSP is to provide the foundation for the commercialization of carbon capture, utilization, and storage technology. Funding of BSCSP's proposed project would help

the DOE meet its goals of advancement and development of feasible carbon utilization and storage technology to ultimately reduce greenhouse gas emissions.

1.3 BSCSP Project Background

Through the Phase I and Phase II efforts, the BSCSP identified large saline formations with at least 200 billion metric tons (220 billion tons) of CO_2 storage capacity. This capacity would be sufficient to store the region's cumulative anthropogenic CO_2 emissions for several centuries. The storage estimates for regional basalt formations, scaled globally, suggest that the five largest basalt provinces in the world could sequester 10,000 years of the world's CO_2 emissions (NETL, 2010; BSCSP and NETL, 2012). There are three areas that showed the most potential for initial field testing (Aljoe, 2011).

- The Columbia River Basalt Group covers approximately 164,000 square kilometers (km^2) (63,320 square miles), with CO_2 storage capacity estimated at 33 - 134 billion metric tons (36 - 148 billion tons). Unlike sedimentary rock formations, basalt formations have unique properties that could result in relatively rapid chemical trapping of injected CO_2, thus effectively and permanently isolating it from the atmosphere.
- The Green River Basin/Moxa Arch region of southwestern Wyoming possess extensive sandstone and limestone formations that may be capable of storing more than 100 years of CO_2 emissions from point sources in the region. The sandstones have an average thickness of greater than 200 feet (ft), porosities of greater than 15 percent (%), and are highly permeable. Thousands of feet of impermeable limestones and shales overlie the sandstones. Operating petroleum and natural gas processing facilities in the region provide convenient sources of CO_2 for testing.
- Kevin Dome is a large underground, geologic dome that covers roughly 700 square miles (or approximately 1,800 km^2) in north central Montana located along the Sweetgrass Arch in north central Montana. It includes the Duperow Formation, which contains naturally occurring CO_2 as well as sections structurally downdip from the trapped CO_2 that are capable of storing large quantities of additional CO_2. Kevin Dome has great potential to serve as a regional storage center because of its unique geologic properties, its proximity to present and future sources of anthropogenic CO_2, and the similarity of this feature to other large domes in Montana. The Duperow Formation within the North Central Montana Province has an estimated CO_2 storage capacity of 15-59 gigatonnes (GT) (10^9 metric tons), and the Duperow Formation within the Williston Basin Province has an estimated storage capacity of another 25-102 GT.

DOE issued Categorical Exclusions for BSCSP Phase I and Phase II projects in compliance with the National Environmental Policy Act (NEPA). Phase I focused on characterizing the geology and potential terrestrial storage options in the Big Sky region, culminating in the development of an action plan for terrestrial and small-scale geologic carbon storage field studies. DOE issued a Categorical Exclusion for Phase I because the work consisted solely of data gathering activities and field reconnaissance. Phase II included the continuation and expansion of data gathering and field reconnaissance activities initiated in Phase I; several different small-scale terrestrial field experiments (cropland, rangeland, and forest land); and a small (approximately 1000 tons) pilot CO_2 injection test into the Grande Ronde basalt formation (part of the Columbia River Basalt

Group) at a site in eastern Washington state. DOE issued Categorical Exclusions for all activities under Phase II, including the pilot-scale CO_2 injection test (Aljoe, 2011).

The initial Phase III award for BSCSP, made in November 2008, was a provisional award that authorized MSU to work on a limited set of Phase III tasks while conditions of a final, definitive Phase III award were being negotiated. The provisional Phase III project was to fund a large-scale injection of CO_2 into the Nugget Sandstone formation in the Moxa Arch region of southwestern Wyoming using CO_2 from a proposed natural gas processing facility in the region. The most important provision of this award – a letter from a CO_2 supplier confirming its commitment to the project and for the required non-DOE cost share – was never fulfilled. NETL, therefore, allowed the provisional agreement to expire on March 31, 2009. The provisional Phase III project received three Categorical Exclusions for the following activities: (1) information gathering, analysis, documentation, dissemination, and training (paper studies); (2) additional small-scale terrestrial experiments in Montana, Washington, Idaho, and Oregon; and (3) site characterization and environmental monitoring, including the drilling and installation of a monitoring well, at the Moxa Arch site (Aljoe, 2011).

1.4 Projects Considered for Cumulative Impacts

NEPA requires review and consideration of the potential cumulative impacts of a proposed action to the surrounding environment. The presence of other projects and activities occurring in the area can contribute to or affect the cumulative impacts of the BSCSP's proposed project.

The geographic scope of potential interactive impacts is different for each resource area. The cumulative impact section of each resource area in Chapter 4 elaborates on which projects have the potential for cumulative impacts on that given resource. However, given that land use and socioeconomic impacts can be farther reaching than other resource areas, two projects that are over 400 miles away (Denbury's Greencore Pipeline and PCOR Bell Creek Demonstration Project (details below)) were retained for cumulative analysis consideration.

1.4.1 Specific Projects

The following projects were identified and considered for cumulative environmental impacts, due to their proximities to the proposed project location.

Project Number: DOI-BLM-M030- 2011- 0024-EA
Project Name: Kevin Sunburst Oil Field Cultural Evaluation and Cleanup
Summary: This project entails the identification of cleanup options for the historic Kevin Sunburst Oil Field.
Initiation date: 5/24/2011
Source: (BLM, 2011a)

Project Number: DOI-BLM-M030-2011- 0025-EA
Project Name: North Star Fence
Summary: The Permittee is constructing a range fence in Toole County.
Initiation date: 5/26/2011
Source: (BLM, 2011b)

Project Number: DOI-BLM-M030- 2011- 0016-CX
Project Name: SRP Renewal for Richard Birdsell
Summary: This is a Special Recreation Permit renewal for Richard Birdsell, who profits from river rafting and/or fishing in Toole County.
Decision date: 3/3/2011
Source: (BLM, 2011a)

Project Number: DOI-BLM-M030-2011- 0017-EA
Project Name: Northern Telephone Coop. MTM 102281
Summary: This project consists of a below ground fiber optic cable installation in Toole County.
Initiation date: 3/22/2011
Source: (BLM, 2011a)

Project Number: DOI-BLM-M030- 2011- 0001-CX
Project Name: Raptor Nesting Platforms Kevin Rim Area
Summary: Through this project, artificial raptor nesting platforms will be installed in Kevin Rim Area in Toole County. The Kevin Rim escarpment is a nesting habitat for raptors, and the Bureau of Land Management has designated it as an Area of Critical Environmental Concern and as a Key Raptor Area. Based on the number of nesting ferruginous hawks, the site qualifies as an Important Bird Area of Global Significance.
Decision date: 10/28/2010
Sources: (BLM, 2011a; Audubon, 2011)

Project Name: Glacier Wind Farm (Completed)
Summary: The Glacier Wind Farm is a 30,000-acre (121 km^2) facility in Toole and Glacier County Montana. It is located between Highway 2 and the Marias River, west of I-15.
Sources: (Toole County, No date[a]; Alexander, 2011)

Project Name: Rim Rock Wind Farm (Early Stages)
Summary: This project is a proposed 37,000-acre (150 km^2) wind farm by NaturEner, to be completed by 2013. The tentative location is 20 miles (32 kilometers (km)) northeast of Cut Bank, west of Highway 15, and 5 miles (8 km) west of Sunburst.
Source: (Alexander, 2011)

Project Name: HiLine RMP
Summary: Through this project, the Bureau of Land Management (BLM) Malta office will revise the West Highline Resource Management Plan (RMP). Updates and revisions are needed to correspond to considerable changes within the planning area, which have occurred since completion of the Judith-Valley-Phillips RMP and the West HiLine RMP. The purpose of an RMP is to guide BLM's management of public lands. Some anticipated changes are

standardizing oil and gas lease stipulations to provide more consistency; managing recently identified lands with wilderness characteristics; and analyzing methods of renewable and nonrenewable energy activities in greater sage-grouse habitat. The estimated completion date is late 2013.
Sources: (BLM, 2011c; BLM, 2011d)

Project Name: PCOR Bell Creek Demonstration Project
Summary: The Energy & Environmental Research Center of University of North Dakota will use the ConocoPhillips Lost Cabin and Madden Gas Plant for CO_2 Capture and Storage in Powder River County, Southeast Montana. The injection rate is anticipated to be 2,466 tons per day (2,237 metric tons per day). The project cost is anticipated to be $94 million. This project would be over 400 miles away from BSCSP's proposed project. For further information on the project, please see http://www.netl.doe.gov/publications/factsheets/project/Project679_4P.pdf.
Date of anticipated completion: 1/1/2012
Source: (NETL, 2011a)

Project Number: DE-FE0001156
Project Name: Differential Absorption LIDAR for Spatial Mapping of CO_2
Summary: This project plans to use BSCSP's proposed project site to test and deploy a scanning eye-safe diode laser based differential absorption light detection and ranging (LIDAR) for near surface mapping of CO_2 number densities. The instrument would be housed in a cargo trailer. The BSCSP's proposed project site was selected to facilitate collaboration between the two projects. This project received a categorical exclusion in August 2011. This project would be conducted concurrently with BSCSP's proposed project.
Sources: (NETL, 2011b; Repasky, 2011)

Project Name: Denbury's Greencore Pipeline
Summary: Denbury is building a 20-inch pipeline to transport CO_2 from Wyoming to southeast Montana, specifically to Bell Creek oil field. Denbury plans to use the CO_2 for enhanced oil recovery (EOR). The plan is to connect the Greencore pipeline to others in the region owned by ExxonMobil and Anadarko. The pipeline is schedule to operate in December 2012. Future connections for the pipeline include a coal-to-liquids plant in Medicine Bow, Wyoming as well as Cedar Creek Anticline in southeast Montana. This project would be over 400 miles away from BSCSP's proposed project.
Sources: (Fugleberg, 2011; Tollefson, 2011a)

1.4.2 Background Activities and Planned Oil and Gas Activities

In addition to the above projects, the project area's surroundings have had ranching and cultivation activities for the past century (BSCSP and NETL, 2012). Further, oil and gas production has occurred in the Kevin Dome region for more than 85 years, particularly from the Cut Bank field located approximately 50 miles southwest of the project site (DOE, 2006). To date over 2,000 wells have been drilled within a five mile radius of the boundary of the project area, and over 6,500 wells have been drilled in the expanded Kevin Dome area (Byrd, 2011; Tollefson, 2011a) (see Figure 1.4.2 below). The existing wells are generally gas wells of less than 2,000 feet in depth. Several thousand miles of gathering-system pipelines exist to connect

these individual wells, and several hundred miles of oil and natural gas pipelines exist in the area (Byrd, 2011; BSCSP, 2012a). BSCSP's proposed project would install six to ten miles of pipeline of two inches in diameter, which would be too small to provide the necessary infrastructure for any EOR activities, especially as the pipeline terminates in an area with no existing oil and gas production (Tollefson, 2011a). Although the Cut Bank field has been identified as a potential candidate for CO_2 EOR (DOE, 2006), the proposed BSCSP pipeline would be too small and too far away from the Cut Bank field to be of any use in this regard (Aljoe, 2012).

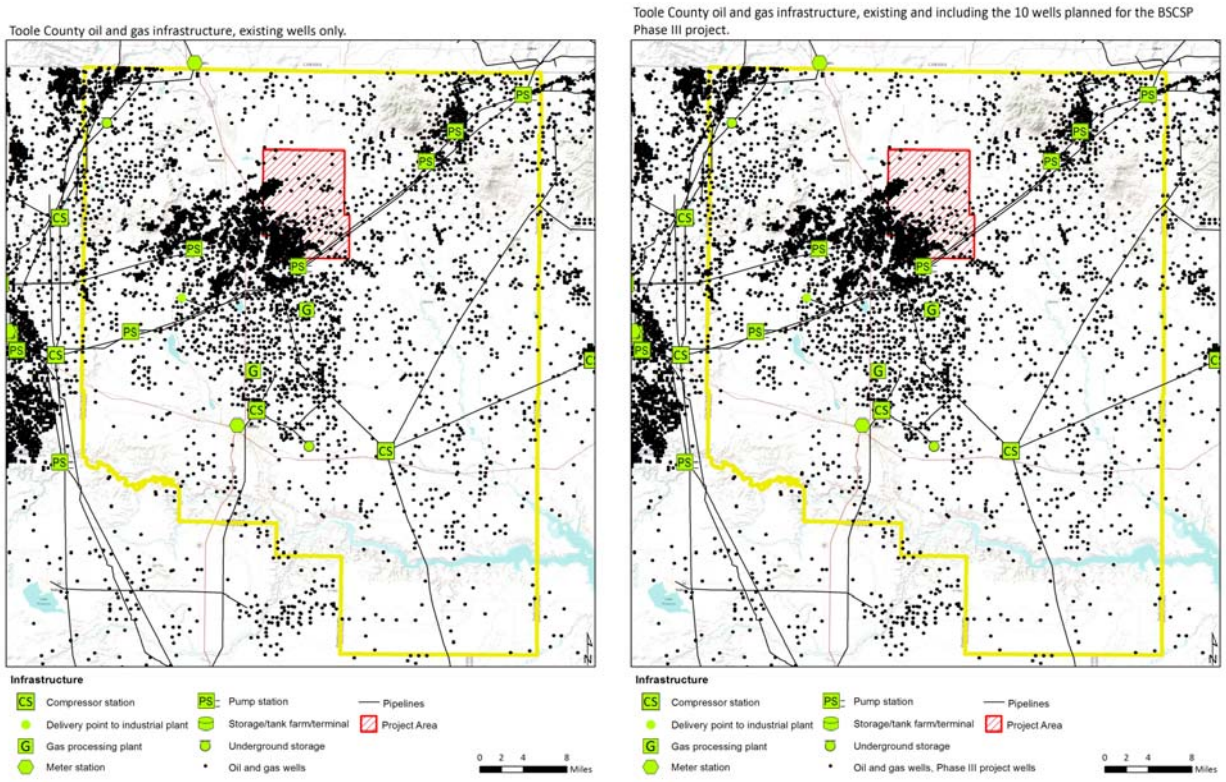


Figure 1.4.2. Existing and BSCSP's Proposed Project Wells within Toole County, MT
Source: (Spangler, 2012)

Based on historical trends of the past decade, between 10 and 20 additional development wells would receive permits annually. Generally, companies decide whether to conduct actual drilling based on commodity prices. Vecta Oil and Gas, a private sector partner in BSCSP's proposed project, is not the only company interested in developing oil and gas in the area. Other operators are evaluating shale opportunities (Banff, Bakken, and Three Forks). These wells are being drilled south of BSCSP's proposed project. If the results are positive, then some additional drilling may occur. The magnitude of the increase is entirely dependent on the results of the exploration (Byrd, 2011; BSCSP and NETL, 2012).

BSCSP's proposed project area is in Toole County, Montana as shown in Figure 2.2.1-1 in this Draft EA. Denbury, an oil and gas company that is not part of or associated with BSCSP, has been acquiring leasehold adjacent to the Kevin Dome area, for the purpose of evaluating CO_2 resources in place for EOR operations (Litynski, 2011; Byrd, 2011). The focus of their activity

has been several miles to the west and southwest of BSCSP's proposed project area. Denbury has drilled and completed one well fifteen miles west of the western boundary of the project area and is currently drilling a second well approximately ten miles southwest of the western boundary of BSCSP's proposed project area. The operator is evaluating the resource for a possible commercial application, but it is important to note that there is no CO_2 pipeline or transportation infrastructure present within or anywhere near the project area (Byrd, 2011).

EOR in the next 10 years on Kevin Dome would be highly unlikely, because the most productive oil formation is the Madison, which is too shallow for CO_2 flooding (Tollefson, 2011a). While potential may exist for a commercial EOR application utilizing a CO_2 source, the areal extent of the reservoir and the quantity of the resource in place have yet to be determined, and significant additional work needs to be completed before any realistic development scenario can be modeled. If there were sufficient CO_2 in place to pursue a commercial project, then a transportation solution would also need to be developed. BSCSP believes that potential for CO_2 development during the life of the project is limited and speculative, primarily because BSCSP is the only project in the Kevin dome area actively involved in the production of CO_2 at this time or for the foreseeable future. The extensive amount of capital necessary to develop a CO_2 well and pipeline infrastructure in this area would require a production and reservoir model that ensures that the resource is in place and can be produced in viable quantities over a meaningful amount of time (Byrd, 2011). Other groups are independently assessing the economic viability of Kevin Dome for CO_2 EOR. BSCSP's proposed project is not large enough to change the economic viability of the EOR. Consequently, CO_2 EOR is in its very early stage of exploration in the Kevin Dome area (Tollefson, 2011a). Accordingly, DOE concludes that BSCSP's proposed project is a very small incremental activity to other activities that industry has planned in the region (Litynski, 2011). Higher prices for oil that makes tertiary recovery (EOR) more affordable and advances in EOR technology drive these industry activities in the area (Tollefson, 2011a).

Other groups may be exploring EOR opportunities in the Kevin Dome region. In its consultation response, BLM identified a Delfan project, located near BSCSP's proposed project, which would produce CO_2 for transport to Canada for EOR (see Appendix F) (Jaynes, 2011). According to Manchester (2011), Delfan discussed the project with BLM two years ago, but no further permits or discussions have occurred. Normont (Delfan's U.S. subsidiary) has not disclosed any intent during lease negotiations to drill wells in proximity to BSCSP's proposed project. The only agreement between Delfan and Normont that BSCSP is aware of involves data sharing between Vecta and Normont (Spangler and Tollefson, 2011). As Delfan has no contracts in place or under negotiation, and has not applied for any permits, the Delfan project is considered speculative and not specifically analyzed in this EA. However, the potential for general expansion of oil and gas operations discussed previously is considered.

1.5 Scope of DOE Decision

DOE must decide whether to provide cost-shared financial assistance for BSCSP's proposed project, which focuses on conducting a large-scale CO_2 storage research program and includes the drilling of wells and CO_2 injection activities. To inform this decision, NEPA requires that DOE compare the potential impacts of the proposed project with the impacts of the no-action

alternative. To conduct this comparison, DOE assumes that if it were to decide not to provide financial assistance, the project would not proceed. Table 1.5, below, summarizes the results of this comparison. If the project were to proceed without DOE's financial assistance, DOE assumes that the potential impacts would be essentially identical to those under its action alternative (i.e., providing assistance that allows the project to proceed).

Table 1.5. Comparison of Impacts		
Resource	**No-Action Alternative**	**BSCSP's Proposed Project**
Air Quality	Selecting the no-action alternative could have minor indirect impacts to air quality, which is less than the significance threshold.	Short- and long-term, minor, and adverse impacts to air quality would be likely with the implementation of BSCSP's proposed project. Direct and indirect air emissions would not be expected to contribute to a violation of any Federal, state, or local air regulation.
Geology and Soils	No impacts	BSCSP's proposed project would cause no measurable migration of CO_2 from the storage formation to the surface or into another area in the subsurface, and there is no more than an imperceptible risk of inducing seismic events due to increased reservoir pressure. Changes in soil stability, permeability, or productivity would be limited in extent. Full recovery would occur in a reasonable time, considering the size of the project. Mitigation, in the form of industry standard construction practices, would be simple to implement and has been proven effective in previous applications.
Water Resources	No impacts	Any changes to surface water quality or hydrology would be confined to the immediate project area. Full recovery would occur in a reasonable time, considering the size of the project and the affected area's natural state. Any changes to groundwater quality and quantity would be at the lowest detectable levels. Full recovery would occur in a reasonable time. Mitigation for an unlikely release of CO_2 would be applied using the project's established risk management approach put in place for that purpose and proven effective in previous applications.
Wetlands and Floodplains	Only negligible impacts due to lost opportunity for global climate change solutions research.	No impacts to floodplains are expected due to avoidance and compliance with regulations. Only negligible to minor impacts to wetlands from pedestrian traffic are expected.
Terrestrial Vegetation	No impacts	The project would not affect the viability of the resources. Recovery would occur in a reasonable time, considering the size of the project and the affected resource's natural state. Therefore, impacts on terrestrial vegetation would not be expected to exceed the significance threshold.
Wildlife	No impacts	Wildlife impacts would be limited to a small portion of the population. The loss of individuals of any species would not affect the viability of the resource. Full recovery would occur in a reasonable time, considering the size of the project and the affected species' natural state.

Table 1.5. Comparison of Impacts		
Resource	**No-Action Alternative**	**BSCSP's Proposed Project**
Land Use	No impacts	Any change in land use would be limited, and affected areas would fully recover once the project is completed. The recovery process would be expedited by the reclamation provisions of the agreements with the landowners.
Demographics	No impacts	The minimal effect on local labor conditions and economy are not expected to create any measurable draw for populations to move into or out of the area, resulting in minor beneficial impacts.
Employment and Income	No impacts	Minor beneficial employment and economic impacts associated with BSCSP's proposed project are anticipated.
Infrastructure	No impacts	BSCSP's proposed project would have short-term, minor, and adverse effects on traffic, road use, and infrastructure. Long-term negligible effects would be primarily due to monitoring and maintenance activities for all areas associated with BSCSP's proposed project.
Parks and Recreation	No impacts	Only negligible impacts to parks and recreation are expected due to the distance between the parks and the project.
Visual Resources	Only negligible impacts due to lost opportunity for global climate change solutions research.	BSCSP's proposed project should not change the visual classification of the area, and the temporary visual changes should not be objectionable to local residents and frequent visitors.
Noise	No impacts	Negligible short-term and minor long-term effects to the noise environment would be likely with the implementation of BSCSP's proposed project.
Environmental Justice	No impacts	BSCSP's proposed project would not be expected to produce any disproportionately high and adverse effects on minority or low-income populations.
Human Health and Safety	Only negligible impacts due to lost opportunity for global climate change solutions research.	The project would pose only a minimal risk to health and safety of onsite workers and the local populations, based on the low failure rate of CO_2 pipelines, as well as the proper siting, safety procedures, and monitoring planned for this effort.
Cultural Resources	No impacts	The project would cause less than significant impacts after mitigation for the inadvertent adverse effects caused by the seismic crews and additional measures to avoid future effects, pending consultation with the SHPO and Native American tribes.
Waste Management	No impacts	The wastes generated would not cause contamination that poses a threat to human or ecological health and safety if managed properly in compliance with regulatory requirements.

1.6 Legal Framework

DOE prepared this EA in accordance with the Council on Environmental Quality (CEQ) "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act," codified in Title 40 of the *Code of Federal Regulations* in Parts 1500 through 1508 (40 CFR 1500-1508) and DOE's NEPA implementing procedures (10 CFR 1021). These regulations implement the procedural requirements of the NEPA, found in Title 40 of the *United States Code* in Section 4321 and following sections (42 USC § 4321 *et seq*.).

NEPA requires federal agencies to consider the potential environmental consequences of a proposed action in their decision-making processes. NEPA encourages federal agencies to protect, restore, or enhance the environment through well-informed decisionmaking.

The CEQ NEPA regulations specify that an EA be prepared to:

- Provide sufficient analysis and evidence for determining whether or not to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI);
- Aid in an agency's compliance with NEPA when no EIS is deemed necessary; and
- Facilitate EIS preparation when one is necessary.

Further, the CEQ NEPA regulations encourage agencies to integrate NEPA requirements with other environmental review and consultation requirements. Relevant environmental requirements are contained in other federal statutes, such as the Clean Air Act and the Clean Water Act, and their state counterparts. The following federal and state statutes and regulations are relevant to this EA. Federal and state permits that may be required are also listed.

Clean Air Act

One of the central components of the Clean Air Act (CAA), 42 USC § 7401 *et seq.*, is the National Ambient Air Quality Standards (NAAQS) developed by the United States Environmental Protection Agency (USEPA). NAAQS are established for a small set of pervasive pollutants referred to as criteria pollutants: sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), and particulate matter (both particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$)). The NAAQS define acceptable concentrations of these pollutants in the ambient air, which is defined as the outdoor air to which the general public is exposed. The CAA also contains requirements for stationary emissions source permit programs designed to ensure the protection of the nation's air quality. Performance standards, another significant part of the CAA, establish design standards, equipment standards, work practices, and operational standards for new or modified sources of air emissions. There are sets of performance standards that address criteria pollutants – New Source Performance Standards (NSPSs) – and that address hazardous air pollutants – National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Where the NAAQS emphasize air quality in general, the NSPSs and NESHAPs focus on particular industrial categories or sub-categories (e.g., fossil fuel fired generators, grain elevators, steam-generating units). Regulations implementing the CAA are found in 40 CFR Parts 50-95. State enforcement of stationary source air quality related laws is provided by the Clean Air Act of Montana (Montana Code Annotated (MCA) § 75-2-101, *et seq*.) and are

administered by the Montana Department of Environmental Quality (MDEQ) through its Air Quality Program which is implemented through the Administrative Rules of Montana (ARM) Title 17, Chapter 8.

Clean Water Act

The Clean Water Act (CWA), 33 USC § 1251 *et seq.*, establishes a comprehensive framework of standards, technical tools, and financial assistance to address "point source" pollution from municipal and industrial wastewater discharges and "nonpoint source" pollution from urban and rural areas. Applicants for federal licenses or permits to conduct any activity that may result in a discharge to navigable waters must provide the federal agency with a state CWA Section 401 certification that the discharge will comply with applicable provisions of the CWA. CWA Section 404 establishes a permit program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. CWA Section 402 establishes the National Pollutant Discharge Elimination System (NPDES), which requires point sources of pollutants to obtain permits to discharge effluents and storm water to surface waters. Regulations for implementing relevant CWA programs are found in 33 CFR Parts 320-331 and 40 CFR Parts 400-503. MDEQ administers Montana's Water Quality Act (MCA § 75-2-101, *et seq.*). Title 17, Chapter 30 of the ARM contains the water quality rules.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), 42 USC *300 et seq.*, gives USEPA the responsibility and authority to regulate public drinking water supplies by establishing drinking water standards, delegating authority for enforcement of drinking water standards to the states, and protecting aquifers from hazards such as injection of wastes and other materials into wells. Important for this EA are the SDWA provisions relating to injection wells. Congress passed the Safe Drinking Water Act in 1974. In part, the SDWA requires USEPA to develop minimum federal requirements for Underground Injection Control (UIC) programs and other safeguards to protect public health by preventing injection wells from contaminating underground sources of drinking water. Montana regulates drinking water quality in observance of the Federal Safe Drinking Water Act. These state water quality regulations include the Public Water Supply Act (75-6-101, *et seq.*), Regional Water and Wastewater Authority Act, (75-6-301 *et seq.*), and the ARM Public Water Supply and Sewage System Requirement rules (17.38.101, *et seq.*).

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 *et seq.*, regulates the treatment, storage, and disposal of solid and hazardous wastes. RCRA sets "cradle to grave" standards for both solid waste and hazardous waste management. Certain wastes are specifically excluded because they are regulated under other statutes. Some examples are domestic sewage and septic tank waste, agricultural wastes, industrial discharges, some nuclear wastes, and mining overburden. RCRA regulations are found in 40 CFR Parts 239-282. The Montana Hazardous Waste Act (MHWA) allows MDEQ to adopt, administer, and enforce the state's hazardous waste program pursuant to federal RCRA. Related legislation is Montana Hazardous Waste Act, MCA Title 75 Chapter 10 Section 401 *et seq.*

Comprehensive Environmental Response, Compensation, and Liability Act/Emergency Planning and Community Right-to-Know Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC § 9601 *et seq*., also known as "Superfund," established a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA also establishes requirements for closed and abandoned hazardous waste sites, provides for the liability of persons responsible for the release of hazardous substances, and establishes a trust fund to pay for orphan facility cleanup and closure. Regulations for implementing CERCLA can be found in 40 CFR Parts 300-312.

The Emergency Planning and Community Right-to-Know Act (EPCRA), 42 USC § 1001 *et seq.*, requires federal agencies to provide information on hazardous and toxic chemicals to state emergency response commissions, local emergency planning committees, and USEPA. EPCRA's goal is to provide this information to ensure that local emergency plans are sufficient to respond to unplanned releases of hazardous substances. Regulations implementing EPCRA are found in 40 CFR Parts 350-374. Montana regulations include the Comprehensive Environmental Cleanup and Responsibility Act MCA Title 75 Chapter 10 Section 705 *et seq.*

National Historic Preservation Act

The National Historic Preservation Act (NHPA), 16 USC § 470 *et seq.*, requires DOE to consult with the State Historic Preservation Officer (SHPO) prior to any construction to ensure that no historic properties would be adversely affected by a proposed project. DOE must also afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed project. The Montana State Historic Preservation Office cooperates with and advises federal and state agencies when a proposed project could affect potentially significant historical, archaeological, or other cultural resources. Federal agencies make formal determinations of resource eligibility for inclusion on the National Register for Historic Places (NRHP) and potential effects to historic properties; these recommendations are then provided to SHPO for concurrence. This process for implementing NHPA is found in 36 CFR 800-812. NETL intends to use the NEPA process to satisfy the Section 106 requirements with regard to tribal consultation. The SHPO in Montana is the Montana State Historical Society. This authority comes from regulations MCA Title 22 Chapter 3 Section 101 *et seq.*, and MCA Title 2 Chapter 15 Section 1512 *et seq.*

Archaeological Resources Protection Act

The Archaeological Resources Protection Act, 16 U.S.C. 470aa-mm, requires a permit for excavation or removal of archaeological resources from publicly held or Native American lands. The Act requires that excavations further archaeological knowledge in the public interest, and that the resources removed remain the property of the United States. Regulations for implementing the Act are found in 43 CFR 7 and 36 CFR 296.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act, 42 USC § 1996, establishes policy to protect and preserve the inherent and Constitutional right of Native Americans to believe, express, and exercise their traditional religions. The law ensures the protection of sacred locations, access of Native Americans to those sacred locations and traditional resources that are integral to the practice of their religions, and establishes requirements that would apply to Native American sacred locations, traditional resources, or traditional religious practices potentially affected by construction and operation of proposed facilities. Regulations for implementing the Act are found in 43 CFR 7.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act, 25 USC § 3001, directs the Secretary of the Interior to guide the repatriation of federal archaeological collections and collections that are culturally affiliated with Native American tribes and held by museums that receive federal funding. DOE would follow the provisions of this Act if any excavations associated with the proposed construction led to unexpected discoveries of Native American graves or grave artifacts. Regulations for implementing the Act are found in 43 CFR 10.

Endangered Species Act

The Endangered Species Act (ESA), 16 USC 1531 *et seq.*, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants, as well as the preservation of the ecosystems on which they depend. ESA Section 7 requires any federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species. Regulations implementing the ESA interagency consultation process are found in 50 CFR Part 402. Montana's endangered species protection legislation is in the Montana Code Annotated Title 87 Fish and Wildlife Chapter 5 Wildlife Protection Part 1 (MCA 87-5-101 *et seq*.).

Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA), 16 USC 703-712 as amended, it is unlawful, unless otherwise permitted, to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to sell, barter, purchase, deliver; or cause to be shipped, exported, imported, transported, carried, or received any migratory bird part, nest, egg, or product, manufactured or not. Executive Order 13186 also requires Federal agencies to evaluate the effects of proposed actions on migratory birds.

Fish and Wildlife Conservation Act/Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act, 16 USC § 2901 *et seq.*, encourages federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. In addition, the Fish and Wildlife Coordination Act, 16 USC § 661 *et seq.*, requires federal agencies

undertaking projects affecting water resources to consult with the U.S. Fish and Wildlife Service (USFWS) and the state agency responsible for fish and wildlife resources. Compliance with these statutes is internalized in the DOE NEPA process. The Montana Fish, Wildlife, and Parks (MTFWP) is responsible for the use, enjoyment, and scientific study of the fish in Montana waters. MTFWP also administers the Stream Protection Act, and cooperates with the MDEQ in water quality protection. Montana's fish and stream protection legislation is in the Montana Code Annotated Title 87 Fish and Wildlife Chapter 5 Wildlife Protection Part 5 (MCA 87-5-501 *et seq.*); of note is MCA 87-5-508, Federal actions injuring fish and wildlife.

Noise Control Act

The Noise Control Act of 1972, 42 USC § 4901 *et seq.*, directs federal agencies to carry out programs in their jurisdictions to the fullest extent within their authority and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare. This would involve complying with applicable municipal noise ordinances to the maximum extent practicable.

Farmland Protection Policy Act

The Farmland Protection Policy Act, 7 USC § 4201 *et seq.*, directs federal agencies to identify and quantify adverse impacts of federal programs on farmlands in order to minimize the unnecessary and irreversible conversion of agricultural land to non-agricultural uses. Regulations implementing the Act are found in 7 CFR 658. Montana's open spaces law is MCA Title 76 Land Resources and Use Chapter 6 Open Spaces (MCA 76-6).

Occupational Safety and Health Act

The Occupational Safety and Health Act, 29 USC § 651 *et seq.*, requires employers to furnish employees with employment and a place of employment that are free from recognized hazards that cause or are likely to cause death or serious physical harm, and to comply with occupational safety and health standards promulgated by the Occupational Safety and Health Administration (OSHA). OSHA standards are implemented under regulations found in 29 CFR Parts 1900-2400. Further state occupational health and safety acts are the Montana Employee and Community Hazardous Chemical Information Act, MCA 50-78-101 to 50-78-402, the Montana Occupational Safety and Health Act, MCA 50-71-111 *et seq.*, and regulations at ARM 24.30.102 to 24.30.107, as well as the Montana Safety Culture Act (MSCA), MCA 39-71-1504.

Pollution Prevention Act

The Pollution Prevention Act, 42 USC § 13101 *et seq.*, establishes a national policy for waste management and pollution control that focuses first on source reduction, and then on environmentally safe waste recycling, treatment, and disposal. Three executive orders provide guidance to agencies to implement the Pollution Prevention Act: Executive Order (EO) 12873, "Federal Acquisition, Recycling, and Waste Prevention;" EO 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition;" and EO 13148, "Greening the Government through Leadership in Environmental Management."

Montana Legal and Regulatory Requirements

A few states have acted to define who is responsible for long-term liability risk for injection of CO_2. Montana law SB 498 makes the storage site operator liable for harm during injection and through a 30 year post-injection monitoring period. Fifteen years after injection of CO2 ends, the Montana Board of Oil and Gas (MBOG) will issue a certificate of completion to the operator if the operator is in full compliance of all rules. For a period of an additional 15 years after the certificate of completion is issued, the operator must continue adequate monitoring of the wells and reservoir and continue to accept all liability(MCA §§82-11-182, 82-11-183). The permitting provisions of Montana law are conditioned on a delegation of authority from USEPA.

Similar to NEPA is the Montana Environmental Policy Act (MEPA) state law (75-1-101 *et seq.*, MCA and ARM 17.4.601 *et seq.*). MEPA applies to actions taken by Montana state government agencies that may have an impact on the environment. For the proposed project, MDEQ would be required to identify and evaluate the project's potential environmental impacts as a part of making determinations to issue air quality and water discharge permits. Likewise, the Montana Department of Natural Resources and Conservation (MDNRC) would conduct a similar analysis in the course of issuing permits to drill the production and monitoring wells. MSU is not exempt from MEPA. The university would utilize this NETL EA to prepare the state equivalent (BSCSP, 2012a).

In addition to the NEPA requirements, MEPA requires state agencies to:

- List and describe the responsibilities of federal, state, and local agencies that have jurisdiction over any aspect of the Proposed Action;
- Describe potential growth-inducing or growth inhibiting impacts;
- Describe the economic and environmental benefits and costs of the Proposed Action;
- Describe the relationship between local short-term uses of man's environment and the effect on maintenance and enhancement of the long-term productivity of the environment; and
- Evaluate the effects of regulatory restrictions on private property.

Federal Aviation Administration Act

Granted by 49 USC § 106(f) and (g), the Administrator of the Federal Aviation Administration (FAA) has the authority to regulate objects affecting navigable airspace. Regulations found in 14 CFR Part 77 require FAA notification of the proposed construction of any structure more than 200 ft (approximately 60 meters (m)) high. The FAA then determines if the structures would or would not be an obstruction to air navigation. Montana regulates navigable airspace under Montana Aeronautics Act (MCA 67-1-201 *et seq.*), Montana Aeronautics Regulatory Act (MCA 67-1-101 *et seq.*), Montana Airport Zoning Act (MCA 67-6-101 *et seq.*), and the Montana Municipal Airports Act (MCA 67-10-101 *et seq.*), located within MCA Title 67 Aeronautics.

Executive Orders

A number of presidential executive orders provide additional guidance to Federal agencies in developing this EA. The most potentially relevant executive orders include:

- Executive Order 11514, "Protection and Enhancement of Environmental Quality";
- Executive Order 11988, "Floodplain Management";
- Executive Order 12856, "Right to Know Laws and Pollution Prevention Requirements";
- Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations";
- Executive Order 13112, "Invasive Species"; and
- Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management".

Federal executive orders can be accessed in federal register archives: http://www.archives.gov/federal-register/codification/.

Federal Permitting

Though the list is not comprehensive, the following are potentially applicable federal permitting requirements to construct and operate the proposed facilities:

- USEPA Class V Experimental Well Permit or USEPA Class VI geological sequestration well;
- NESHAP;
- NSPS; and
- Surface permits for access during seismic surveys (BSCSP et al., 2011).

Montana State Permits

The following are potentially applicable federal and state permitting requirements to construct and operate the proposed facilities:

- Air Quality Operating Permits, Title V Permit;
- Air Quality Permits, Stationary Source Permit;
- Registration of Air Contaminant Sources, ARM 17.8.1703;
- UIC, Class II wells ARM 36.22.1401, *et seq.*;
- Montana Pollutant Discharge Elimination System (MPDES);
- Stormwater Discharge General Permits (MPDES permit);
- Montana Stream Protection Act (SPA) (SPA 124 Permit);
- Surface access permit for state lands from MDNRC (BSCSP et al., 2011);
- Geophysical exploration permit with County and MBOG (BSCSP et al., 2011); and
- Application for permit to drill from MBOG (BSCSP et al., 2011).

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 DOE's Proposed Action

DOE's proposed action is to provide BSCSP with $63.8 million in cost-shared financial assistance for BSCSP's proposed project to inject CO_2 captured from a natural source into the Duperow formation for geologic storage. This project would conduct the geologic storage of up to one million metric tons (1,100,000 short tons) of CO_2 over the four-year project injection period. The purpose of the DOE's proposed action is to contribute to the development phase of the RCSP Initiative by testing the application of large volume utilization and storage of CO_2 in regionally significant geological formations in North America.

2.2 BSCSP's Proposed Project

BSCSP's proposed Kevin Dome Carbon Storage Project (BSCSP, 2011a; BSCSP, 2011b) includes the following activities:

- Drill up to five CO_2 production wells;
- Drill four CO_2 monitoring wells;
- Drill one CO_2 injection well;
- Install six to ten miles of two inch diameter CO_2 pipeline;
- Install a natural gas compressor station in the vicinity of the CO_2 production wells;
- Conduct a three dimensional, nine component seismic survey, covering less than 75 square miles of land area;
- Conduct vertical seismic profiling (VSP) and cross-well seismic surveys in the vicinity of the injection and monitoring wells;
- Monitor environmental parameters such as surface water quality, groundwater quality, air quality, and soil composition;
- Construct ten well pads of 200 feet by 200 feet including reserve pits;
- Construct five miles of access roads; and
- Utilize natural gas from existing wells or drill shallow well for natural gas production.

At a rate of approximately 250,000 metric tons (275,000 short tons) per year, BSCSP's proposed project would inject up to one million metric tons of supercritical CO_2 over the four-year project injection period into the Duperow formation in Kevin Dome (IEAGHG and NETL, 2011; Tollefson, 2011b). The source of the CO_2 is naturally occurring CO_2 in the Devonian dolostone reservoir in the Duperow formation, where it has been trapped for millions of years. The purity of the CO_2 is unknown. The data from the first production well drilled would determine the necessary number of production wells to obtain the required amount of CO_2. This EA analyzes the maximum of five production wells. As part of this project, BSCSP would implement many monitoring and sampling activities (see Table 2.2.6) (BSCSP, 2011a).

BSCSP would conduct baseline characterization and monitoring of the surface and subsurface conditions. Monitoring would occur throughout the injection period and would continue an additional two years after the completion of CO_2 injection activities (IEAGHG and NETL, 2011). Throughout the injection and monitoring periods, the BSCSP team would implement its research MVA program. The basic goals of the MVA program would be to monitor CO_2

movement and pressure after injection, detect leakage, and ensure well integrity. Figure 2.2 depicts the project flowchart.

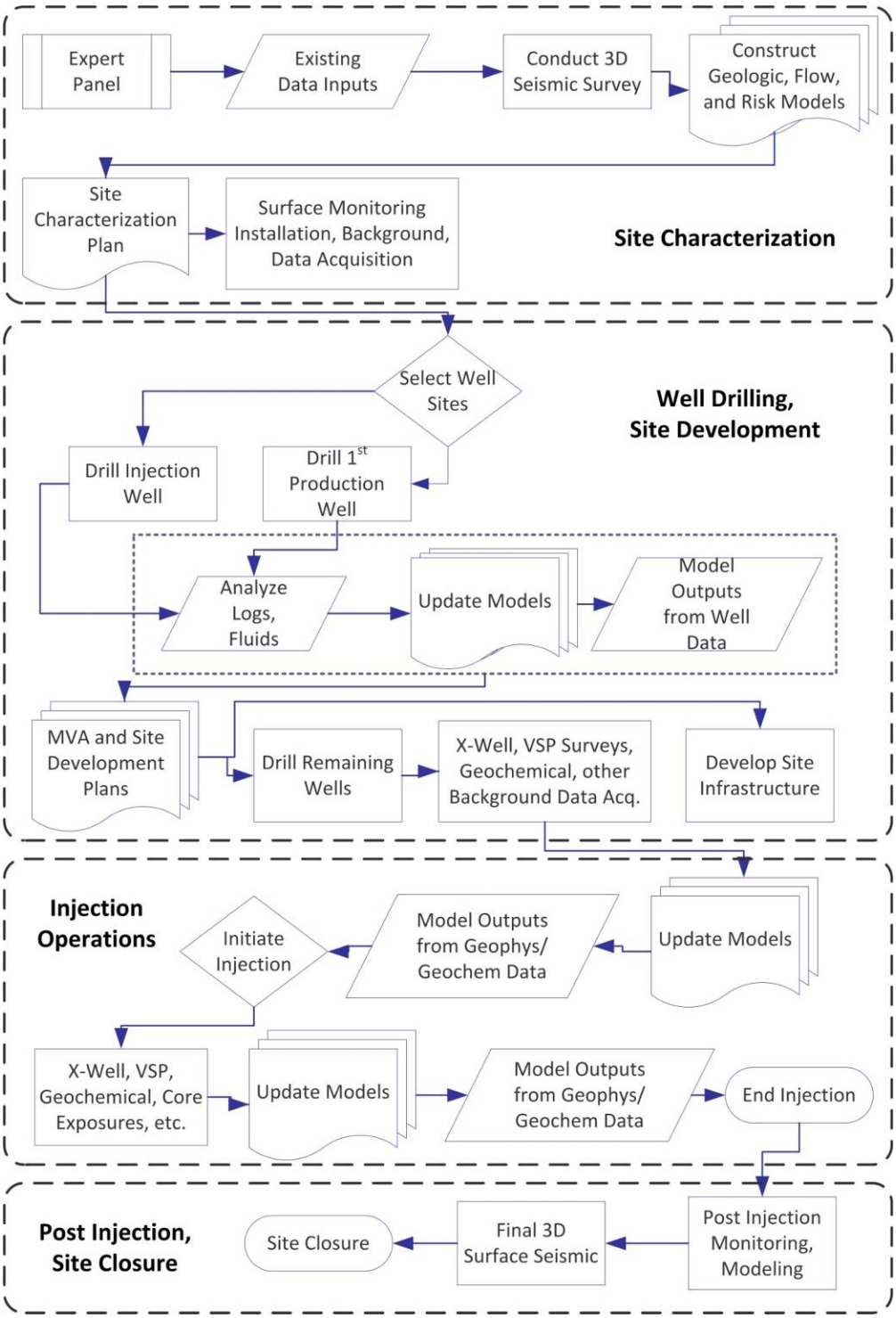


Figure 2.2. Project Flowchart
Source: (BSCSP, 2010)

2.2.1 Project Location

The proposed injection site is about 8 miles east of Sunburst, and the proposed production well site is approximately 12 miles northeast of the town of Kevin in Toole County, Montana (BSCSP, 2011b). Figure 2.2.1-1 (next page) shows the location of BSCSP's proposed project. Figure 2.2.1-2 (following page) depicts the regional location of the project. The exact well locations would be determined after analyzing the seismic survey data and obtaining necessary mineral, surface and state permits. The pipeline route depends on the well locations (BSCSP et al., 2011) and permitting. The production, injection, and monitoring activities would occur on Montana's state trust land or privately owned land (BSCSP, 2011b; IEAGHG and NETL, 2011). The production wells would be spaced 160, 320 or 640 acres apart based on the test results of the first production well (IEAGHG and NETL, 2011). Many of the activities related to seismic work and pipeline construction would occur on lands held in fee title by private landowners, but BSCSP would work with these owners for access (IEAGHG and NETL, 2011). Vecta Oil and Gas owns or has access to the mineral leases for the Kevin Dome project site. Vecta is also one of the cost-sharing partners in the DOE Financial Assistance Agreement funding this effort. BSCSP would negotiate with the surface owners for pore space rights (BSCSP, 2011a). If surface or mineral owners do not grant access for project activities, BSCSP will modify the project to ensure there is no trespass.

2.2.2 Request for Interim Action Prior to Completion of NEPA Process

BSCSP requested DOE funding for a three-dimensional (3-D) nine component (9C) seismic survey and some environmental monitoring before the completion of DOE's NEPA review process in order to determine the location of the project components, perform the necessary modeling for permitting, and establish the necessary environmental baseline data. DOE reviewed this request as an interim action. DOE contacted the MDEQ, MDNRC, SHPO, Tribes, BLM, and USFWS for concerns regarding the interim action. BSCSP independently obtained landowner and mineral owner permission, required state and federal permits, and coordinated other compliance including NEPA and MEPA. DOE authorized the seismic survey and baseline activities to commence under an interim action on November 17, 2011. The interim action required that cultural surveys be performed in advance of the seismic survey program. Project activities allowed under the interim action began in December 2011. After discovery of inadvertent disturbances of cultural resources in February 2012, these interim action activities were cancelled in March of 2012 before BSCSP or its contractors could perform any of the baseline environmental monitoring (Gwilliam, 2012a; Gwilliam, 2012b). BSCSP would now perform the seismic surveys and baseline environmental monitoring after DOE completes the NEPA review (Fayish, 2012).

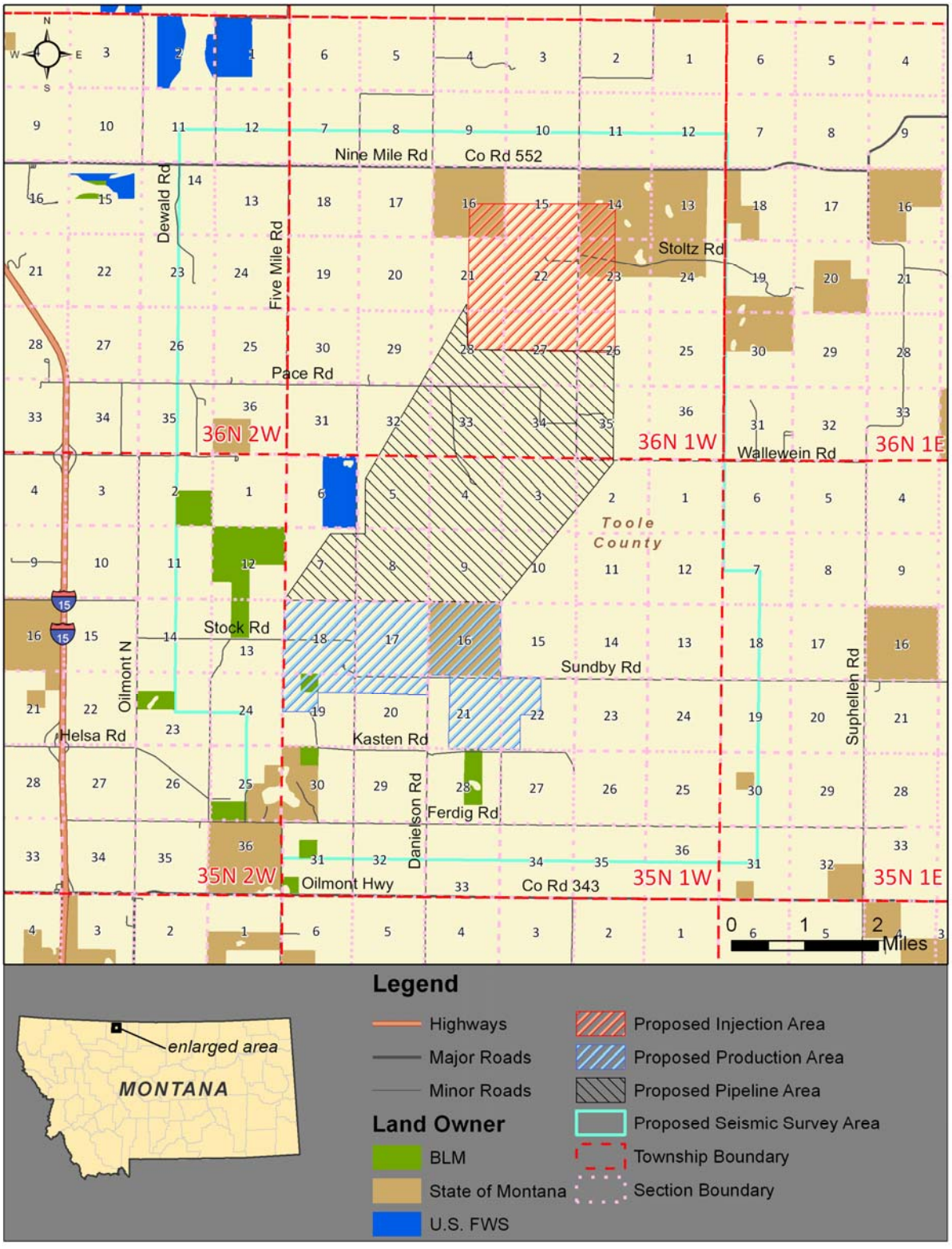


Figure 2.2.1-1. Site Map with Proposed Locations of Project Activities
Sources: (ESRI, 2010; USGS, 2011a)

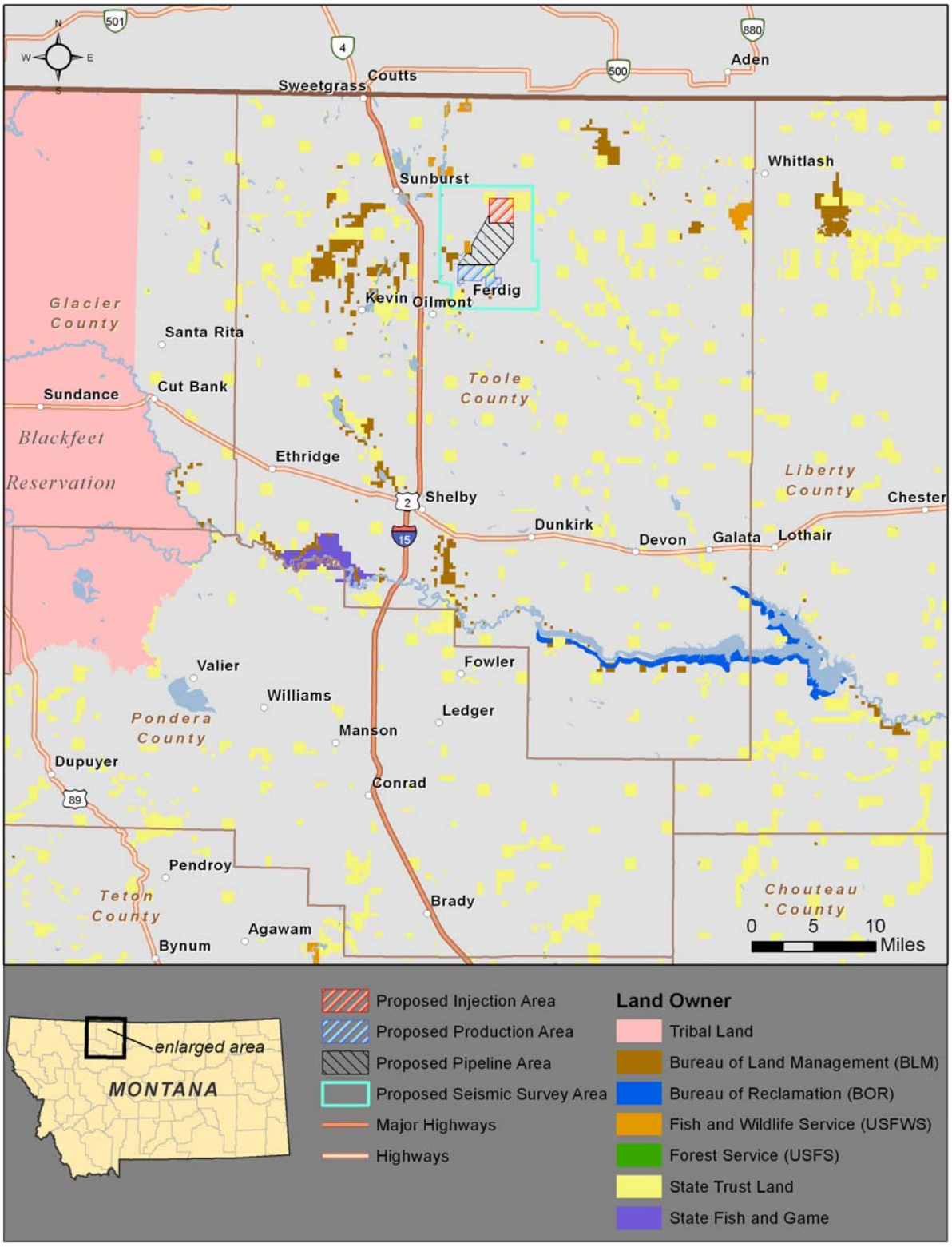


Figure 2.2.1-2. Regional Map
Sources: (ESRI, 2010; USGS, 2011a)

2.2.3 Initial Seismic Survey

BSCSP would perform a 3-D seismic shoot of not more than 75 square miles that would cover the proposed production site, the injection site, and the location of the monitoring wells (BSCSP, 2011a; BSCSP, 2011c). The processed data of the seismic survey would allow BSCSP to create the necessary 3-D images and model of the subsurface (BSCSP, 2011d). The seismic survey data would also allow BSCSP to identify any faults or fractures (BSCSP et al., 2011).

Approximately seventy-three percent of the proposed seismic survey area is or has been cultivated. The land in the area is owned by private owners, state agencies, and federal agencies (see Figure 2.2.1-1). BSCSP is pursuing the permits and any related MEPA or NEPA compliance for use of the lands (BSCSP, 2011d; BSCSP et al., 2011). The proposed seismic survey area covers an area larger than necessary to accommodate any issues with permissions or other constraints, including biological, archeological, aquatic, or economic restrictions (BSCSP, 2011d).

The seismic survey commenced in December 2011 but stopped on March 1, 2012 due to inadvertent adverse effects to cultural resources (see Section 4.10.2.4). The seismic survey would recommence after NEPA completion and would continue over 12 to 15 months depending on weather, crew availability, and other factors. Due to migratory bird concerns, spring meltdown, and the agricultural season, the seismic survey would stop from March 15 to August 15 (BSCSP, 2011d). The seismic survey began near the injection area to determine the injection well location. The next priority site may be the production area, but the surveying schedule depends on the weather and permits (Tollefson, 2011c).

Crews generally operate for 12-hour shifts per day. Crews would be approximately 20 people for recording and 6 additional people for surveying. The crews would stay in Shelby, Montana hotels. A field quality control staff member would be onsite to monitor the crews. Occasionally, work would begin in early morning hours to avoid afternoon winds and potential ground thawing during winter months (BSCSP, 2011d).

The seismic survey plan calls for receiver lines to be spaced 660 feet apart, and the source lines 880 feet apart. The sources and receivers would be placed every 110 feet along the lines (BSCSP, 2011d).

Wetlands, lakes, rivers, streams, and any other sensitive resources identified during this shoot would be avoided (BSCSP, 2011d). A professional surveyor surveyed pre-plot seismic source and receiver lines. BSCSP would reroute all lines to avoid all surface waters, streams, low-lying depressions, and areas of high soil moisture. Further, an archeologist would ensure the routes avoided check dams and ponds. The vibroseis trucks would only cross at established stream crossings and would not enter any other portion of streams (BSCSP, 2012b). The crew would only cross water bodies at bridges or other pre-established crossings. The crew is trained in identifying wetlands and other water bodies but may cross or access some wetland areas by foot. The crew would place receivers around lakes and walk them across streams (BSCSP, 2011d).

BSCSP has conducted a pedestrian cultural survey on some of the lands lacking previous cultural surveys or ground disturbances, such as cultivation (see Section 4.10).

A biological survey is not planned prior to the seismic survey, but seismic surveys would occur outside of the migratory bird season. Once infrastructure locations are determined, BSCSP will consult with USFWS and complete any recommended biological surveys. BSCSP consulted with the U.S. Army Corps of Engineers (USACE), and the USACE determined that BSCSP did not need to perform a wetland study (Blank, 2012).

For the seismic survey, receivers or sensors (called geophones) would be temporarily installed at the surface to record echoes from geological layers. One sensor would be deployed at each receiver location and planted approximately five inches into the ground using a portable hand drill. The sensors are cylindrical, about three inches in diameter and eight inches long. The sensor would remain in place for one to two months. The sensor holes, which are about the size of a soda can, are similar to aeration holes in lawns and generally refill naturally within one year (BSCSP, 2011d).

To create the sound waves, trucks that are equipped with large pads (vibroseis trucks) send vibrations through the earth. Once the geophones are placed, these trucks move in tandem in a grid pattern lowering the vibration pad onto the surface at regular intervals. The waves travel deep underground and are reflected back from the different rock layers. Sensors pick up these reflections and transmit them to a recording truck, which captures the data for computer processing and analysis. From the timing of the reflection data, the depths of the layers can be determined, and an image of the subsurface can be formed. No explosives would be used in the survey (BSCSP, 2011d).

All vibroseis trucks would have sand tires (low relief tires) to reduce the disturbance. The pad used to create the waves is three feet by four feet. On dry ground, the pad creates an indentation of less than an inch. The diesel engine of the vibroseis trucks is a source of operational noise. The shaking would only be felt up to approximately 100 ft. from the source location. The trucks would occupy each location for a couple of minutes (BSCSP, 2011d). The seismic work would utilize several different vehicles (mostly diesel), including all terrain vehicles (ATVs), pick-up/line trucks, two passenger vans for crew transport, a fuel truck for the vibroseis trucks, and vibroseis trucks (BSCSP, 2011d).

Permitting and landowner agreements require that the crews clean equipment between sites to reduce invasive species concerns (BSCSP et al., 2011). Only field maintenance would occur, and BSCSP would not build a maintenance shop. BSCSP would create a staging area of approximately one acre at one location on private land, likely on pre-disturbed land. Reclamation would be done at landowner request (BSCSP, 2011d).

Trucks would be driven off-road due to the low density of roads. However, they would be limited to disturbed areas or areas that have had a cultural resource study performed (Gwilliam, 2012c). No roads or other infrastructure would be built for the seismic survey. Landowners would be compensated for any damages or losses to crops. Generally, there would be no

remaining signs of the work by the following summer. However, the surface owner may request restoration or remediation work (BSCSP, 2011d).

2.2.4 Baseline Environmental Monitoring

BSCSP would perform baseline environmental monitoring for atmospheric and soil CO_2 flux as well as meteorological conditions. Water sampling would also occur from existing water wells and surface waters for background water chemistry.

Figure 2.2.4. Example of a Eddy Covariance Tower System
Source: (BSCSP, 2011d)

Eddy Covariance Tower. BSCSP would install an Eddy Covariance Tower (Figure 2.2.4). All of its hardware would cover an area less than 8 m by 8 m. The total disturbed volume for soil property sensors may be up to 0.5 m wide by 1.5 m long by 0.1 m deep. The tower would be located in Township 36N Range 1W, Section 22, with the exact location depending on landowner permission. The tower would be active for the duration of the project (BSCSP, 2011d).

The Eddy Covariance Tower would have several sensors above and below ground. The above ground sensors include a wind sensor (a 3-D sonic anemometer), a wind monitor, a CO_2 and water gas analyzer, a temperature and relative humidity probe, a barometer to measure atmospheric pressure, a rain gauge, a sunlight sensor (net radiometer), and a photosynthetically available radiation sensor (a quantum sensor). The below ground sensors would include soil moisture probes, temperature probes, and soil heat flux plates. The sensors would send a subset of the data back to MSU-Bozeman via modem and cellular phone network. A stand-alone solar power system would generate power for the instrumentation; the system would consist of two solar panels and one large battery, capable of powering the station through the winter. The battery would be housed in a secure weatherproof plastic box, buried approximately one meter underground. The battery box would be checked every spring and fall. BSCSP would conduct any necessary reclamation post-monitoring, at landowner's request (BSCSP, 2011d).

Soil Surface CO_2 Flux Survey. BSCSP proposes soil surface CO_2 flux surveys covering an area of 1,600 m by 1,600 m through gridding near the proposed well locations, pending landowner permission. The proposed spacing between grid lines is approximately 200 to 400 m. Field personnel would travel between sampling points by foot and possibly ATV with landowner permission. Field personnel may select additional sampling sites within the project boundary,

based on the results of a field survey. The first survey would occur once the NEPA process is complete and in advance of the injection, weather permitting. Additional soil surveys will occur throughout the life of the project. The survey process lasts about five to ten minutes at each location. The field crews should complete the surveys in approximately two days, including traveling between the sampling points (BSCSP, 2011d).

BSCSP plans to use a West Systems fluxmeter to measure soil surface CO_2 flux. A surveyor places a handheld chamber connected to a backpack mounted gas analyzer chamber on the soil surface to make measurements. If necessary, vegetation at the site is clipped to ground surface within a one-foot diameter circle surrounding each sampling point. No equipment is left in the ground or on the surface after the measurement. In general, no one more than one meter from the accumulation chamber can hear the noise above the ambient levels of a field away from buildings and traffic (BSCSP, 2011d).

Water Sampling. BSCSP also proposes water sampling from existing water wells and surface waters in the vicinity of the project area. BSCSP would analyze water samples for standard water chemistry and the presence of naturally occurring tracers. With landowner permission, sampling crews would travel between sites by foot or possibly ATV. No materials or equipment would be left onsite. These samples would be collected monthly to quarterly (BSCSP, 2011d).

2.2.5 Construction

BSCSP would conduct the production, injection, and monitoring activities on Montana's state trust land or privately owned land (BSCSP, 2011b; IEAGHG and NETL, 2011). Locations of the wells and all supporting equipment (including pipeline and compressor station) depend on the seismic survey results, permitting, landowner permission, and biological and cultural survey results. BSCSP would perform cultural surveys as recommended by SHPO for locations where construction activities would occur in uncultivated lands. Cultural resource surveys will be conducted for construction in cultivated or otherwise disturbed areas, if activities would disturb ground at a deeper level than previously disturbed (such as through cultivation) (BSCSP et al., 2011).

BSCSP does not anticipate that the total disturbed area for the well pads, pipeline construction, and compressor station would exceed 55 acres, which includes the potential for gathering lines for a natural gas well (BSCSP, 2012b). Crews would drill all wells to a maximum of 5,200 feet (BSCSP, 2011b), with each completed within a three week period (Tollefson, 2011d). The ten well pads would measure 200 ft by 200 ft including pits (BSCSP, 2011b; Tollefson, 2011a), with excavation for the pads not exceeding 15 ft in depth. Crews would complete development of each of the well pads within one to two days (Tollefson, 2011d). BSCSP estimates an annual average of 13 FTEs to drill and complete wells (Tollefson, 2011e). Crews would conduct the construction activities for the project from approximately 7 A.M. until sundown (Tollefson, 2011d).

Well drilling operations would use a freshwater-based drilling mud. Drilling mud and fluids would be contained in tanks and reserve pits. The tanks would hold approximately 16,800 gallons and are fully contained units with open tops. During drilling operations, the tanks are

used to hold and recycle drilling fluids. Since the mud is fresh-water based and the project will not be extracting hydrocarbons, the tanks would not contain oil. After the well is completed, the tanks are pumped and removed from the site. The reserve pits hold the solid wastes (solids from the shaker and cuttings from the pump pits) during drilling operations. These pits also are not expected to contain oil since it is a freshwater mud. These pits would be unlined unless requested by a state or federal agency. Each pit would measure approximately 12 ft by 20 ft by 8 ft deep, and is included within the well pad size described above. When the pits are constructed, topsoil is stockpiled. Once crews have removed and disposed of drilling fluids and solids and replaced the subsoil, they use the topsoil to reclaim the pit. The surface owner would determine the seeding requirements during permitting (BSCSP, 2012b). The well pads would also include an approximately 10 ft by 35 ft settling pit and 6 ft by 35 ft suction pit. These pits would be unlined unless requested by a state or federal agency. They would be decommissioned in the same manner as the reserve pit (Tollefson, 2011a).

Up to five production wells would extract the CO_2 from the gas cap of Kevin Dome. The spacing and number of the wells depend on the test results of the first production well. The first production well would be cored, and all production wells would have instrumentation for data collection (BSCSP, 2011a; IEAGHG and NETL, 2011). A two-inch stainless steel pipeline gathering system would connect the production wells to a CO_2 processing facility in the production well field (BSCSP, 2011a).

The CO_2 processing facility would house the CO_2 compressor, and the facility size would not exceed 40 ft by 60 ft with a concrete base (Tollefson, 2011a). The building would be located in an enclosed fenced area with a trailer (BSCSP, 2011a). It would compress and dehydrate the extracted gas to the necessary specifications for injection (BSCSP, 2011b). Site preparation and construction for the processing facility, as well as completion of the access road, would last 60 to 90 days (Tollefson, 2011e).

During well drilling, an operations technician would be onsite 24 hours a day, 7 days a week. The technician would monitor all wells, the compressor, and the pipelines, as well as monitor site security (Tollefson, 2011d). The processing facility would have meters, controls, and instruments to monitor the equipment and conditions, such as the individual well flows, dehydration triethylene glycol bath temperature, and compressed gas flow. The compressor and dehydration system would be gas fired. The facility would also include a wastewater tank. The compressor components would be inside the building. If required, there is also the possibility of a CO_2 pre-heater by natural gas that would be located in the compressor facility (BSCSP, 2011a; BSCSP, 2011b).

A two-inch carbon steel pipeline (L80) of six to ten miles would transport the CO_2 under pressure from the processing facility in the production well field to the injection well (BSCSP et al., 2011; BSCSP, 2011a). BSCSP would bury this pipeline six feet underground. The pipeline right-of-way (ROW) would be reclaimed to pre-burial use of cropland or rangeland (BSCSP, 2011b). When construction is complete, the temporary access road on the ROW would be reclaimed to cropland or native seed at landowner's request. This ROW would be 30 ft wide during construction and 15 ft wide permanently (Tollefson, 2011d). The pipeline crossings of road and ephemeral waterways would be bored rather than trenched. In other words, these

crossings would be drilled underground and not trenched from the surface to reduce surface impact and erosion (BSCSP, 2011b; Tollefson, 2011f). The site preparation and pipeline construction work would take 30 to 60 days (Tollefson, 2011e).

The project includes a mobile project trailer (dog house) that would be powered by a generator on the drilling rig (BSCSP, 2011a). This mobile project trailer would measure 8 ft by 50 ft and would not create any waste (Tollefson, 2011d). The compressor facility and instrumentation would be powered by natural gas and backed up with a generator. Either the natural gas for the project would be purchased from an existing natural gas well or BSCSP would drill a shallow well of less than 1,000 ft to produce natural gas at the production site. If BSCSP decided to use an existing well, a one to two inch polyethylene flow line would transport the natural gas less than two miles (Tollefson, 2011d). This flow line may require a new pipeline corridor, which is included in the 55-acre disturbance area (BSCSP, 2012c).

For access, BSCSP would use existing roads whenever possible. However, BSCSP estimates constructing five miles of aggregate roads to access the wells. For these roads, BSCSP would select sites away from seasonal wetlands. As needed, culverts and water boards would be sized and placed to allow spring flows to pass unrestricted across roads (BSCSP, 2011b). BSCSP crews would drive off-road, which is standard practice in this area, to access any project components not accessible from existing or newly created roads (Tollefson, 2011f). As needed, BSCSP would immediately reseed ROWs and construct sediment fences to prevent sediment flows to permanent or ephemeral watercourses (BSCSP, 2011b).

Altamont Energy would provide water for drilling activities, using a non-potable source of agricultural, irrigation water. Crews would haul potable water to the site in 5-gallon reusable containers (BSCSP, 2011b). The project would use about 5,000 gallons of diesel oil and 1,176,000 gallons of water, as well as 42,000 feet of two-inch schedule 40 stainless steel pipe (BSCSP, 2011a; BSCSP, 2011b). In addition to the one million metric tons of CO_2, the project would create or utilize approximately:

1. 117,600 gallons of water per well,
2. 147,000 gallons of drilling fluid/mud (includes water) per well,
3. 3,266 cubic feet of cuttings per well,
4. 1,225 cubic feet of lost circulation materials per well,
5. 18,000 pounds of cement per well,
6. Sulfur hexafluoride (SF_6) tracer in CO_2 stream,
7. Krypton tracer in CO_2 stream,
8. Xenon tracer in CO_2 stream,
9. Carbon 14 (^{14}C) tracer in CO_2 stream,
10. Perfluorocarbons (PFT) tracer in CO_2 stream,
11. 50,000 feet of 5.5 inch casing (for all 10 wells),
12. 50,000 feet of 2 and 3/8 inch tubing (for all 10 wells),
13. 10 packers (for all 10 wells),
14. 10 stainless steel well heads (for all 10 wells),
15. One 500-1000 horsepower two stage compressor,
16. Glycol dehydration unit,
17. Less than 500 pounds of municipal solid waste,

18. Other nonhazardous drilling products, such as lime,
19. 10 well pads, and
20. Aggregate of five miles of road (BSCSP, 2011a; BSCSP, 2011b; Tollefson, 2011d).

Drill cuttings would be disposed of onsite as allowed by the state. Municipal solid wastes would be disposed of offsite to High Plains Landfill in Toole County, Montana (BSCSP, 2011a). The waste facilities have the capacity to handle this project and would not require expansion to accommodate this project (Tollefson, 2011d). Drilling mud would be reclaimed onsite by Altamont Energy. Wastewater would be hauled to an injection system facility operated by Altamont Energy. No septic systems would be used for this project, with the exception of portable toilets (BSCSP, 2011a). Local contractors would bring in supplies and materials for the project as needed, so no staging area would be required except for the temporary staging area for the seismic survey discussed previously (Tollefson, 2011a).

2.2.6 Injection and Monitoring

Naturally occurring CO_2 exists in the Devonian dolostone reservoir of the Duperow Formation, where the CO_2 has been trapped for millions of years. The CO_2 at the project site is expected to be approximately 1,200 pounds of pressure and 94 degrees Fahrenheit (°F). The purity of the CO_2 would be determined after the first production well is drilled and the gas composition is analyzed (BSCSP, 2011a; BSCSP et al., 2011).

The materials of the CO_2 processing system could handle the corrosive nature of wet CO_2. The system would utilize triethylene glycol with glycol regenerator for dehydration. The dehydration could occur before or after compression (BSCSP, 2011b). If the arriving CO_2 is close to the desired pressure (approximately 1,500 pounds per square inch (psi)), then a single stage of compression may be used. The 550-1000 horsepower (hp) two-stage compressor and dehydration system would be capable of receiving a range of pressures from the production wells (IEAGHG and NETL, 2011). Gas analysis of the first production well's CO_2 would identify any necessary purification steps to the compression and dehydration process in the CO_2 processing facility (Tollefson, 2011d; Tollefson, 2011f; Tollefson, 2011g).

Three types of produced water could occur from the CO_2 stream. First, some water and other fluids may be produced from the CO_2 production well. These fluids would be removed from the pipeline prior to entering the compressor facility. During compression and cooling, the CO_2's ability to retain fluid diminishes, creating another type of produced water. The final source of produced water from the CO_2 stream is the dehydration process. The quantity and quality of these fluids would be unknown until completion of the gas analysis of the first production well. However, BSCSP would handle and dispose of all fluids and contaminants in compliance with all applicable regulations and BSCSP would obtain all necessary permits (Tollefson, 2011f). Waste facilities have the capacity to handle this produced water without expansion (Tollefson, 2011d).

As described in Section 2.2.5, a pipeline would transport the CO_2 six to ten miles from the production wells to the injection well. Through the one injection well, the supercritical CO_2 would be injected below the gas-brine contact in the Duperow formation (BSCSP, 2011a;

Tollefson, 2011b). The injection well would be instrumented to automatically shut down the compressor, should a loss in injection pressure or other indication of system leakage occur at the surface or in the subsurface. Four monitoring wells would be near the injection well (IEAGHG and NETL, 2011). BSCSP estimates an average annual employment of three FTEs for transportation and injection of CO_2 (Tollefson, 2011e).

Injection equipment at the site would include workover rigs and logging trucks to move tools, geophones, sampling equipment, seismic sources, and tubing for MVA work (BSCSP, 2011b). Onsite operators would continually monitor the production wells, compressor station, and the injection well (IEAGHG and NETL, 2011). An operations technician would visit the production wells, monitoring wells, injection well, compressor system, and ancillary installations twice every day during injection. Remote real time monitoring would occur through data capture and transmission devices (BSCSP, 2011b).

BSCSP would have CO_2 monitors inside the well shacks and compressor station. They would also employ downhole pressure and temperature gauges. During the operational phase of the project, a technician would be onsite during the dayshift, physically checking on all infrastructure and monitoring their systems. The technician would monitor the pressure/temperature recording systems gathering real-time data on the injectors and monitor wells. The technician would also monitor temperature in the well shacks, compressor station performance, and surface monitoring equipment. The compressor station would be remotely monitored and have an automated shut-off (Tollefson, 2011d). Table 2.2.6 has more information about the various monitoring features that BSCSP would enact. BSCSP estimates an average annual employment of 12 FTEs for operational monitoring (Tollefson, 2011e).

Laboratory and computational work would be performed at Lawrence Berkeley National Laboratory, Los Alamos National Laboratory, Idaho National Laboratory, and campus facilities at Montana State University, Barnard College, and Columbia University. Schlumberger Carbon Services would also be conducting analytical work at various corporate sites in Denver, Colorado and Houston, Texas (BSCSP, 2011b). None of these sites would undergo renovations or increase their workforce as a result of BSCSP's proposed project, and any equipment or modifications would be minor (Tollefson, 2011d).

BSCSP would employ seismic data and other geochemical and geophysical techniques to ensure no potential leakage conduits are in the storage reservoir area of interest (IEAGHG and NETL, 2011). The Duperow formation, a saline aquifer, has very poor water quality with total dissolved solids (TDS) far exceeding 10,000 parts per million (ppm) (IEAGHG and NETL, 2011; BSCSP, 2011a).

Monitoring would include multi-component surface seismic, logging, multi-component 3-D VSP, crosswell seismic, micro-seismic analysis of the host rocks and cap rock, geochemical sampling, tracer studies, pressure monitoring, and surface assurance monitoring techniques (BSCSP, 2011b). Water monitoring would also occur (IEAGHG and NETL, 2011). Cores would be taken from one production well, one monitoring well, and the injection well. These samples would be used for core flood and core flow experiments to provide data for modeling

the injection. After four years of injection, a final 3-D 9C seismic survey would be conducted on nine square miles near the injection site (BSCSP, 2011b).

Geochemical modeling (Geochemist Workbench) and reactive transport modeling (TOUGHREACT) would be performed in conjunction with an extensive fluid sampling and geochemical and core analysis program. The methods for sampling, modeling and simulation, and laboratory measurements have been used in other carbon storage projects, such as Cranfield, initiated by a different Regional Carbon Sequestration Partnership (IEAGHG and NETL, 2011). Examples of monitoring methods include eddy covariance, surface and downhole geophysics, soil flux chambers, and hyperspectral imaging (BSCSP, 2011b; IEAGHG and NETL, 2011). Tracers allow for determining travel times from the injection well to the observation wells with geochemical sampling as well as residual water saturation (Tollefson, 2011d). See table below for more details about the planned monitoring efforts. Monitoring efforts would be evaluated periodically through the project, and sampling frequency would be subject to change.

Table 2.2.6. Planned Measurement Technologies

	Technique	Measurement Parameters	Application	Frequency
Subsurface	Downhole Pressure, Temperature	Formation pressure and temperature	Overburden pressure to ensure caprock and wellbore integrity	Continuous
	Well Logs, initial	Cement bond, Gamma/Neutron, Resistivity, Sonic, Formation Micro-Imaging, Modular Formation Dynamics Testing Tool (MDT), Pulsed Neutron, and Mechanical Integrity Test	Characterize formation and well integrity	Initial
	Well Logs, annual	Pulsed Neutron Annual Mechanical Integrity Test	Measure fluid composition changes at monitoring wells Assure injection well integrity	Annually
	Aqueous Geochemistry	U-tube sampling	Provide information on dissolution/mineral trapping	Monthly
	Tracers	Phase partitioning tracers, rare earth element, ^{14}C. Fluids sampled with U-tube.	Determine hydrologic properties, dissolution	Monthly
	Cross-well Seismic	Use three monitoring wells	Perform early stage, high resolution fence line image of plume development	Background, 1, 3, 6 months
	VSP, 3-D, 9C	3-D, 9C surface seismic	Provides relatively high resolution, high sensitivity plume imaging and calibration	Background. This would occur at 6, 18, 30, and 48 months into the project.
	Surface Seismic	Surface Seismic	Provides larger area subsurface imaging of the plume and its migration	There would be the initial under the interim action and a final at 84 months into the project.
	Core Testing and Analysis	Rock physics measurements and core flood/flow experiments would be performed on reservoir and cap rocks	Determine mechanical and geochemical properties and how they change with CO_2 exposure	Cores would be obtained during drilling and from post-injection side wall cores.

Table 2.2.6. Planned Measurement Technologies				
	Technique	**Measurement Parameters**	**Application**	**Frequency**
Near Surface and Atmospheric	Drinking water aquifer monitoring	Assurance monitoring. Monitor dissolved CO_2, alkalinity, dissolved species	Ensure no CO_2 is reaching drinking water supply	Monthly
	Soil flux	Use flux chambers to measure CO_2 fluxes.	Ensure CO_2 is not leaking to surface	Monthly
	Eddy Covariance	Measure CO_2 fluxes	Ensure CO_2 is not leaking to surface	Continuous
	Hyperspectral Imaging	Airborne by airplanes hyperspectral imaging Follow up soil gas or soil flux monitoring can be used. These are wide area assurance monitoring techniques.	Look for anomalous plant stress Determine if CO_2 is cause	Biannually
	Soil gas	Commercial CO_2 soil gas probes	To be deployed if wide area techniques indicate concerns	Monthly
	Differential Absorption LIDAR	Laser based, horizontal, line-of-sight measurement of atmospheric CO_2 concentration	Monitor CO_2 concentrations	Biannually

Sources: (IEAGHG and NETL, 2011; BSCSP and NETL, 2012)

The project would include hydrogen sulfide safety equipment. BSCSP would create a safety plan (BSCSP, 2011b) and conduct a risk assessment, which would use a probabilistic assessment of an event's occurrence, using determinations identified by a panel of experts. The plan would include risk scenarios built from the identification of features, events, and processes that constitute risk to the project, as well as mitigation strategies for these scenarios. This process would be ongoing to incorporate the gathered information about the site characteristics (IEAGHG and NETL, 2011).

Post-injection monitoring would occur for two years after injection (IEAGHG and NETL, 2011). Wells with commercial viability would be transferred to Vecta. All other wells would be plugged and abandoned, and the compressor facility idled. Mechanical Integrity Tests (MITs) would continue for the injection well, and Reservoir Saturation Tool (RST) would be conducted on the distil monitoring well. BSCSP would continue to operate surface detection devices along with the U-tube device in the monitoring well (BSCSP, 2011a). BSCSP estimates average annual employment of ten FTEs for post-injection monitoring (Tollefson, 2011e).

2.2.7 Post-Project Decommissioning

The site closure would involve the transfer of the wells and associated infrastructure, surface, and subsurface leases, and long-term liability to Vecta Oil and Gas, Limited (IEAGHG and NETL, 2011). The U-tube sampling, data capture and transmission facilities, and surface detection equipment would be removed. However, the industrial partner may continue using the pipeline for CO_2 production from production wells (BSCSP, 2011a). Vecta may extract the injected CO_2 from this project and utilize it for EOR tests in an adjacent oil and gas development until well bores return only brine, at which time the injection well and monitoring wells would be plugged and abandoned or reclassified as oil and gas wells (IEAGHG and NETL, 2011; BSCSP, 2012a). The CO_2 production wells may remain in use for production of CO_2 for EOR or may be recompleted in another formation as oil and gas production wells (IEAGHG and NETL, 2011).

The design of BSCSP's proposed project is experimental to determine the potential for carbon storage in Kevin Dome and similar formations. Vecta may independently assess if the EOR were financially viable within a reasonable timeframe after BSCSP's proposed project, which would be over eight years. Otherwise, Vecta would plug and abandon the wells from BSCSP's proposed project. If Vecta chooses at some future date to pursue EOR tests or large-scale EOR in the future with requisite infrastructure development, Vecta would comply with all applicable regulations and permits (BSCSP and NETL, 2012). Any of these EOR activities are dependent on the market and are speculative at this point. However, as described in Section 1.4.2 and in the summary of PCOR's Bell Creek and Denbury's Greencore projects (Section 1.4.1), oil and gas activities (even carbon storage and EOR) are not unusual activities in the region, so the potential future expansion of EOR in the region would not be considered a connected action.

2.3 Alternatives

DOE's selections under Funding Opportunity Announcement, DE-PS26-05NT42255 *Regional Carbon Sequestration Partnerships - Phase II* determined which of the proposed projects would be eligible for non-competitive progression to Phase III, and limited DOE's alternatives.

Because DOE's proposed action is limited to providing financial assistance in cost-sharing arrangements to projects submitted by applicants eligible to apply for non-competitive progression to Phase III, DOE's decision is limited to either accepting or rejecting the project as proposed by the proponent, including its proposed technology and selected sites.

DOE's consideration of reasonable alternatives is therefore limited to the proposed action and the no-action alternative for this project.

2.4 No-Action Alternative

Under the no-action alternative, DOE would not provide funds to the proposed project. As a result, this project would be delayed as BSCSP looks for other funding sources to meet their needs, or abandoned if other funding sources are not obtained. Furthermore, study of geologic storage on a large scale, validation of the storage capabilities of the target formation, and the advancement of strategies for reducing greenhouse gas emissions would not occur or would be delayed. DOE's ability to achieve its objectives under the RCSP program would be impaired.

2.5 Issues Considered and Dismissed

The Purpose and Need section above highlighted the importance of the overall program of evaluating carbon capture, utilization, and storage (CCUS) as one tool among many to address global climate change while providing this nation with a secure energy future. Because of the lack of potential impact to certain issues due to the specific characteristics of the BSCSP's proposed project, the following potential impacts were considered but dismissed from more detailed analysis:

- Increase Local Govt. Expenditures: The expected population dynamics of the temporary workforce are not expected to impose additional local govt. expenditures through the need for new roads, schools, etc.
- Impact Property Values: This is a minor and temporary expansion of similar industrial activities present nearby.
- Alter Local Hydrology Patterns: None of the proposed construction would affect drainage in the local watershed.
- Wild and Scenic Rivers: No listed Wild and Scenic rivers are within the general area of the proposed project site. The closest Wild and Scenic River is the Flathead River, over 75 miles away.
- Protection of Children: In the 2005-2009 American Community Survey, Toole County's population of children under five

	years old was 4.7%, which is below the national average of 6.9% (Census, No date[a]). The project is over eight miles from the nearest school and occurs in a field (ESRI, 2010). Therefore, with the planned monitoring and regulatory compliance, the project should not represent any disproportional effects on children.
• Paleontological Resources	Isolated surface bedrock exposures exist in the project area that could contain fossilized remains, traces, or imprints of organisms (BSCSP, 2012c). The project area's geological formations are either unknown potential or moderate potential for fossils. The moderate potential means there is low chance for significant fossil locality while unknown means further research is needed (BLM, 2007; BLM, 2008). However, these rock areas in the project site are too steep for the project activities. Therefore, it is unlikely that the project would disturb potentially fossil yielding bedrock or alluvium. Therefore, impacts to this resource were dismissed from further analysis.

2.6 Other Alternatives Considered and Dismissed by DOE and BSCSP

BLM provided scoping comments recommending the use of Cut Bank Oil Field to allow for the benefit of EOR to meet domestic energy needs, while using existing infrastructure (Jaynes, 2011) (see Appendix F). BSCSP did not choose the Cut Bank Oil Field for several reasons. Proving ability to store CO_2 in carbonate saline formations is of substantial public benefit (see Section 1.1). Additionally, DOE requires a higher level of cost share for EOR projects, and it is unlikely BSCSP would have been able to meet the cost share requirements at the Cut Bank Oil Field. Further, the Cut Bank Oil Field is 24 to 30 miles from the source of CO_2, which exceeds the maximum distance DOE allowed in the Funding Opportunity Announcement (FOA) for Phase III projects. Many of the Cut Bank wells are on 40 acre spacing that would have made wellbore integrity of existing wells a major concern. Moreover, the CO_2 pipeline would have had to cross Interstate 15, which would have created permitting and budgetary challenges (Spangler, 2011a). For the above reasons, BSCSP did not choose to relocate the project to the Cut Bank Oil Field.

3.0 THE ENVIRONMENTAL ANALYSIS APPROACH

This chapter describes how the environmental review team analyzed the potential impacts of BSCSP's proposed project (i.e., injection and analysis of potential for geologic storage of CO_2). Chapter 4 provides a description of the affected environment and the potential environmental effects of the BSCSP's proposed project, along with an analysis of environmental effects if the BSCSP's proposed project were not implemented.

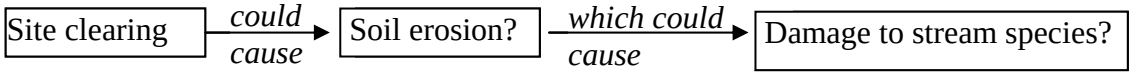
3.1 Approach to the Analysis

It is the intention of an Environmental Assessment to be a clear, focused analysis of impacts. It is not intended to be merely a compilation of encyclopedic information about the project or about the environment. Accordingly, the environmental review team used a systematic approach to identifying, and then answering, the relevant impact questions.

The initial step was to develop a detailed description of the components of the CO_2 injection process, along with those components that would be added by NETL to study the potential of geologic storage of CO_2 at this site. This description was presented in Chapter 2.

For each project component, (e.g., underground injection of CO_2) the team sought to identify all the types of direct effects which that activity could cause on any environmental resource. For example, clearing a site of vegetation could cause soil erosion. The team drew upon their experience with previous projects to conduct this preliminary identification of potential impacts.

For each potential direct effect, the team then sought to identify the potential indirect effects on other environmental resources. For example, soil erosion could cause sedimentation in nearby streams, which could in turn harm fish and other species in the stream.



In some cases, the team identified multiple effects on the same resource, which are shown in the diagram (Figures 3.1-1 to 3.1-4). Figures 3.1-1 to 3.1-4 are the overall Cause-Effect-Question diagram for the entire project. This served as the framework for the analysis of impacts. Note that Figures 3.1-1 to 3.1-4 (the next four pages) contain references to the specific section of the document where each impact is addressed. The team focused their efforts on answering the following questions:

- Would these effects in fact occur?
- If yes, how extensive, how severe, and how long lasting would the impacts be?

The team compared these findings to the significance levels found in Table 3.2 below.

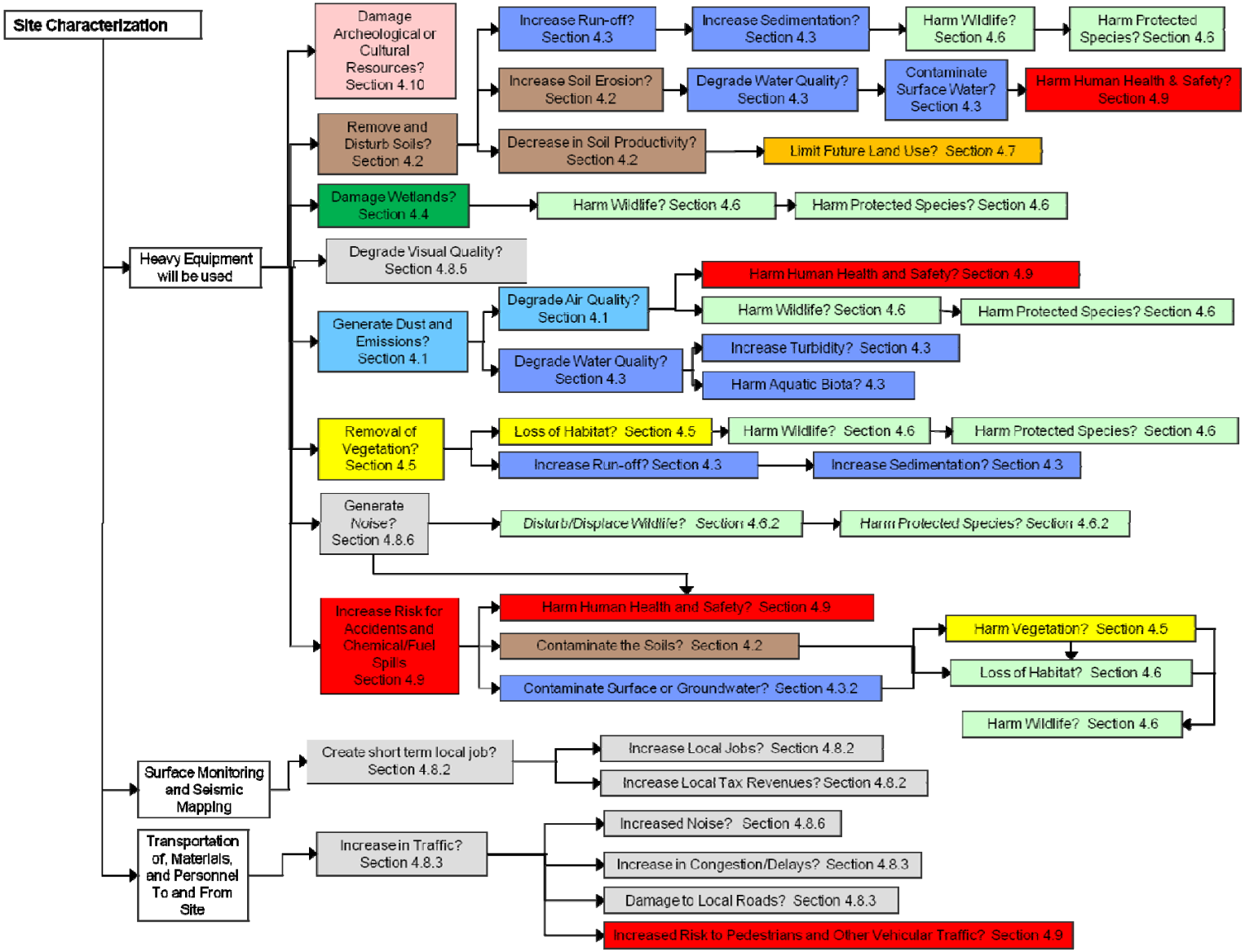


Figure 3.1-1. Cause-Effect-Questions Page 1

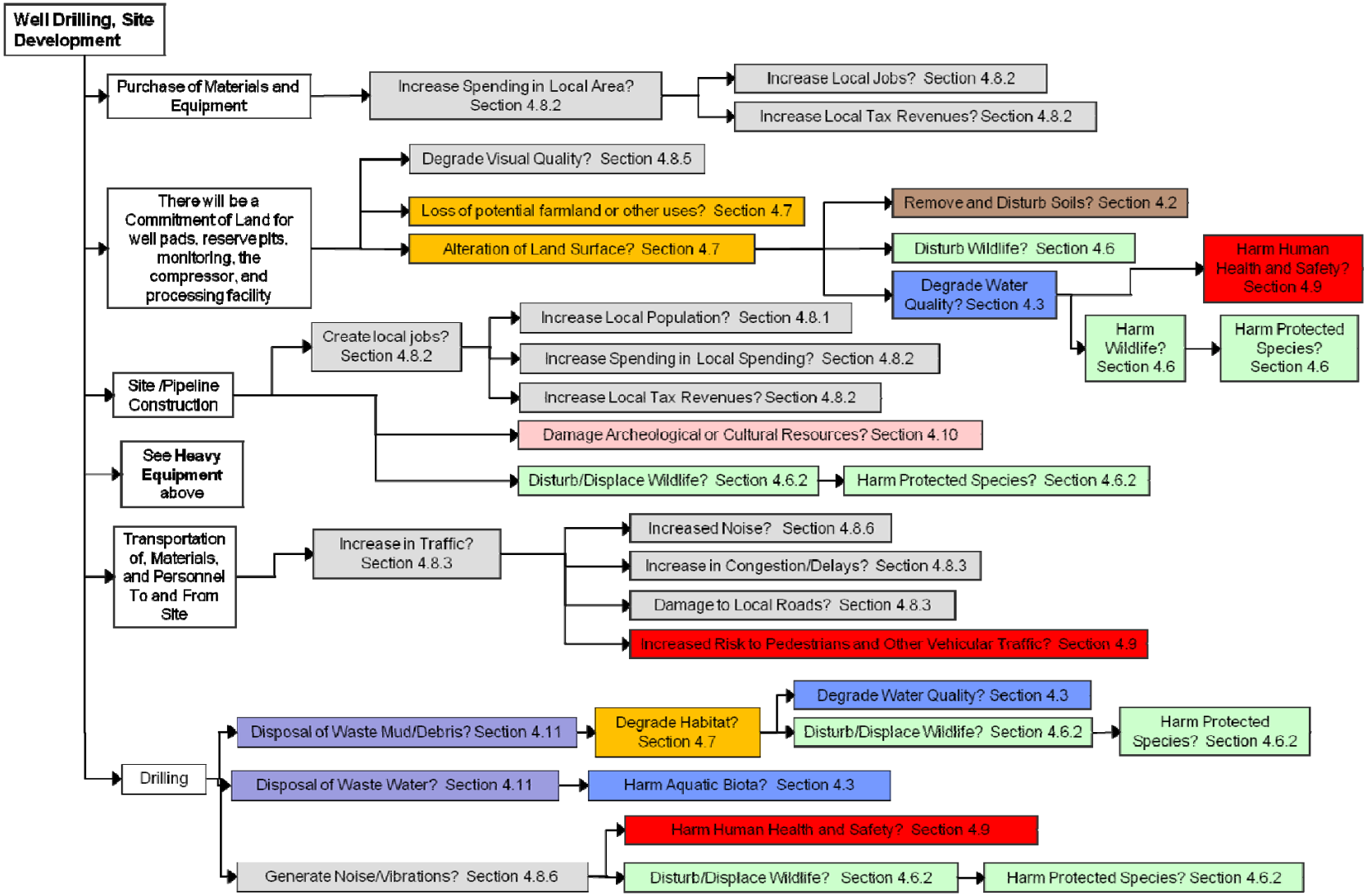


Figure 3.1-2. Cause-Effect-Questions Page 2

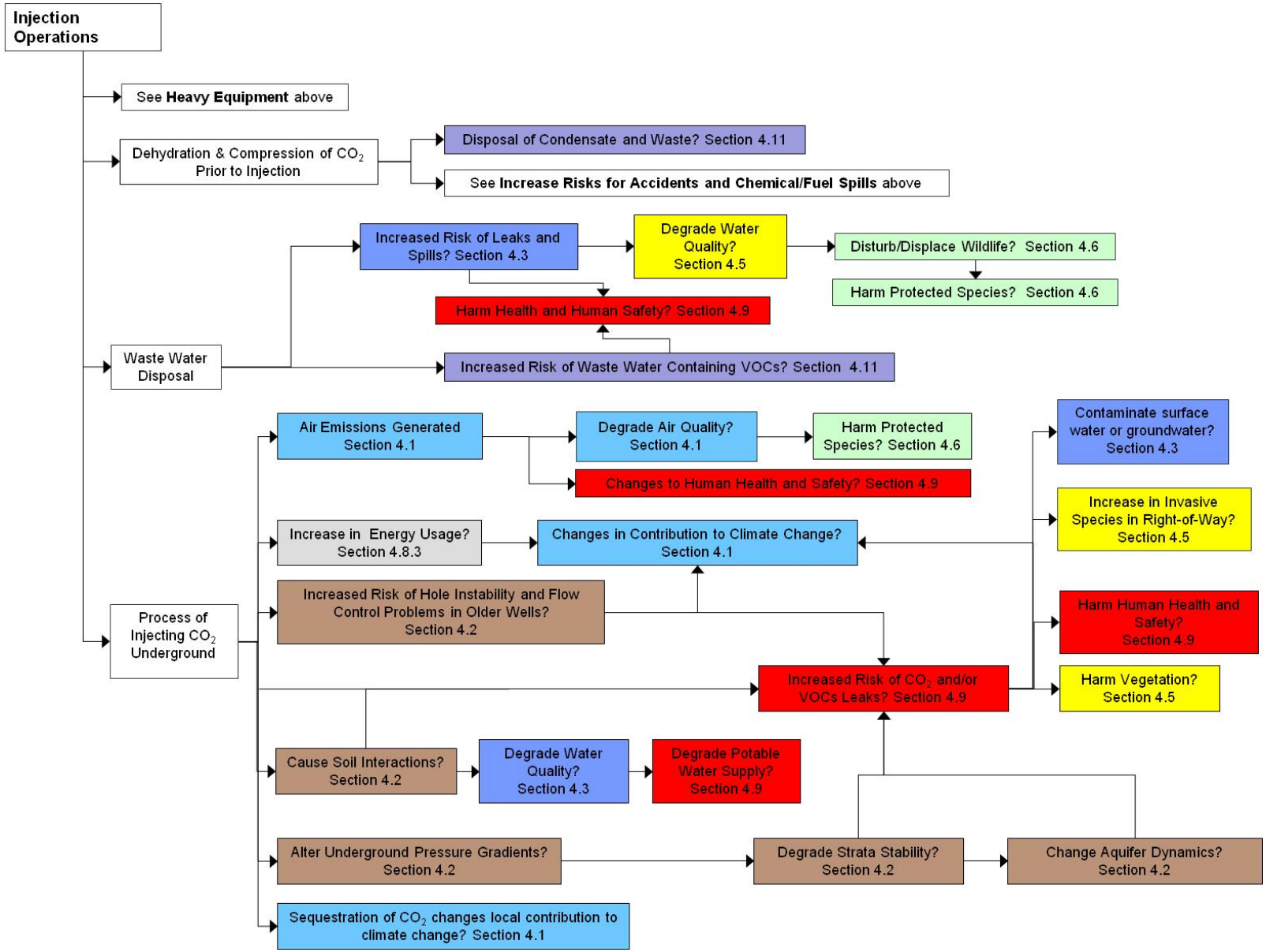


Figure 3.1-3. Cause-Effect-Questions Page 3

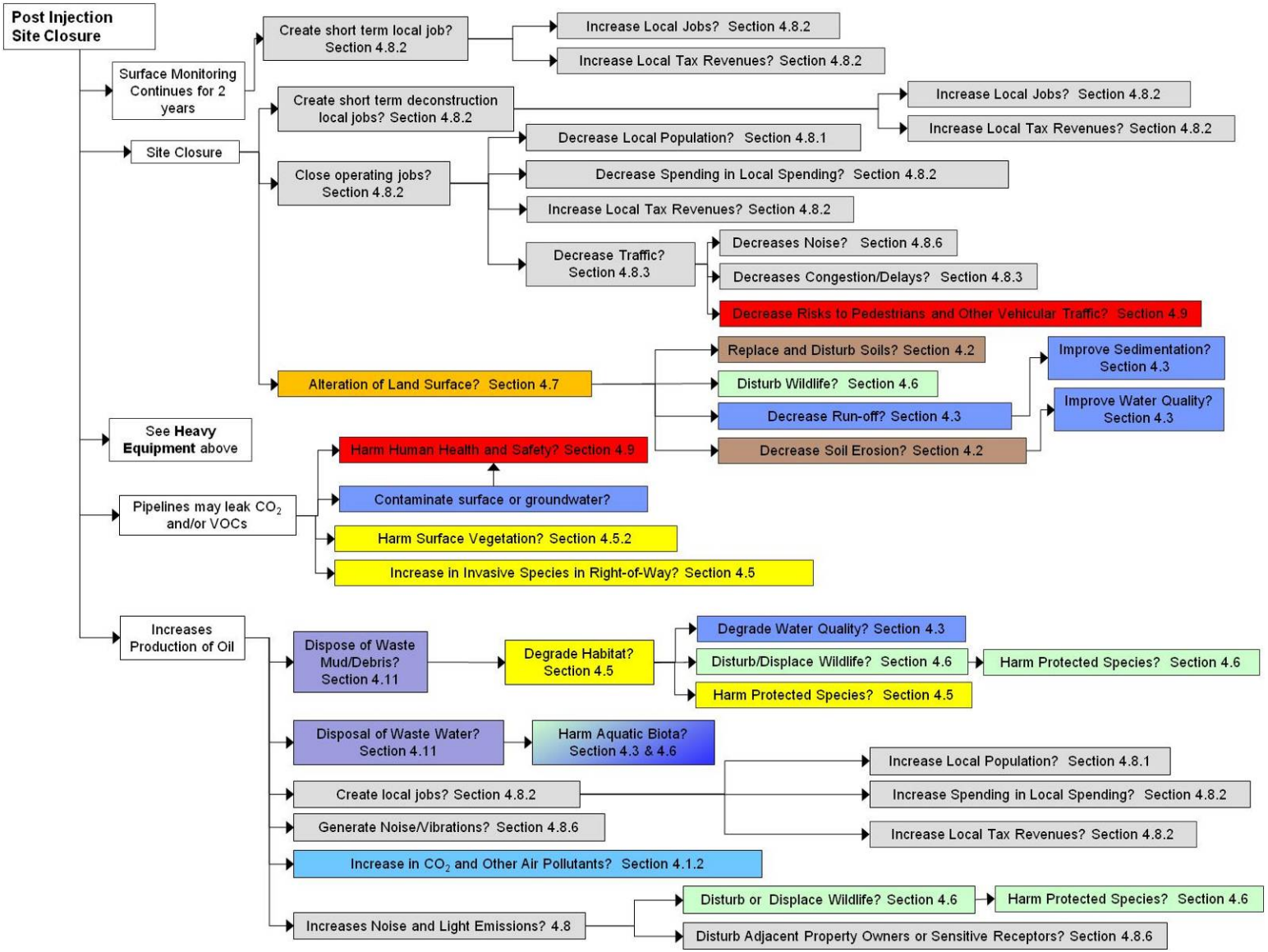


Figure 3.1-4. Cause-Effect-Questions Page 4

3.2 Analysis of Significance

The review team used a systematic process to evaluate the importance, or significance, of the predicted impacts. This process involved comparing the predictions to the significance criteria established by the team and illustrated below in Table 3.2. These significance criteria were based on legal and regulatory constraints and on team members' professional, technical judgment.

Table 3.2. Impact Significance Thresholds

Resource Area	Impact Significance Thresholds An impact would be significant if it EXCEEDS the following conditions
Air Quality	The project would not produce emissions that would impede the area's compliance with the Montana and Federal Clean Air Acts.
Geologic Formations	The BSCSP's proposed project would cause no measurable migration of CO_2 from the storage formation to the surface or into another area in the subsurface, and there is no more than an imperceptible risk of inducing seismic events due to increased reservoir pressure.
Soils	Any changes in soil stability, permeability, or productivity would be limited in extent. Full recovery would occur in a reasonable time*, considering the size of the project. Mitigation, if needed, would be simple to implement using methods proven effective in previous applications.
Surface Water	Any changes to surface water quality or hydrology would be confined to the immediate project area. Full recovery would occur in a reasonable time, considering the size of the project and the affected area's natural state.
Groundwater	Any changes to groundwater quality and quantity would be at the lowest detectable levels. Full recovery would occur in a reasonable time. Mitigation, proven effective in previous applications, would be implemented, if needed.
Wetlands and Floodplains	Any impacts to wetlands and/or floodplains would be confined to the immediate project area and would not cause any regional impacts. Planned mitigation measures would fully compensate for lost wetland values in a reasonable time.
Terrestrial Vegetation	Any changes to native vegetation would be limited to a small area and would not affect the viability of the resources. Full recovery would occur in a reasonable time, considering the size of the project and the affected resource's natural state. Mitigation, proven effective in previous applications, would be implemented if needed.
Wildlife	Any changes to wildlife would be limited to a small portion of the population and would not affect the viability of the resource. Full recovery would occur in a reasonable time, considering the size of the project and the affected species' natural state.
Threatened or Endangered Species	Any effect to a federally listed species or its critical habitat would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. This negligible effect would equate to a "no effect" or a "not likely to adversely affect" determination in U.S. Fish and Wildlife Service terms.

Table 3.2. Impact Significance Thresholds	
Resource Area	**Impact Significance Thresholds** **An impact would be significant if it EXCEEDS the following conditions**
Land Use	Any change in land use would be limited to a small area and would not noticeably alter any particular land use at the project site or in adjacent areas. The affected areas would fully recover in a reasonable time once the project is completed.
Population and Employment	Changes to the normal or routine functions of the affected community are short-term or do not alter existing social or economic conditions in a way that is disruptive or costly to the community.
Infrastructure	The project would not noticeably affect or disrupt the normal or routine functions of public institutions, roads, electricity, and other public utilities and services in the project area.
Parks and Recreation	Any disturbance would be minor, temporary in duration, and in character with existing uses of the study area.
Visual Resources	The action, along with planned mitigation, would not permanently change the visual landscape in a way that is objectionable to a number of local residents or frequent visitors. (or) The action, along with planned mitigation, would not change the visual resource classification of the affected area.
Noise	Noise levels in the project area would not exceed ambient noise level standards as determined by Federal, State, and/or local government.
Environmental Justice	Neither minority nor low-income groups within the affected community would experience proportionately greater adverse effects than other members of the community.
Human Health and Safety	The project, with current and planned mitigation measures, would pose no more than a minimal risk to the health and safety of onsite workers and the local population.
Cultural Resources	The action would not affect the context or integrity features (including visual features) of a site listed or eligible for listing on the National Register of Historic Places or of other cultural significance. Following consultations with the SHPO/Tribal Historic Preservation Officer (THPO) and consultations with any other potentially affected groups including Indian Tribes, local governments, and the National Park Service (NPS), the determination of effect under Section 106 of the NHPA would be *no adverse effect*.
Waste Management	The action is unlikely to cause air, water, or soil to be contaminated with material that poses a threat to human or ecological health and safety.

* Recovery in a reasonable time: Constant, sustainable improvement is apparent and measurable when the site is routinely observed, and full recovery is achieved over a period of no more than several years.

4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

4.1 Air Quality

4.1.1 Description

This is a description of regional climate, ambient air quality with respect to attainment of NAAQS, and identification of applicable air quality regulations.

4.1.1.1 National Ambient Air Quality Standards and Attainment Status

USEPA Region 8 and MDEQ regulate air quality in Montana. The CAA (42 USC 7401-7671q), as amended, gives USEPA the responsibility to establish the primary and secondary NAAQS (40 CFR Part 50) that set acceptable concentration levels for six criteria pollutants: fine particulate matter (PM_{10} and $PM_{2.5}$), SO_2, CO, oxides of nitrogen (NO_x), O_3, and lead. Short-term standards (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term standards (annual averages) have been established for pollutants contributing to chronic health effects. Each state has the authority to adopt standards stricter than those established under the Federal program, and Montana has promulgated state ambient air quality standards.

The BSCSP area is completely within the Great Falls Intrastate Air Quality Control Region (AQCR) 141 (40 CFR 81.168). Federal regulations designate AQCR 141 as an attainment area for all criteria pollutants (40 CFR 81.168) (USEPA, 2011a).

4.1.1.2 Local Ambient Air Quality

Worst-case ambient air quality conditions can be estimated from measurements conducted at air-quality monitoring stations. Monitoring values shown in Table 4.1.1.2 were measured in 2008 at a monitoring station within the city limits of Great Falls, the nearest ambient air monitoring station to the proposed project. Because data are unavailable that more accurately represent the sparsely populated area surrounding the project site, the levels presented in Table 4.1.1.2 can be considered the highest levels that could reasonably be expected at the project site. Ambient air concentration data for the other criteria pollutants are not available for this region (USEPA, 2011b).

Table 4.1.1.2. NAAQS and Monitored Air Quality Concentrations

Pollutant and Averaging Time	Primary NAAQS[1]	Secondary NAAQS[1]	Primary MAAQS	Monitored Data[2]	Location of Station
CO					
1-Hour Maximum (ppm)	35	-	23	1.6	Great Falls
8-Hour Maximum (ppm)	9	-	9	0.9	

1 - Source: 40 CFR 50.1-50.12.
2 - Source: (USEPA, 2011b)

4.1.1.3 Climate and Greenhouse Gases

The BSCSP project area is in northern Toole County, Montana, in an area with little development. Surface elevations in the area are approximately 3,500 feet above mean sea level with generally flat topography. The Continental Divide and mountain ranges of Glacier National Park lie more than 80 miles west of the project site. Shelby, Montana, the largest city in Toole County, is approximately 20 miles from the project area (BSCSP and NETL, 2012). The BSCSP proposed site lies 8 miles east of Sunburst and approximately 12 miles to the northeast of Kevin. Kevin has mild summers and very cold winters. Kevin's average high and low temperature in the coldest month of January is 29.5°F (-1.4°Celsius (°C)) and 9.5°F (-12.5°C) respectively, and an average high and low temperature in the warmest month July of 80.7°F (27.1°C) and 51.3°F (10.7°C), respectively. Kevin also has an average annual snowfall of 16.0 inches (40.6 centimeters (cm)) per year and average annual precipitation of 13.1 inches (33.2 cm) per year. The wettest month of the year is June with an average rainfall of 2.5 inches (6.4 cm) (Idcide, 2011).

Greenhouse gases (GHGs) are gases in the atmosphere that absorb and emit infrared radiation, and therefore, contribute to the greenhouse effect and global warming. Most GHGs occur naturally in the atmosphere, but increases in their concentration have resulted from human activities such as the burning of fossil fuels. Global temperatures are expected to continue to rise as human activities continue to add CO_2, methane, NO_x, and other greenhouse (or heat-trapping) gases to the atmosphere. Most of the U.S. is expected to experience an increase in average temperature. Precipitation changes, which are also very important to consider when assessing climate change effects, are more difficult to predict. Whether or not rainfall will increase or decrease remains difficult to project for specific regions (USEPA, 2011c; IPCC, 2007a).

The extent of climate change effects, and whether these effects prove harmful or beneficial, will vary by region, over time, and with the ability of different societal and environmental systems to adapt to or cope with the change. Human health, agriculture, natural ecosystems, coastal areas, and heating and cooling requirements are examples of climate-sensitive systems. Rising average temperatures are already affecting the environment. Some observed changes include shrinking of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of growing seasons, shifts in plant and animal ranges, and earlier flowering of trees (USEPA, 2011c; IPCC, 2007a). Section 4.1.4 outlines additional information on long-term effects of climate change.

4.1.2 Effects of BSCSP's Proposed Project

Short- and long-term, minor adverse impacts to air quality would be likely with the implementation of BSCSP's proposed project. Short-term emissions would be limited to fugitive dust and diesel emissions from drilling and construction equipment during well and pipeline development. Long-term effects would come from the operation of the compressor, line heater, and dehydration plant. Direct and indirect air emissions would not exceed applicability thresholds, or contribute to a violation of any Federal, state, or local air regulation. Therefore, emissions from BSCSP's proposed project would not impede the area's ability to maintain the NAAQS.

4.1.2.1 Estimated Emissions and General Conformity

The general conformity rules require Federal agencies to determine whether their action(s) would increase emissions of criteria pollutants above preset threshold levels (40 CFR 93.153(b)). These *de minimis* (of minimal importance) rates vary depending on the severity of the non-attainment and geographic location. Because AQCR 141 is in attainment, the general conformity regulations do not apply. Although the area is in attainment, the BSCSP's proposed project emissions of criteria pollutants and the applicability thresholds under the general conformity rules were carried forward for more detailed analysis to determine the level of impact under NEPA. All direct and indirect emissions of criteria pollutants were estimated and compared to applicability threshold levels of 100 tons (91,000 kilograms (kg)) per year (tpy) to determine whether implementation of BSCSP's proposed project would cause significant impacts. These estimates account for the total direct and indirect emissions associated with the following activities:

- Site preparation and drilling of injection and monitoring wells and well pads,
- Site preparation and construction of the six to ten miles of transport pipeline,
- Site preparation and construction of a 40 by 60 foot building with five miles of access road, and
- Operation of the compressor, line heater, and dehydration plant.

Emissions would primarily be due to the use of heavy construction equipment, diesel drilling rigs, mud pumps, diesel generators, deliveries to the site, and fugitive dust. Drill rig operations during well construction are estimated to occur 24-hours per day and seven days per week for approximately six months. Activities along the proposed pipeline or at the well sites that would generate emissions of criteria pollutants include operation of the compressor, line heater, and dehydration plant.

The total direct and indirect emissions associated with BSCSP's proposed project would not exceed applicability threshold levels (Table 4.1.2.1). Because AQCR 141 is an attainment area, there is no existing emission budget. However, due to the limited size and scope of BSCSP's proposed project, it is not likely that the estimated emissions would make up ten percent or more of regional emissions for any criteria pollutant. A detailed breakdown of drilling and construction as well as operational emissions is included in Appendix A.

Table 4.1.2.1. BSCSP's Proposed Project Emissions Compared to Applicability Thresholds

	Annual emissions (tpy)						*De minimis* threshold (tpy)	Would emissions exceed applicability thresholds? [Yes/No]
Activity	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**		
Site preparation, Drilling, and Construction	6.2	13.0	1.6	<0.1	0.6	0.6	100	No
Operational Emissions	9.2	50.5	3.1	<0.1	1.0	1.0		

Notes: VOC is volatile organic compounds, and SO_x is sulfur oxides.

Decommissioning. Air emissions from decommissioning activities would be similar in nature to construction emissions. However, these activities and associated emissions would be less intense and shorter in duration. These effects would also be less than the significance threshold.

4.1.2.2 Regulatory Review

New stationary sources of emissions may be subject to both Federal and state air quality rules. These include, but are not limited to, New Source Review, Prevention of Significant Deterioration, and New Source Performance Standards for selected categories of industrial sources. The rules for MDEQ's Air Quality Program are found in the ARM; Title 17, Chapter 8, Subchapter 3; they include emission standards and control requirements on both a pollutant-specific basis and industry-specific basis. ARM Title 17, Chapter 8, Subchapter 7 sets forth potentially applicable permitting requirements for the project's stationary emission sources. In the final design stage, the compressor, line heater, and dehydration plant would need to be reviewed to determine if they require a minor source permit under state permitting regulations.

Some permitting thresholds include: 1) the state stationary source emissions threshold of 25 tpy of any pollutant for requiring a minor source air quality permit to construct, and 2) EPA's guideline threshold of 40 tpy of NO_x for requiring a modeling demonstration compliance with the 1-hour NO_2 standard. The compressor and gas processing station would likely require a Montana Air Quality Permit to construct and modeling to demonstrate compliance with the 1-hour NO_2 standard based on estimated potential emissions. In addition, the project would have to demonstrate compliance with all applicable air quality regulations and continued protection of the NAAQS as a condition of receiving a permit. Among the requirements they would have to satisfy is a requirement to identify and use Best Available Control Technology (BSCSP and NETL, 2012).

4.1.2.3 Project Level Greenhouse Gas Emissions

Direct and Indirect CO_2 Emissions. The CEQ recently released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA analyses. The draft guidance includes a presumptive effects threshold of 27,563 tons (25,000 metric tons) of CO_2 equivalent emissions from an activity on an annual basis (CEQ, 2010). The total amount of CO_2 generated as a result of BSCSP's proposed project would be approximately 3,041 short tons (2,764 metric tons) due to the burning of diesel fuel during drilling and worker commutes. This is equivalent to 541 passenger vehicles or 344 household's annual electricity usage (USEPA, 2011d). Therefore, the GHG emissions associated with BSCSP's proposed project fall well below the CEQ threshold (Table 4.1.2.3).

Table 4.1.2.3. Total CO_2 Emissions for BSCSP's Proposed Project

Activity/Source	Emissions (Short Tons)
Drilling and Pipeline Construction	154
Worker Commutes	362
Operational Emissions	3,041
Total Emissions	**3,557**

Note: the operational emissions are for the life of the project.

Fugitive CO_2 Emissions. Because transport and compression of CO_2 is an integral part of BSCSP's proposed project, fugitive air emissions of CO_2 could occur during routine operations. Sources of emissions during storage operations could include injection and monitoring wells; and aboveground valves, piping, and wellheads that comprise parts of the transmission pipeline. Fugitive CO_2 emissions would be minute, and the effects would be negligible.

4.1.3 Effects of No-Action

Selecting the no-action alternative could have minor indirect impacts to air quality, which is less than the significance threshold. No-action, meaning that BSCSP's proposed project is not carried out in any setting, would delay planned larger-scale storage projects by perhaps several years, because the increased understanding of subsurface behavior of CO_2 would not be gained.

4.1.4 Cumulative Effects

BSCSP's proposed project would have both short- and long-term, minor adverse cumulative effects on air quality.

The state has various ways of accounting for and controlling cumulative impacts resulting from emissions in the past, the present, and the future. They directly monitor recent and current concentrations of pollutants to ensure continued NAAQS compliance. They also have developed emissions source requirements to reduce emissions in nonattainment areas and to minimize emissions increases in attainment areas. State Implementation Plans (SIPs) are the regulations and other guidance materials for meeting clean air standards and associated CAA requirements. SIPs include:

- State regulations that USEPA has approved;
- State-issued, USEPA-approved orders requiring pollution control at individual companies; and
- Planning documents, such as area-specific compilations of emissions estimates and computer simulations (modeling analyses), demonstrating that regulatory limits assure the air will meet air quality standards.

The SIP process applies either specifically or indirectly to all sources of air emissions associated with the projects outlined in Section 1.4 and all activities in the region.

No large-scale projects or proposals have been identified in Section 1.4 that, when combined with the BSCSP's proposed project, would threaten the attainment status of the region, would have substantial GHG emissions, or would lead to a violation of any Federal, state, or local air regulation. Air pollutants from construction equipment would be temporary and limited to the immediate vicinity of the construction areas. Estimated emissions generated by BSCSP's proposed project would be below 100 tpy, and would not threaten the region's attainment status. The compressor and gas processing station would likely require a Montana Air Quality Permit to construct based on estimated potential emissions (i.e., 50 tpy NO_x versus a permitting threshold of 25 tpy). These effects would be minor. Long-term beneficial effects from CO_2 storage have the potential to provide increased benefits with respect to climate change and global warming.

Greenhouse Gases and Global Climate Change.
According to the IPCC (2007a), a worldwide environmental issue is the likelihood of changes in the global climate as a consequence of global warming produced by increasing atmospheric concentrations of GHGs (IPCC, 2007a). The atmosphere allows a large percentage of incoming solar radiation to pass through to the earth's surface, where it is converted to heat energy (infrared radiation) that is more readily absorbed by GHGs such as CO_2 and water vapor than incoming solar radiation. The heat energy absorbed near the earth's surface increases the temperature of the air, soil, and water (NETL, 2011c).

Greenhouse gases include water vapor, CO_2, methane, nitrous oxide (N_2O), O_3, and several chlorofluorocarbons. The gasses constitute a small percentage of the earth's atmosphere. Water vapor, a natural component of the atmosphere, is the most abundant GHG. The second-most abundant GHG is CO_2, which remains in the atmosphere for long periods of time. Human activities have caused atmospheric CO_2 concentrations to increase approximately 35 percent over preindustrial levels. The burning of fossil fuels is the primary contributor to increasing concentrations of CO_2 (IPCC, 2007a; NETL, 2011c).

According to the IPCC Fourth Assessment Report, "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level" (IPCC, 2007b). The IPCC report finds that the global average surface temperature has increased by approximately 0.74°C in the last 100 years; global average sea level has risen approximately 150 millimeters over the same period; and cold days, cold nights, and frosts over most land areas have become less frequent during the past 50 years. The report concludes that most of the temperature increase since the middle of the twentieth century "is *very likely* due to the observed increase in anthropogenic [GHG] concentrations" (IPCC, 2007b; NETL, 2011c).

The IPCC 2007 report estimates that, at present, CO_2 accounts for approximately 77 percent of the climate change potential attributable to anthropogenic releases of GHGs, with the vast majority (74 percent) of this CO_2 coming from the combustion of fossil fuels (IPCC, 2007b; NETL, 2011c).

The IPCC and the U.S. Climate Change Science Program (CCSP) examined the potential environmental impacts of climate change at global, national, and regional scales. IPCC's report states that, in addition to increases in global surface temperatures, the impacts of climate change on the global environment may include:

- More frequent heat waves, droughts, and fires;
- Rising sea levels and coastal flooding;
- Melting glaciers, ice caps, and polar ice sheets;
- More severe hurricane activity and increases in frequency and intensity of severe precipitation;
- Spread of infectious diseases to new regions;
- Loss of wildlife habitats; and
- Heart and respiratory ailments from higher concentrations of ground-level ozone (IPCC, 2007b; NETL, 2011c).

On a national scale, average surface temperatures in the United States have increased, with the last decade being the warmest in more than a century of direct observations (CCSP, 2008). Impacts on the environment attributed to climate change that have been observed in North America include:

- Extended periods of high fire risk and large increases in burned area;
- Increased intensity, duration, and frequency of heat waves;
- Decreased snow pack, increased winter and early spring flooding potentials, and reduced summer stream flows in the western mountains; and
- Increased stress on biological communities and habitat in coastal areas (IPCC, 2007b; NETL, 2011c).

Annual average temperature over the Northwest region, which includes western Montana, as a whole rose about 1.5°F over the past century, with some areas experiencing increases up to 4°F. The region's average temperature is projected to rise another 3 to 10°F in this century, with higher emissions scenarios resulting in warming in the upper end of this range. Increases in winter precipitation and decreases in summer precipitation are projected by many climate models, though these projections are less certain than are those for temperature. Impacts related to changes in snowpack, streamflows, sea level, forests, and other important aspects of life in the Northwest are already underway, with more severe impacts expected over the coming decades in response to continued and more rapid warming (USNA, 2009).

Because climate change is a cumulative phenomenon produced by releases of GHGs from industry, agriculture, and land use changes around the world, it is generally accepted that any successful strategy to address it must rest on a global approach to controlling these emissions. In other words, imposing controls on one industry or in one country is unlikely to be an effective strategy. Because GHGs remain in the atmosphere for a long time and industrial societies will continue to use fossil fuels for at least 25 to 50 years, climate change cannot be avoided. As the IPCC report states, "[s]ocieties can respond to climate change by adapting to its impacts and by reducing [GHG] emissions (mitigation), thereby reducing the rate and magnitude of change" (IPCC, 2007b; NETL, 2011c).

According to the IPCC, there is a wide array of adaptation options. While adaptation will be an important aspect of reducing societies' vulnerability to the impacts of climate change over the next two to three decades, "adaptation alone is not expected to cope with all the projected effects of climate change, especially not over the long term as most impacts increase in magnitude" (IPCC, 2007b). Therefore, it will also be necessary to mitigate climate change by stabilizing the concentrations of GHGs in the atmosphere. Because these gases remain in the atmosphere for long periods of time, stabilizing their atmospheric concentrations will require societies to reduce their annual emissions. The stabilization concentration of a particular GHG is determined by the date that annual emissions of the gas start to decrease, the rate of decrease, and the persistence of the gas in the atmosphere. The IPCC report predicts the magnitude of climate change impacts for a range of scenarios based on different stabilization levels of GHGs. "Responding to climate change involves an iterative risk management process that includes both mitigation and adaptation, taking into account actual and avoided climate change damages, co-benefits, sustainability, equity, and attitudes to risk" (IPCC, 2007b; NETL, 2011c).

The main purpose of BSCSP's proposed project is to test the application of large volume utilization and storage of CO_2 in the Kevin Dome, a regionally significant geologic formation. The principal goal of DOE's Regional Carbon Sequestration Partnerships is to gain a scientific understanding of carbon utilization and storage options and to provide cost-effective, environmentally-sound technology options that ultimately may lead to a reduction in greenhouse gas intensity and stabilization of atmospheric concentrations of CO_2 (DOE, 2007a). Overall, there would be a beneficial reduction in greenhouse gas emissions, as the proposed project would help the viability of carbon storage as a means of controlling and mitigating climate impacts from the burning of fossil fuels.

4.2 Geology and Soils

4.2.1 Description

4.2.1.1 Geology

The project area lies within a regional geographic feature known as the Sweetgrass Arch. The Sweetgrass Arch is a large structural complex in northwestern Montana and in Canada (Figure 4.2.1.1-1). The arch is a compound antiform made up of the South Dome and the Kevin-Sunburst Dome. The Sweetgrass Arch abuts the steeply dipping and thrusted Rocky Mountain geosyncline to the west. Toward the east, the slope falls across Saskatchewan unevenly but more gently around smaller domes, terraces, and troughs toward the Williston Basin. However, the eastern slope in Montana is relieved by domes towering up to four times the height of the Sweetgrass Arch. These are Late Cretaceous and Tertiary laccoliths represented by the Bearpaw, Little Rocky, and Highwood Mountains, the Cypress Hills, and Bowdoin Dome. This region lies north of the central Montana uplift forming the Little Belt and Big Snowy Mountains (AGS, 2008; BSCSP and NETL, 2012).

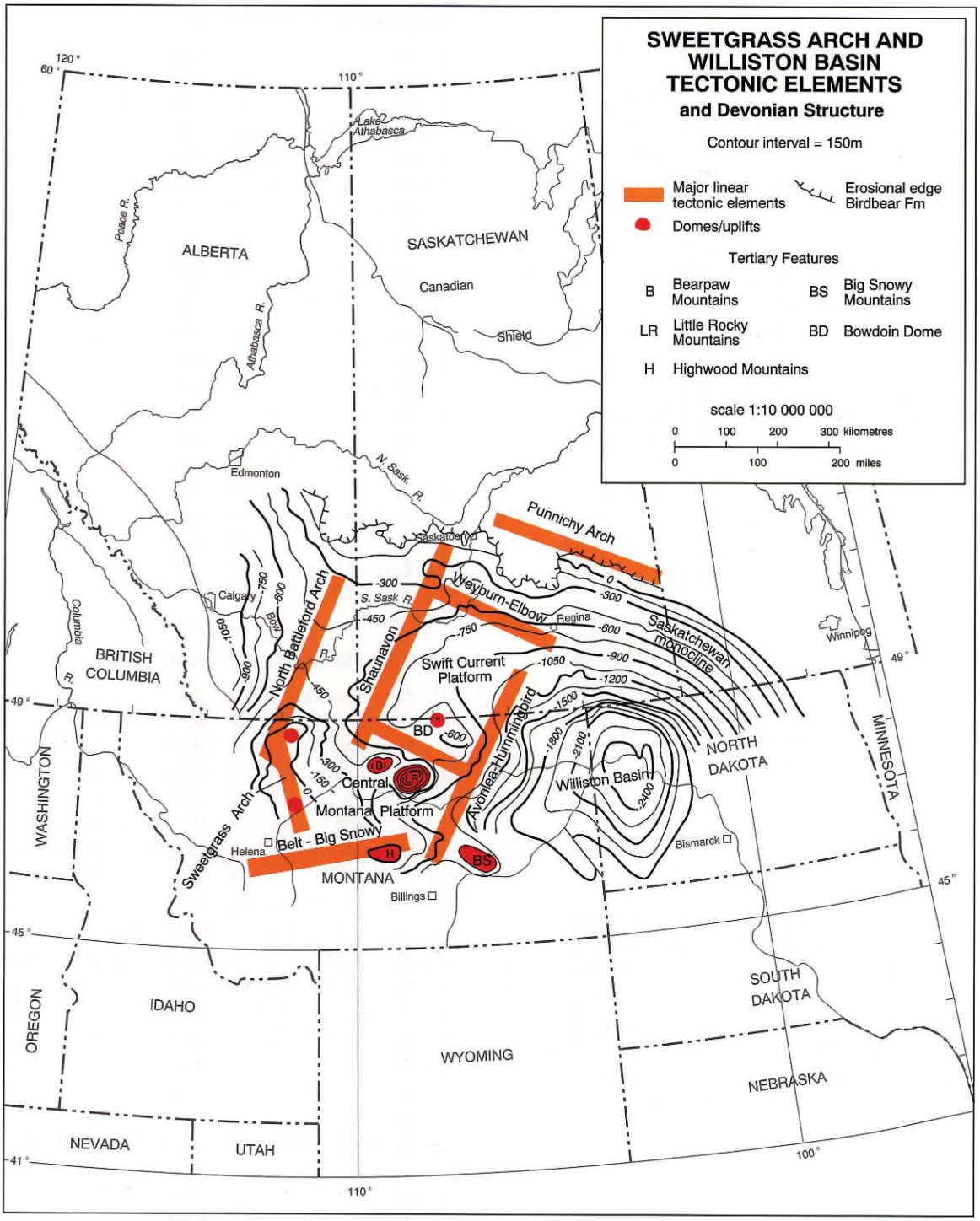


Figure 4.2.1.1-1. Sweetgrass Arch
Source: (Kent & Christopher, 1994)

The eastern portion of the Sweetgrass Arch is defined by the Swift Current Platform of southwestern Saskatchewan and the adjacent Central Montana Platform, both of which are extensions of the Arch and Williston Basin. A third element of the region is the easterly trending Belt-Big Snowy Trough, terminating the arch to the south as a deep structure entering the Williston Basin from the Rocky Mountain geosyncline (AGS, 2008).

Kevin Dome, also known as Kevin-Sunburst Dome, forms a large structural culmination on the Sweetgrass Arch (Figure 4.2.1.1-2). The Arch lies east of the Sevier fold-and-thrust belt and is not noticeable, except for very small differences in erosion of surface formations. Despite its broad, gently dipping nature, Sweetgrass Arch has a well-defined crest, which is the Kevin Dome, and it is slightly asymmetric. The Sweetgrass Arch is three distinct offset arches, from north-to-south: (1) Bow Island Arch, (2) Kevin-Sunburst Dome, and (3) South Arch (Lorenz, 1982; Bowen and Talbott, No date). Under this part of Montana, there are several magnetic anomalies in the Precambrian basement. The Pendroy fault, Joplin structure, Rock Creek-Bynum trend, and Scapegoat-Bannatyne trend are an array of ductile shear zones and basement terrane boundaries collectively known as the Trans-Montana Orogen (Mudge, 1982; Sims et al., 2004; Bowen and Talbott, No date).

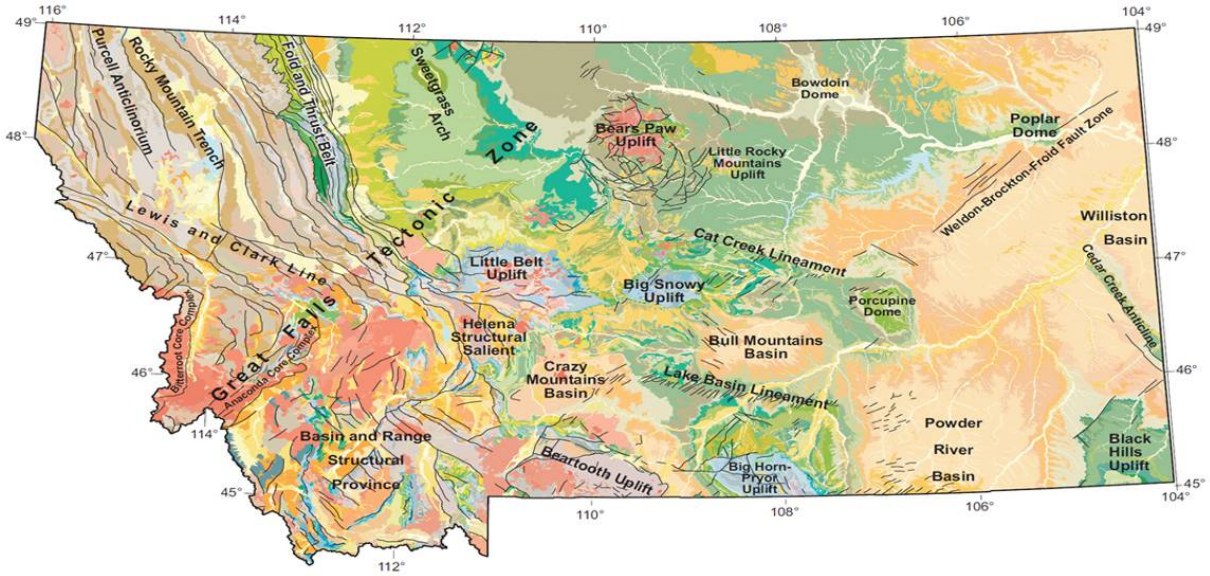


Figure 4.2.1.1-2. Tectonic Map Showing the Sweetgrass Arch in Montana
Sources: (Bowen and Talbott, No date; Vuke et al., 2007)

Kevin Dome

Kevin Dome encompasses greater than 750 square miles (1,942 km^2) in Toole County, Montana. Oil and gas were first discovered on Kevin Dome in 1922, and the dome has a history of exploration and production. Drilling for oil and natural gas reservoirs has created a database of subsurface information useful to understanding the geology of units important for trapping CO_2 on the dome. A significant volume of rock at depths approximately 3,000 to 4,500 ft (900 to 1,400 m) in the Devonian Duperow Formation is likely to contain producible quantities of naturally-occurring CO_2 (Figure 4.2.1.1-3)(Bowen and Talbott, No date). However, less than 5%

of all dome wells have drilled below the Madison Formation to the Duperow Formation, and no detailed characterization of the Duperow Formation reservoir and associated caprock exists (Bowen and Talbott, No date).

Geology of Similar Domes

Several similar domes in terms of scale, structural style, and stratigraphic architecture exist in the state of Montana (Figure 4.2.1.1-2). These domes are potential saline aquifer storage sites because the structural trapping in domes provides additional assurance of storage security (Bowen and Talbott, No date). These domes include Bowdoin Dome, Porcupine Dome, Poplar Dome, Big Coulee - Hailstone Dome, Ingomar Dome, and Big Wall Dome.

Regional Glaciation

During the last ice age, two ice sheets reached over the Canadian border into the United States. The Laurentide ice sheet extended into central Montana and the project site area. The Laurentide ice sheet was far-reaching, extending also into areas of the Eastern United States as far east as Boston and New York City. The remaining effects of glacial advances are polished and striated outcroppings, rounded hills, moraines, valley fills of glacial till and outwash. A sedimentary deposit derived from glacial erosion known as till was deposited throughout the northern United States as the ice sheets receded (BSCSP and NETL, 2012; Rittenour, No date).

Seismicity and Tectonics

Seismic activity can occur in the western reaches of Montana. This location is adjacent to the Intermountain Seismic Belt. The cause of the seismic activity in the Belt can be traced to the tectonic actions occurring along the western coast of the U.S. although it is not along a plate boundary. The frequency of strong earthquakes in northern Montana is low when compared to southwestern portions of the state (MT, 2004).

Karst Topography

Karst topography is a landscape dominated by carbonate bedrock, including limestone, dolomite, and marble. These formations are susceptible to dissolution by water, which can make an area prone to land subsidence. Throughout the United States, subsidence occurs in at least 45 states and affects approximately 17,000 square miles of land. NPS land requires special protections for karst terrain. Often the existence of karst topography is related to the presence of aquifers. Karst landscapes can occur from coast to coast, but karst landscapes are not expected near the project area (USGS, 2000).

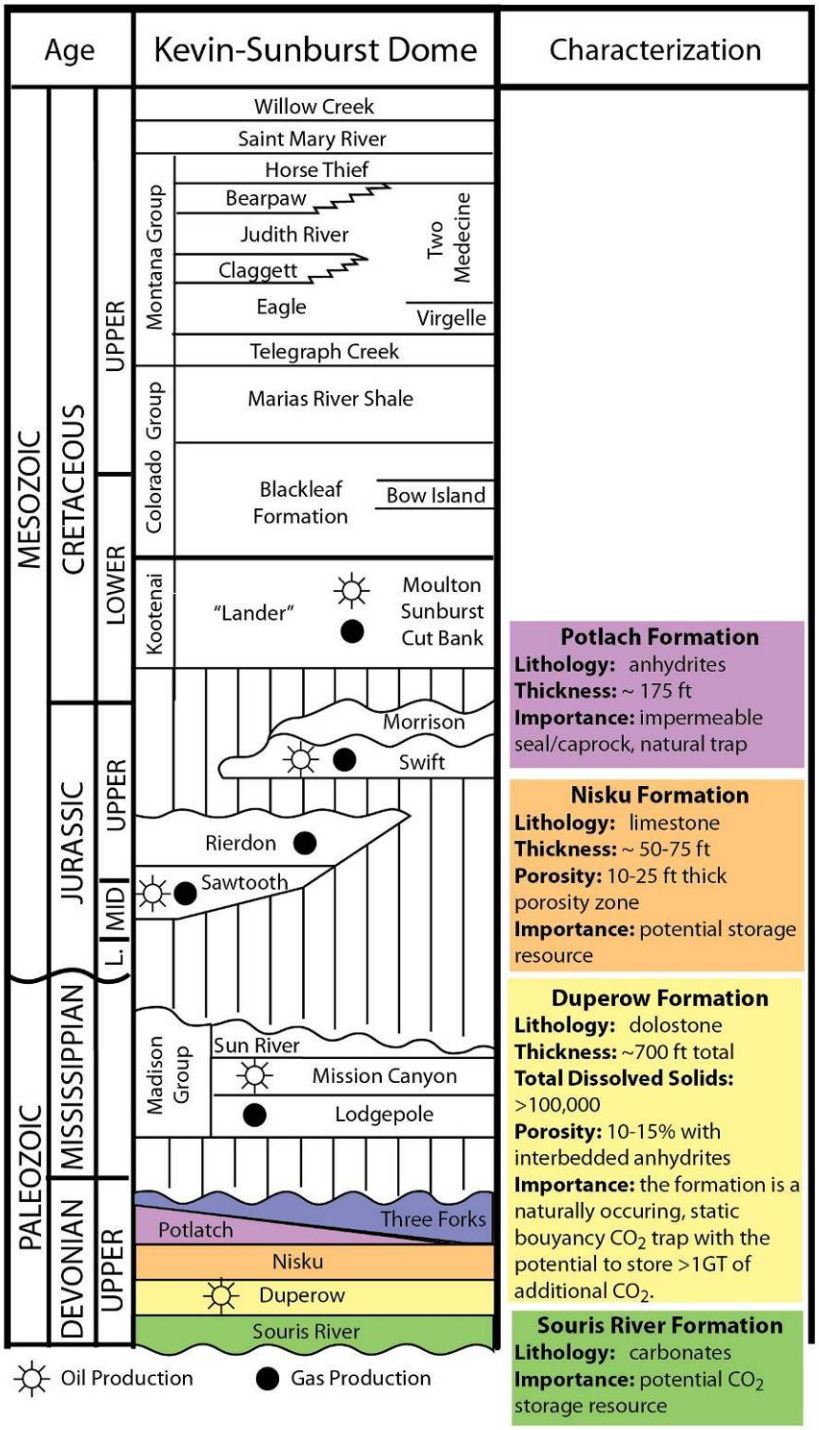


Figure 4.2.1.1-3. Stratigraphy of Kevin-Sunburst Dome
Source: (Spangler, 2011b)

Induced Seismicity

A report issued by the National Research Council (NRC) of the National Academy of Sciences includes findings that, although there is no documented experience with large scale carbon storage projects (greater than 1 million metric tons per year injected), there is a potential for induced seismicity at this scale if the storage reservoirs behave in a manner similar to what is observed in oil and gas fields (NRC, 2012).

The report also notes that of more than 150 observations of known or suspected induced seismicity listed, none of them was attributed to carbon capture and storage projects, including those that the NETL has been funding. The report further states that there is much that is not known about the potential for induced seismicity from carbon storage projects on issues such as how the interaction of CO_2 with host/adjacent rock influences seismic events, the potential magnitude of earthquakes, and the complexities of hydro-chemical-mechanical effects on CO_2 injection and storage. The report recommends more research, including initiatives similar to the regional NETL projects (NRC, 2012).

Similar concerns and recommendations have been expressed in recent Congressional testimony by recognized experts in induced seismicity. The testimony notes that the potential for induced seismicity exists; with large events possible where large faults exist, making it necessary to identify and avoid these large fault areas with appropriate project planning and relevant seismic data. Zoback adds that even small to medium earthquake events can possibly damage caprock seals with potential releases of CO_2 beyond the sealing formation (Hitzman et al., 2012).

One of the regional NETL carbon storage projects specifically referenced in the NRC report is the Midwest Geological Sequestration Consortium (MGSC) project in Decatur, Illinois, which has been injecting CO_2 since 2011. On its project website, MGSC's Illinois Basin – Decatur Project (IBDP) Team offers additional comments and professional evaluations of the NRC report. The IBDP Team:

- agrees that more research is needed on the potential for induced seismicity of large-scale projects;
- notes that the report recommends consideration of seismicity before and during operation of a project;
- notes that the report recommends new information is needed to better predict induced seismicity, with which IBDP is assisting;
- notes that the report points out that good permeability and a thick storage reservoir, such as that present for the IDBP, minimize the potential for induced seismicity; and
- notes that the report recommends detailed data collection, instrumentation, and modeling, such as that being done at IBDP (MGSC, 2012).

4.2.1.2 Soils

Soils found in the injection, pipeline, and production areas of the project site are illustrated in Figure 4.2.1.2. Soil characteristics are summarized in Table 4.2.1.2.

Table 4.2.1.2. Summary of Project Soil Types by Percent of Area		
Project Area	**Soil Type**	**Percent in Project Area**
Injection	Yamacall loam, calcareous, 8-15% slopes	27.7
	Joplin-Hillon clay loams, 2-8% slopes	15.8
	Delpoint-Cabbart clay loams, 25-60% slopes	13.9
Pipeline	Joplin clay loam, 0-4% slopes	23.5
	Joplin complex, 0-4% slopes	16.0
	Evanston complex, 0-4% slopes	11.5
Production	Joplin clay loam, 0-4% slopes	27.2
	Joplin complex, 0-4% slopes	25.3
	Telstad-Joplin clay loams, 0-4% slopes	13.9

Sources: (ESRI, 2010; NRCS, 2010)

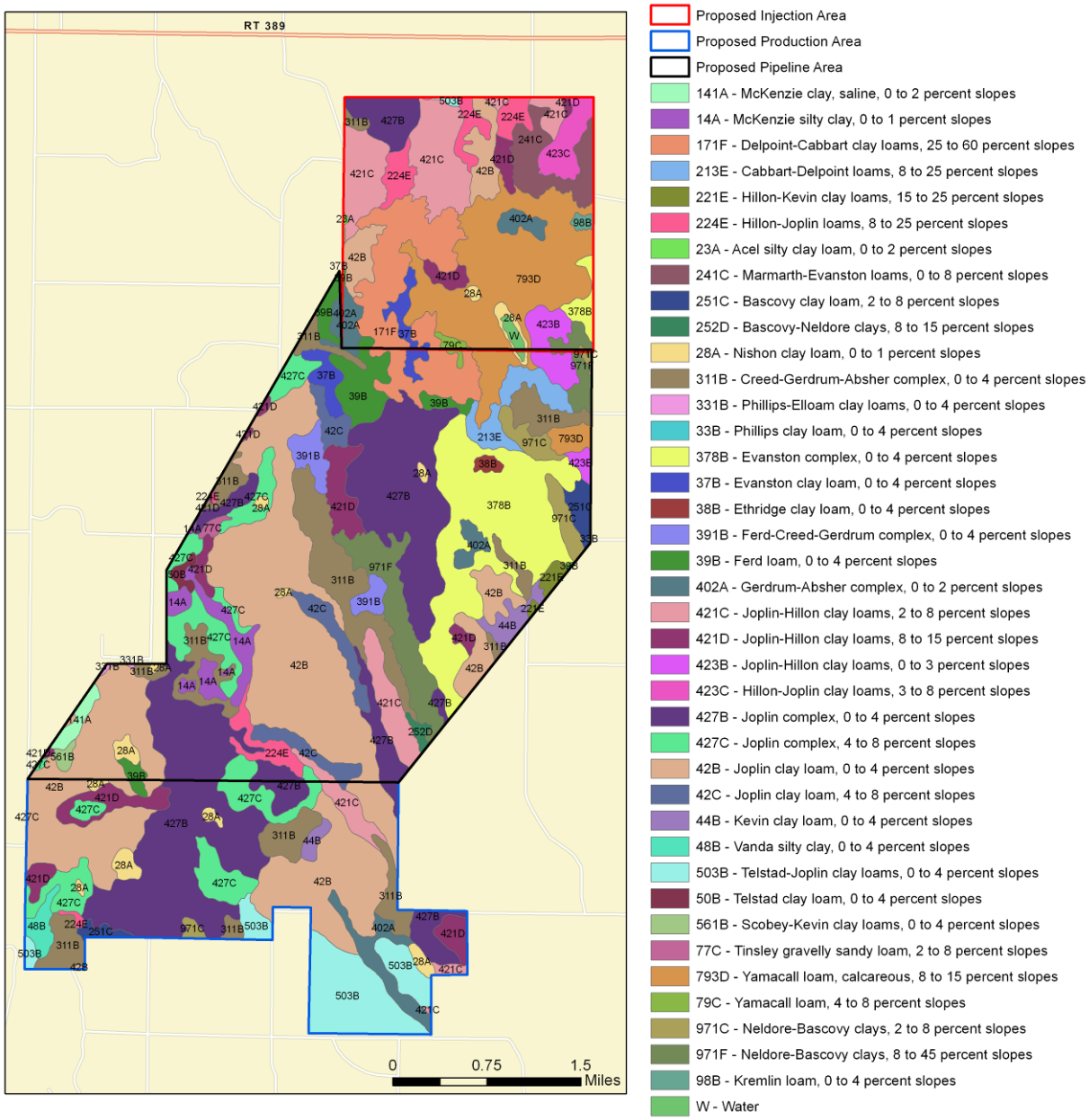


Figure 4.2.1.2. Project Soil Types
Sources: (ESRI, 2010; NRCS, 2010)

Hillon Series

In the injection area of the project site, soils types include variations of the Hillon soil series. The Hillon series, found in the glaciated plains of northern Montana, consists of very deep, well-drained soils that formed in calcareous loam till (NCSS, 1998a).

This series is found in till plains, escarpments, and hills at elevations of 1,900 to 4,000 feet (579 to 1219 m) and slopes of 0 to 70 percent. The soil derives from calcareous loam till, and the frost-free period associated with this soil type is 100 to 135 days. This soil series is well-drained

with slow permeability. These soils are used mainly for rangeland and for cropland (NCSS, 1998a).

Joplin Series

In all three areas of the project site (injection, pipeline, and production), the predominant soils include variations of the Joplin soil series. The Joplin series, found in the glaciated plains of northern Montana, consists of very deep, well-drained soils that formed from glacial till deposition (NCSS, 1998b). Glacial till soils consist of unsorted heterogeneous sediments.

The Joplin series is found in plains and hills at elevations of 2,400 to 3,800 feet (732 to 1158 m) and slopes of 0 to 25 percent. The frost-free period associated with this soil type is 100 to 130 days (NCSS, 1998b).

This soil series has moderate permeability in the upper to middle horizons and slow moisture movement in the underlying till. These soils are used mainly for dryland farming for small grain and for range (NCSS, 1998b).

In addition to the Joplin soils, the injection area of the project site contains large areas of Delpoint-Cabbart soils and Yamacall soils.

Delpoint-Cabbart Series

This series consists of undulating to gently rolling Delpoint and Cabbart soils on uplands, generally found on elevations of 2,300 to 3,800 feet (701 to 1,158 m) (SCS, 1986).

Delpoint. The Delpoint soil is moderately deep and well-drained. It formed on the lower part of slopes in material that weathered from soft siltstone. The surface layer is typically dark brown loam four inches thick. The upper part of the subsoil is grayish brown loam 4 inches (10.2 cm) thick. The lower part is light yellowish brown loam 8 inches (20.4 cm) thick. The substratum is light brownish gray clay loam, 16 inches (40.8 cm) thick. Below that, to a depth of 60 inches (152.4 cm), is soft siltstone that rubs to loam, silt loam, or clay loam (SCS, 1986).

Permeability is moderate, and available water capacity is moderate. The average annual wetting depth of the soil under native vegetation is 32 inches (81.3 cm). Runoff is medium. Wind and water erosion are moderate hazards. The depth to soft siltstone ranges from 20 to 40 inches (50.8 to 101.6 cm) (SCS, 1986).

Cabbart. The Cabbart soil is shallow and well-drained. It formed in material that weathered from soft siltstone. Typically, the surface layer is grayish brown loam 4 inches (10.2 cm) thick. The substratum is grayish brown loam 8 inches (20.3 cm) thick. Below that, to a depth of 60 inches (152.4 cm), there is soft siltstone that rubs to loam, silt loam, or clay loam (SCS, 1986).

Permeability is moderate, and available water capacity is very low. The average annual wetting depth of the soil under native vegetation is 12 inches (30.5 cm). Runoff is medium. Wind and

water erosion are moderate hazards. The depth to soft siltstone ranges from 10 to 20 inches (25.4 to 50.8 cm) (SCS, 1986).

The soils in this series are used mainly as rangeland. In some areas, they are used for dryland crops, mainly wheat, barley, and oats. Wind and water erosion are the main limitations to the use of these soils for cultivated crops. Strip cropping, tall grass barriers, field windbreaks, minimum tillage, tillage that utilizes crop residue, contour strip cropping, and grassed waterways help control wind erosion (SCS, 1986).

The soft sedimentary beds at a depth of 10 to 20 inches (25.4 to 50.8 cm) in the Cabbart soil and 20 to 40 inches (50.8 to 101.6 cm) in the Delpoint soil are limitations for most urban uses. Basements, foundations, and septic tank absorption fields on these soils require special design (SCS, 1986).

Yamacall Series

The Yamacall series, found in the eastern part of Montana and possibly in adjacent states, consists of very deep, well-drained soils that formed in alluvium or colluvium derived from sedimentary rock. These soils are on alluvial fans, fan remnants, stream terraces, escarpments, drainage ways, sedimentary plains, ridges, and hills at elevations of 1,900 to 6,500 feet (579 to 1,981 m) and slopes of 0 to 45 percent. The frost-free period associated with this soil type is 80 to 135 days. This soil series has moderate permeability. These soils are used mainly for non-irrigated and irrigated crops and for range (NCSS, 2011).

Evanston Series

The Evanston series, found in the intermountain areas of western Wyoming, Montana, and Colorado, consists of very deep, well-drained soils that formed in alluvium weathered from quartzite, sandstone, and shale or other sedimentary rocks. Evanston soils are on alluvial fans, terraces, hills, hill slopes, nearly level to steep ridges, and relict surfaces of sedimentary plains and uplands at elevations of 2,300 to 8,200 feet (700 to 3,500 m) and slopes of 0 to 65 percent. The frost-free period associated with this soil type is 60 to 130 days. This soil series is slow to rapid runoff and has moderate or moderately slow permeability. These soils are used mainly for irrigated cropland, dry cropland, rangeland, and wildlife habitat (NCSS, 2000).

Telstad Series

The Telstad series, found in the glaciated plains of northern Montana, consists of very deep, well-drained soils that formed in till. This series is found in till plains and hills at elevations of 2,000 to 4,000 feet (610 to 1,220 m) and slopes of 0 to 15 percent. The parent material in the soil is till. The frost-free period associated with this soil type is 100 to 130 days. This soil series has moderate permeability above the till and slow moisture movement in the till. These soils are used mainly for dryland farming for small grain and for range (NCSS, 1998c).

4.2.2 Effects of BSCSP's Proposed Project

4.2.2.1 Geology

As mentioned in Section 2.2.2, a seismic survey began in December 2011 for creating 3-D images and models of the subsurface that would enable the identification of any faults or fractures that could potentially lead to geological issues for the project. With regard to environmental consequences for geological resources, the seismic survey would allow project planners to have sufficient information to optimize placement of subsurface project elements such as production wells and injection wells so that the potential for subsurface migration of CO_2 is minimized.

Existing geologic data indicates that the selected injection site is distant from any active faults (Bowen and Talbott, No date; Vuke et al., 2007). Additionally, Section 2.2.6 describes an elaborate subsurface monitoring system that includes multi-component surface seismic, well logging, multi-component 3-D VSP, crosswell seismic, micro-seismic analysis of the host rocks and cap rock, geochemical sampling, tracer studies, pressure monitoring, and surface assurance monitoring techniques. These activities would be performed concurrent with injection operations as well as during the post-injection period. The monitoring would allow for the detection of any unplanned variations from initial model predictions, including the potential for seismic, subsidence, and landslide concerns and the avoidance or prevention of their effects.

Risk Management

BSCSP has convened an expert panel with knowledge of this project and experience with other CO_2 storage projects to identify potential features, events, and processes that constitute risk to the project. This panel leads a multistep process where risk pathways, potential events, and specific event scenarios are identified. A risk assessment approach would be developed for each scenario (BSCSP, 2010). In most cases the assessment approach would involve development of a specific monitoring approach that has potential to detect the event; use of monitoring data as inputs to a model; use of the model to perform a sensitivity analysis; and analysis of the results to develop a methodology for identifying the occurrence of a potential event in advance. Mitigation strategies for each event scenario would also be developed (BSCSP and NETL, 2012). This process would be ongoing and would utilize new data gathered during site characterization and injection operations to update the risk management model (BSCSP, 2010).

Los Alamos National Laboratory (LANL) and Schlumberger Carbon Services (SCS) would perform the risk assessment, modeling and mitigation portion of the project. The lead organization for risk modeling in the BSCSP is LANL. LANL has extensive experience in risk and performance assessment, specifically in the context of engineered natural systems (both subsurface geological systems and aboveground systems). Much of this experience is from specific work in support of DOE's Carbon Storage Program and includes the development CO_2-PENS, a system level model for geologic storage that tracks the fate of CO_2 with all associated risks. The CO_2-PENS model includes detailed work on the integrity of wellbores and seals in the context of CO_2 storage. LANL would be performing the discrete static and dynamic fracture simulations for the risk assessment portion of the project. This work would directly assess

important aspects of site performance and risk due to pressure and stress changes in fracture networks (BSCSP, 2010).

The overall structure for the BSCSP risk management approach addresses the potential impacts of CO_2 migration from a planning, operations, and risk mitigation perspective. It offers BSCSP the opportunity to exercise the best level of control over potential impacts to geological resources at these three distinctly different stages of the project. Table 4.2.2.1 below illustrates sample impact-minimizing actions for resources that include geological resources.

Table 4.2.2.1. Risk Management Approach for Reducing Resource Impacts					
Risk Pathway	**Potential Event**	**Event Scenarios**	**Risk Assessment Approach**	**MVA Approach**	**Mitigation Strategy**
Storage Reservoir	Reservoir has insufficient capacity or injectivity to complete pilot test	CO_2 plume reaches maximum extent of reservoir prior to injection completion. Pressure increases more rapidly than predicted during injection phase. Colloids and other particulates are mobilized and alter permeability field. Predicted porosity or permeability field differs from observed.	Uncertainty analysis would provide estimates of variability for key parameters to be fed into CO_2-PENS. Reservoir model coupled to CO_2-PENS simulates capacity/injectivity for various combinations of parameters in Monte Carlo approach.	Preexisting data from site would be used to assess key reservoir parameters. Cores would be analyzed as available. Plume migration would be monitored with repeat 3D seismic surveys. Pressure would be monitored during injection.	CO_2 injection would cease if plume exceeds limit of storage reservoir. Additional injection wells[1] could be added if injectivity decreases below desired level.
Groundwater	CO_2 increases in aquifer changes groundwater chemistry.	CO_2 released from reservoir. Water-rock-CO_2 interactions change groundwater chemistry.	CO_2-PENS models the accumulation of CO_2 in groundwater due to various release scenarios. PHREEQ-C[2] is coupled to CO_2-PENS and allows water-rock-CO_2 interactions to change groundwater chemistry.	Groundwater reservoir characteristics (e.g. lithology, porosity, and permeability) and background groundwater chemistry would be tabulated from existing sources and used in modeling efforts. Groundwater chemistry would be monitored on an annual basis using protocol to be defined.	Groundwater sampling (outlined in MVA) would provide detection of potential releases and potential chemistry change. If impact is detected, appropriate water purification technologies can be identified and deployed.

Table 4.2.2.1. Risk Management Approach for Reducing Resource Impacts					
Risk Pathway	**Potential Event**	**Event Scenarios**	**Risk Assessment Approach**	**MVA Approach**	**Mitigation Strategy**
Other Reservoirs	CO_2 (or brine) accumulates in resource reservoir	CO_2 (or brine) from the storage reservoir accumulates in other reservoirs	CO_2-PENS models the accumulation of CO_2 in other reservoirs that are identified in the geologic model.	Fluid samples from other reservoirs would be monitored on a periodic basis as necessary.	If impacts were detected, CO_2 injection would cease.
Terrestrial Systems	CO_2 increase in soils impacts terrestrial ecosystems and/or surface waters.	CO_2 released from reservoir. CO_2 migration to soil zone. CO_2 accumulation in surface waters.	CO_2-PENS models the accumulation of CO_2 at surface (e.g., soils and surface waters) due to various release scenarios.	Soil gas surveys would be conducted on a periodic basis as necessary to assess CO_2 levels. Surface water chemistry surveys can be conducted on a periodic basis as necessary.	If impact is detected in soils, release site would be identified and mitigation would be used to lower CO_2 levels in soil zone. If impact is detected in surface waters, release site would be identified and a mitigation assessment would be developed.

Source: (BSCSP, 2010)

[1] Additional injection wells were not analyzed in this NEPA document. If additional wells were needed, supplemental NEPA documentation would be required.

[2] PHREEQC is a computer program written in the C programming language that is designed to perform a wide variety of low-temperature aqueous geochemical calculations.

According to BLM (Appendix F), the project wells are not on federal mineral estates. BLM would monitor wells associated with the project as part of its drainage program. If the federal resources are lost or migrate from the federal mineral estate, compensation would be required. However, BLM acknowledges that no drainage of federal minerals (oil and gas) is expected in this project. BSCSP would be taking proper steps to secure or have an arrangement with any other subsurface rights holders that could be affected. BSCSP would make arrangements with private landowners for use of their properties (IEAGHG and NETL, 2011).

Induced Seismicity

As detailed in Chapter 2, BSCSP would conduct an initial seismic survey and perform ongoing seismic monitoring sufficient to detect and plan for fault concerns in the project area. BSCSP's proposed project would contribute to addressing the need for further studies indicated in the NRC (2012) report. The positive features of the IBDP referenced in Section 4.2.1.1 are also common to BSCSP's proposed project and demonstrate good correlation with the findings and recommendations of the NRC report. A Principal Geologist with the IBDP Team, Robert J. Finley, offers the following observation on the status and relevance of the IBDP project:

> *It is always possible that [Carbon Capture and Storage] fluid injection will induce some microseismicity. We have some data on events at our site that are down in the -3 to -4 range, really small and really micro* (Finley, 2012).

Although it appears that information is limited for describing a definitive risk for induced seismicity resulting from carbon capture and storage projects, there are also strong indications from ongoing carbon storage projects that the potential for inducing seismic effects is small. There are also sufficient reasons to conclude that BSCSP's proposed project, like similar projects of its size in the NETL Carbon Storage Program, would contribute to understanding of an evolving technology. It would help develop best practices that would benefit projects of this type in the future, including those larger scale projects for which the potential for induced seismic effects may be much greater.

Based upon the analysis of the environmental consequences on geological resources, the proposed project would cause no measurable migration of CO_2 from the storage formation to the surface or into another area in the subsurface, and there is no more than an imperceptible risk of inducing seismic events due to increased reservoir pressure. Therefore, potential impacts to geological resources are expected to be less than the significance threshold.

4.2.2.2 Soils

Actual and potential impacts to soils would occur at all stages of this project. Drilling muds and drill cuttings would be produced and removed or land treated. There is a potential for fuels, lubricants, coolants, drilling muds, and produced fluids to be spilled to the ground. Drilling crews would handle and manage these materials in accordance with regulations and industry standard practices to prevent such spills.

Crews would restore or reclaim any soil disturbance from pipeline construction, which would include excavation for burial of the pipeline, per the request of the landowner. Sensors, gauges, and Pipeline Inspector Gauges (PIGs) would monitor the pipeline. BSCSP does not plan to build roads specifically to construct the pipeline. As previously discussed, BSCSP does anticipate constructing five miles of new roads to access the wells. Crews would access all other project components using existing roads or driving off-road, as is standard practice in this region (Tollefson, 2011f).

During injection and monitoring, the impacts would be restricted to service vehicles accessing injection and monitoring locations to maintain operations and record observations. Impacts to soils could result from spillage of lubricants and fluids from the compressors or very minor loss of fluids collected from the sampling program. Leakage from the injection formation up into the soil profile is a slight possibility and could result from pipeline ruptures, casing leaks, or formation fracturing. CO_2 gas accumulations in soil can cause root function inhibition and oxygen deprivation to soil microbes and surface vegetation.

The frequency of travel would not be sufficient to result in long-term impacts to soils resources in the project area.

To minimize impacts to soils and subsurface geology in the operational phase of BSCSP's proposed project, BSCSP would:

- Verify abandoned well integrity through the review of plug and abandonment records;
- Monitor well casing vent flows;
- Test well completion integrity;
- Properly plug and abandon wells at the end of the BSCSP study or transfer ownership and liability to an industry partner;
- Monitor the site after the BSCSP injections have been terminated; and
- Collect and dispose of any brinish water produced (BSCSP and NETL, 2012).

Elements of the MVA system described in Section 4.2.2.1 include soil flux surveys and the capability to detect and monitor levels of CO_2 in the surrounding soils. This information is integral to the risk management program described in Section 4.2.2.1 and summarized in Table 4.2.2.1.

During drilling operations, crews would build and maintain a drilling fluids, solid waste, and reserve pit for each well that they drill. These pits would be constructed and maintained in accordance with the MBOG regulations as well as consistent with the permit requirements of the Application for Permit to Drill issued by the same agency. The pits are approximately 80 feet by 120 feet (24.4 m by 36.6 m) (BSCSP, 2011b).

When the pits are constructed, topsoil is stockpiled and used to reclaim the pit once drilling solids have been removed and disposed of and the subsoil replaced. Seeding for reclamation would be determined by the MDNRC at the time of permit issuance (BSCSP, 2011b). The pits would be unlined, and as part of the decommissioning process referenced in Section 2.2.5, drilling fluids and solids would be cleaned up and properly disposed. This would include replacement of stockpiled subsoils and topsoils, resulting in minimal impacts to soils resources.

Access roads would be constructed to MBOG and MDNRC requirements with aggregate placed as needed. These soils are clay/loam and subject to wetting during rain or snow events. Most of the traffic on the roads would be during the drilling phase, and erosion controls would be implemented in accordance with the MBOG and MDNRC requirements to minimize soil loss. Roads would be located to avoid seasonal wetlands. Where necessary, crews would size and place culverts and water boards to allow spring flows to pass unrestricted across roads. Where new construction is necessary that involves soil excavation, crews would reseed ROWs and other disturbed areas immediately and construct sediment fences to prevent sediment flows to permanent or ephemeral watercourses. MBOG and MDNRC road construction requirements would minimize any runoff or sedimentation from road construction (BSCSP, 2011b).

Based upon the analysis of the environmental consequences of BSCSP's proposed project on soils resources, changes in soil stability, permeability, or productivity would be limited in extent. Full recovery would occur in a reasonable time, considering the size of the project. BSCSP would employ mitigation strategies, in the form of industry standard construction practices, that are simple to implement and proven effective in previous applications. Therefore, potential impacts to soils from implementing BSCSP's proposed project are expected to be less than the significance threshold.

4.2.3 Effects of No-Action

4.2.3.1 Geology

In the absence of DOE funding, BSCSP's proposed project would not proceed. Subsurface geological formations would remain intact in their current condition. No changes and no impacts to geological resources would result if BSCSP's proposed project did not proceed.

4.2.3.2 Soils

In the absence of DOE funding, BSCSP's proposed project would not proceed. Surface and subsurface soil conditions would remain in their current state. No changes to soil resources would result if BSCSP's proposed project did not proceed.

4.2.4 Cumulative Effects

4.2.4.1 Geology

Projects that could have cumulative geologic resource effects would almost assuredly be those that have subsurface activities. Of the eleven projects described in Section 1.4.1 (i.e., those that are near enough to this proposed project to have interactive effects), only one of them is substantially below the ground surface where it could have a potential cumulative effect on geological resources. That project, the PCOR Bell Creek Demonstration Project, is located in southeast Montana, over 400 miles away from BSCSP's proposed project and therefore with no possible geologic effect on this project in the Kevin Dome area.

Section 1.4.2 describes other activities that, theoretically, could have a cumulative effect with BSCSP's proposed project. While these activities occur near the project area, a variety of reasons or factors limit any likely cumulative effect on the BSCSP's proposed project. These reasons include:

- Many other wells are generally less than 2,000 ft (610 m) in depth with less than 5% reaching the Duperow formation;
- The 2-inch (5.1 cm) pipeline for BSCSP's proposed project is too small to provide the necessary infrastructure for EOR activity, and the proposed pipeline terminates in an area with no existing oil and gas production;
- Despite speculative interest in commercial CO_2 recovery to the west of the project area, there is no CO_2 pipeline or transportation infrastructure present within or anywhere near the project area;
- EOR in the next 10 years on Kevin Dome would be highly unlikely as the most productive oil formation is the Madison, which is too shallow for CO_2 flooding; and
- BSCSP's proposed project is not large enough to change the economic viability of EOR at Kevin Dome.

For reasons presented above, there are inconsequential cumulative effects introduced by this project in relation to other activities in the area. As stated in Section 1.4.2, DOE concludes that BSCSP's proposed project is a very small incremental activity to other activities that industry has planned in the region. Therefore, cumulative effects would be below the significance threshold.

4.2.4.2 Soils

Projects that could have cumulative soils resource effects would primarily involve some level of soils excavation. Of the eleven projects described in Section 1.4.1 (i.e., those that are near enough to this proposed project to have an effect), six of them appear to involve excavation below the ground surface where it could have a potential cumulative effect. The projects include a cultural evaluation and cleanup, a fiber optic cable installation, two wind farms, a CO_2 capture and storage project, and a 20-inch (50.8 cm) CO_2 pipeline. Of these projects, only the cultural evaluation project and the fiber optic cable installation are close enough to the BSCSP's proposed project to warrant further consideration of the strength of their effects. The apparent nature of these two projects seems to have relatively little to minor soils effects that could contribute to cumulative effects and therefore a minimal soils resource effect on this project in the Kevin Dome area. Therefore, cumulative effects would be below the significance threshold.

4.3 Water Resources

4.3.1 Description

DOE requires and BSCSP plans to perform environmental monitoring in advance of BSCSP's proposed project. The background monitoring helps establish baseline measurements for atmospheric and soil CO_2 flux and meteorological conditions. Water would also be sampled from existing water wells and surface waters for background water chemistry (BSCSP, 2011d).

The DOE and BSCSP do not expect to be required to obtain water rights since the water quality of the target locations currently exceeds potable water standards and no water of sufficient quantity would be extracted to require a water right (BSCSP, 2010).

4.3.1.1 Groundwater

The geologic characterization of Kevin Dome performed by BSCSP and reported in the Montana Board of Research and Commercialization Technology Grant Number 08-26, Final Report included water quality data that was obtained and mapped from the United States Geological Survey (USGS) produced waters database (http://energy.cr.usgs.gov/prov/prodwat/) (Bowen and Talbott, No date).

Northern Great Plains Aquifer System

The project area lies within the Northern Great Plains aquifer system with aquifers formed from sandstones of Tertiary and Cretaceous age and carbonate rocks of Paleozoic age that are a part of one of the largest confined aquifer systems in the United States. Unconsolidated glacial and alluvial deposits of Quaternary age, some of which are highly permeable, locally overlie the aquifer system (USGS, 1996).

Regional movement of water is from recharge areas at high altitudes, down the dip of the aquifers, with upward discharges into shallower aquifers or to the land surface. Most of the recharge to the aquifer system is from precipitation or snowmelt. Some local recharge is by seepage of excess irrigation water. Much of the discharge from the aquifer system is by upward leakage of water into shallower aquifers. Some discharge from the aquifer system also occurs by withdrawals from wells or from flowing artesian wells (USGS, 1996).

Local groundwater flows occur in aquifer outcrop areas or where unconsolidated-deposit aquifers overlie the aquifer system. Where the aquifers are covered by a thin layer of unconsolidated deposits, water percolates downward through the permeable parts of the deposits to recharge underlying aquifers. The water discharges to large streams or rivers, such as the Missouri River (USGS, 1996).

4.3.1.2 Surface Water

The project area lies within the watersheds of three river systems: the Upper Milk, Marias, and Willow Rivers (Figure 4.3.1.2).

Upper Milk River Watershed

The Milk River watershed is a small, semi-arid and transboundary watershed. Snowmelt in the upper reaches of the Mile River basin accounts for 50% - 80% of the flow in the river. Runoff from precipitation accounts for the remaining 20% - 50%. Since the basin straddles the boundary between the United States and Canada, water supply and water management have long been an international concern. The Boundary Waters Treaty of 1909 established the International Joint Commission (IJC) to manage water use in the basin, including a 1921 Order

that determines how water is shared among users in the basin. The United States receives 75% of the water during the irrigation season and 50% of the flow when irrigation is not needed (MRWCC, 2011).

Table 4.3.1.2. Milk River Watershed Data	
Total Area of Watershed	61,642 km^2 (23,800 square miles)
Area in Canada	21,442 km^2 (8,279 square miles)
Area in Montana	40,199 km^2 (15,521 square miles)
Length of Milk River	1,173 km (700 miles)
Number of Tributaries	30
Irrigated Land in the Watershed	3,300 hectares (8,154 acres)

Source: (MRWCC, 2011)

The Milk River has its headwaters in northwestern Montana near the eastern boundary of Glacier National Park. The main channel of the Milk River flows from Montana into Canada where it parallels the United States border as it flows in an easterly direction. North-flowing tributaries of the Milk River receive drainage from sub-basins that begin at the northern limits of the project area.

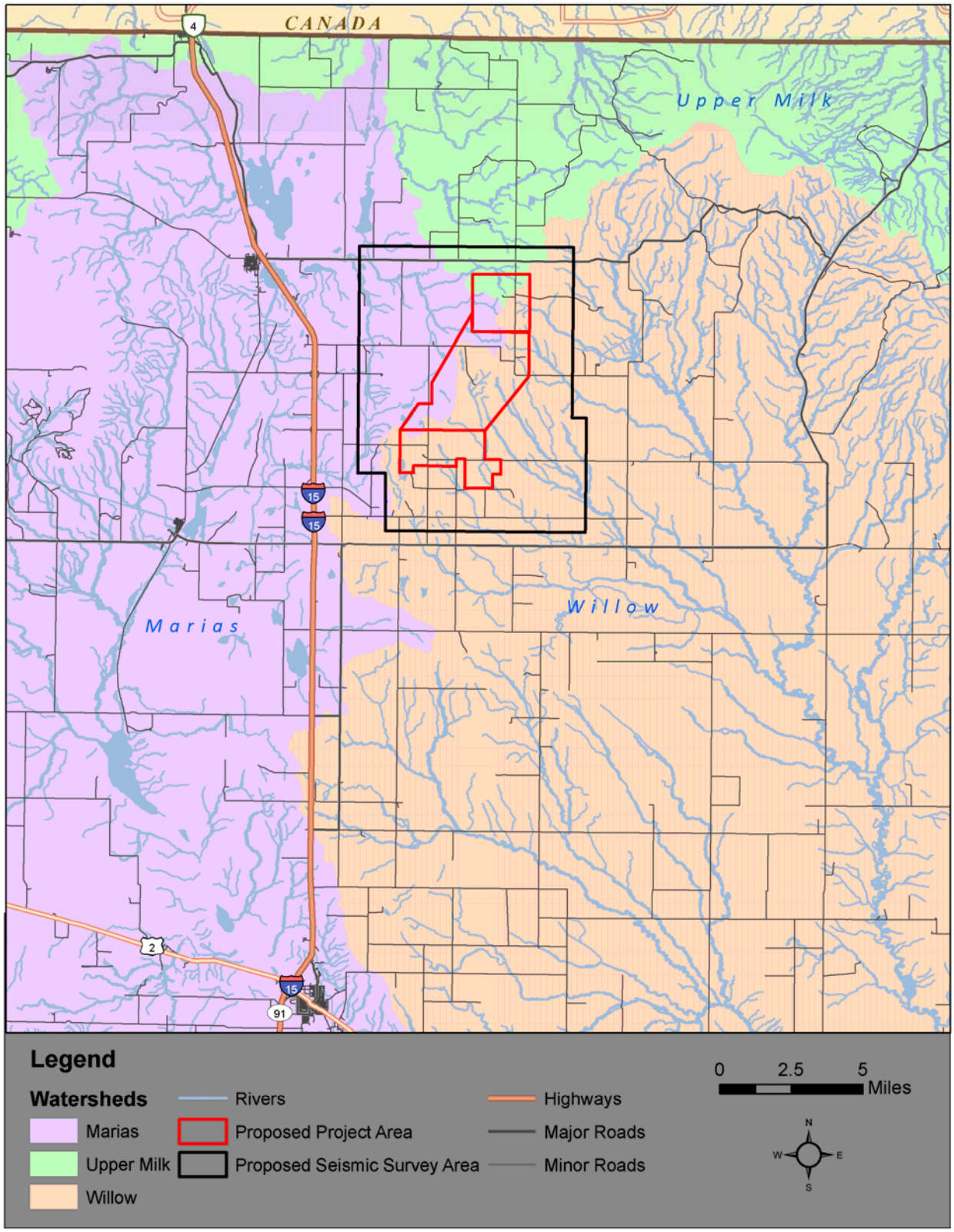


Figure 4.3.1.2. Watersheds within the Project Area
Sources: (USDOI, 2005; ESRI, 2010)

Marias River Watershed

The Marias River headwaters are formed with the intersection of Cut Bank Creek and Two Medicine River at the Toole, Pondera, and Glacier County border. The Marias River flows east from the headwaters through Toole County into Lake Elwell (also known as Tiber Reservoir). The water then travels east-southeast through Liberty and Hill Counties and then south into Chouteau County where it flows into the Missouri River just east of Loma. Tributaries include Dry Fork, Pondera Coulee, Basin Coulee, Dugout Coulee, Black Coulee, Cottonwood Creek, Trail Creek, Eagle Creek, and Chip Creek (MRWG, No date).

The Marias River watershed encompasses 3,294,259 acres (13,331 km^2) with 91.3% in private ownership, 5.7% state trust land, and 3% federal lands. Elevations range from 2,580 to 9,552 ft (786 to 2,911 m) above sea level. Topography includes mountainous terrain in Glacier Park to the west to gently rolling and generally level terrain in the east. There are seven conservation districts in six counties within this watershed: Glacier, Pondera, Toole, Liberty, Hill, Big Sandy and Chouteau (MRWG, No date).

Willow Creek Watershed

There is little written information available for this watershed, which is generally south of the Upper Milk River watershed and east of the Marias River watershed. The Willow Creek watershed drains 1,000 square miles (2,590 km^2). The project area overlies the extreme upper reaches of some of the tributaries of Willow Creek in the northwest sector of the watershed. The lack of data for this watershed suggests that there is little, if any, impairment of water quality in this watershed (USEPA, 2011e).

4.3.2 Effects of BSCSP's Proposed Project

Construction Phase

BSCSP would utilize existing roads to the extent possible for required access roads. Thus, potential runoff from road construction work would be limited to new roads where existing roads cannot provide adequate access. Trucks would access some project sites by driving off-road, in lieu of construction of roads for access. Off-road travel is a common practice in this area. The frequency of travel would not be sufficient to cause long-term impacts to water resources from soil erosion or sedimentation.

When new roads are constructed, crews would minimize the potential for runoff by utilizing best management practices (BMPs) for erosion control, such as silt dams, erosion control blankets, and similar construction industry standard practices. The aggregate roads would be sited away from seasonal wetlands. Where necessary, crews would size and place culverts and flow control improvements to pass unrestricted across roads. Crews would reseed ROWs immediately and construct sediment fences to prevent sediment flows to permanent or ephemeral watercourses (BSCSP, 2011a).

A two-inch carbon steel pipeline (L80) for six to ten miles (9.7 to 16.1 km) would transport the CO_2 from the processing facility in the production well field to the injection well (BSCSP et al., 2011; BSCSP, 2011a). This pipeline would be buried six feet (1.8 m) underground. The pipeline ROW would be reclaimed to pre-burial use of cropland or rangeland (BSCSP, 2011b). The access road on the ROW for construction would be reclaimed to cropland or native seed at landowner request. This ROW would be 30 ft (9.1 m) wide during construction and 15 ft (4.5 m) wide permanently (Tollefson, 2011d).

When pipelines are installed, BMPs for erosion control, such as silt dams, erosion control blankets, and similar construction industry standard practices, would be utilized to minimize runoff. If the pipeline route crosses any waterways or roads, it would be bored, i.e. the pipe would be drilled underground and not trenched in from the surface. Boring reduces surface impact and erosion (Tollefson, 2011f).

For each of the wells, 2,800 barrels of freshwater water would be mixed with the drilling mud mix. The total amount of drilling fluid would be approximately 3,500 barrels (Tollefson, 2011d).

The project would require issuance of new or modified water permits only for control of stormwater runoff. MDEQ requires agencies to complete a notice of intent to discharge and a stormwater pollution prevention plan (BSCSP, 2011b).

Operations Phase

The DOE and BSCSP do not anticipate any potential impacts to groundwater or surface waters in the area, given the characteristics of the Kevin Dome site. However, BSCSP plans to include water sampling in a monitoring program to detect and manage unforeseen impacts to water quality and to detect any unexpected leakage of CO_2 into local water resources. Additionally, since water impacts have been a primary concern of stakeholders and regulators for geologic storage sites around the world, it is important to monitor the groundwater for public assurance (BSCSP, 2010).

The Kevin Dome site is in a very rural area with few water wells, and there are no large surface water bodies nearby. Based upon state water well data, there are six domestic water wells within nine square miles of the injection site. The depths of the wells are shallow, averaging approximately 52 ft, and date to the early 1900s (GWIC, 2012; BSCSP and NETL, 2012). In years 1 and 2 of the project, the BSCSP would request permission to sample all six wells on a quarterly basis to establish baseline water quality in the area. Water sampling and monitoring would continue during production and injection activities (years 3-6) and during the post-injection and monitoring phase of the project (years 7-8) (BSCSP, 2010).

Monitoring crews would measure the following water quality parameters for all water samples: pH, temperature, conductivity, alkalinity, inorganic, organic and total carbon, anions and cations, carbonates nutrients, and metals. Water samples would be collected using industry-accepted procedures and analyzed at Montana State University's Watershed Science Analytical Laboratory. Water monitoring would also include periodic sampling for tracers described in

Chapter 2 and using the well log data to detect if any CO_2 has penetrated the deeper aquifers near the injection well (BSCSP, 2010).

The MDEQ would rely on the UIC permit for groundwater protection (BSCSP et al., 2011). During injection, groundwater in the target formation would be displaced laterally within the formation. Preliminary modeling suggests that water would be displaced from approximately 247 acres (1 km^2) around the injection well. Since the structural closure that composes Kevin Dome is approximately 457,145 acres (1,850 km^2), it is expected that the movement of groundwater would be minimal and temporary. Because much of the injected CO_2 would be re-produced at the end of the post-injection monitoring period, the existing brine groundwater should return to pre-injection saturation levels. Since it is currently well above (greater than 20,000 TDS) U.S. Drinking Water Standards thresholds (less than 10,000 TDS), no impacts to brine water quality would be expected (BSCSP, 2011b).

There could be three kinds of water potentially produced from the CO_2 processing. If there is any water or other fluids produced along with the CO_2, it would be separated and removed in the piping prior to entering the compressor facility. As the CO_2 is compressed, it has less ability to hold fluid, so as the CO_2 is cooled and water condenses, water would be produced during that process. Third, as part of the dehydration process, some water vapor would be produced (Tollefson, 2011f).

The volume, quantity, and quality of the water produced during CO_2 processing are currently unknown. BSCSP plans to test the water to determine the characteristics and the procedure for safe disposal, according to the MDEQ and any other relevant federal or state regulations (Tollefson, 2011f).

The risk management approaches for detecting and mitigating the effects from unplanned CO_2 releases shown in Table 4.3.2 provide a level of assurance that actions have been taken to reduce the potential for these releases, and there are procedures in place to manage such releases in the unlikely event that they would occur.

Table 4.3.2. CO_2 Risk Assessment Approach for Water Resources					
Risk Pathway	**Potential Event**	**Event Scenarios**	**Risk Assessment Approach**	**MVA Approach**	**Mitigation Strategy**
Groundwater	CO_2 increase in aquifer changes groundwater chemistry.	CO_2 released from reservoir. Water-rock-CO_2 interactions change groundwater chemistry.	CO_2-PENS models the accumulation of CO_2 in groundwater due to various release scenarios. PHREEQ-C is coupled to CO_2-PENS and allows water-rock-CO_2 interactions to change groundwater chemistry.	Groundwater reservoir characteristics (e.g., lithology, porosity, permeability) and background groundwater chemistry would be tabulated from existing sources and used in modeling efforts. Groundwater chemistry would be monitored on an annual basis using protocol to be defined.	Groundwater sampling (outlined in MVA) would provide detection of potential releases and potential chemistry change. If impact is detected, appropriate water purification technologies can be identified and deployed.
Terrestrial Systems	CO_2 increase in soils impacts terrestrial ecosystems and/or surface waters.	CO_2 released from reservoir. CO_2 migration to soil zone. CO_2 accumulation in surface waters.	CO_2-PENS models the accumulation of CO_2 at surface (e.g., soils and surface waters) due to various release scenarios.	Soil gas surveys would be conducted on a periodic basis as necessary to assess CO_2 levels. Surface water chemistry surveys can be conducted on a periodic basis as necessary.	If impact is detected in soils, release site would be identified and mitigation would be used to lower CO_2 levels in soil zone. If impact is detected in surface waters, release site would be identified and a mitigation assessment would be developed.

Source: (Spangler, 2011b)

Post-Project Decommissioning

During decommissioning, BSCSP would transfer operation of some wells to Vecta Oil and Gas, and remove other infrastructure, such as U-tube sampling, data capture and transmission facilities, and surface detection equipment. The industrial partner may continue using the pipeline for CO_2 production from production wells. Under these post-project conditions, the injection of CO_2 would be discontinued, and the potential for migration of CO_2 into aquifers would be reduced from the minimal levels that occurred during the project.

Based upon the analysis of the environmental consequences of BSCSP's proposed project on surface water resources, any changes to surface water quality or hydrology would be confined to the immediate project area. Full recovery would occur in a reasonable time, considering the size of the project and the affected area's natural state.

Based upon the analysis of the environmental consequences of BSCSP's proposed project on groundwater resources, any changes to groundwater quality and quantity would be at the lowest detectable levels. Full recovery would occur in a reasonable time. DOE requires and BSCSP plans to implement mitigation strategies for any release of CO_2, using the project's previously established risk management plan. This risk management plan has proven effective in previous applications. Therefore, the impacts from implementing BSCSP's proposed project on water resources would be expected to be below the significance threshold.

4.3.3 Effects of No-Action

In the absence of DOE funding, the project would not proceed. Quality and quantity of both surface water and groundwater would remain at their current levels. No changes to these water resources would result if BSCSP's proposed project did not proceed.

4.3.4 Cumulative Effects

Projects that could have cumulative water resource effects would potentially involve high water use, contamination from spills, or stream sediment loading from uncontrolled runoff. Of the eleven projects described in Section 1.4.1 (i.e., those that are near enough to BSCSP's proposed project to have a possible effect), six of them have characteristics that would indicate potential water resource effects, because they involve soil excavation that could lead to sediment load from runoff or subsurface activity that could affect aquifers. The projects include a cultural evaluation and cleanup, a fiber optic cable installation, two wind farms, a CO_2 capture and storage project, and a 20-inch CO_2 pipeline. Of these projects, the CO_2 capture and storage project is sufficiently distant to minimize potential for aquifer effects and the movement of its CO_2 plume is also likely to be well controlled by regulatory requirements.

Similarly, runoff from the soil excavation projects would be controlled by regulatory requirements to limit sediment loading to watercourses. Most of these projects are outside the watershed that contains BSCSP's proposed project, further reducing potential cumulative effects. Those that are within the same watersheds would have negligible cumulative contributions in addition to the controlled runoff from BSCSP's proposed project.

Based upon the analysis of the environmental consequences of BSCSP's proposed project, considered together with past, present, and reasonably foreseeable future projects on groundwater and surface water resources, any cumulative effects on groundwater quality and quantity would be at the lowest detectable levels. Full recovery would occur in a reasonable time. DOE requires and BSCSP plans to apply mitigation strategies for any release of CO_2, using the project's established risk management plan that is put in place for that purpose and proven effective in previous applications. Therefore, expected impacts to water resources would be less than the significance threshold.

4.4 Wetlands and Floodplains

This section identifies and describes the potential for impacts to wetlands and floodplains by the proposed project.

4.4.1 Description

According to USACE, "wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, under normal circumstances, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE, No date). The USACE regulates the discharge of dredged or fill material into waters and wetlands of the United States pursuant to Section 404 of the CWA (USACE, No date). Other regulations regarding wetlands are in Section 1.6.

According to the National Wetlands Inventory (NWI), several types of wetlands exist in the project area. These include freshwater emergent wetlands, freshwater forested/shrub wetlands, and "other," which in this case is a palustrine unconsolidated shore. Given that the NWI data is over 20 years old, the presence or absence of wetlands need to be ground verified. Figure 4.4.1-1 depicts the wetlands in the area.

Floodplains are low-lying areas around a body of water where excess water travels in the case of larger precipitation events, meaning the area is subject to flooding. The floodplains along with other land uses are in Figure 4.4.1-2. Other regulations regarding floodplains are in Section 1.6.

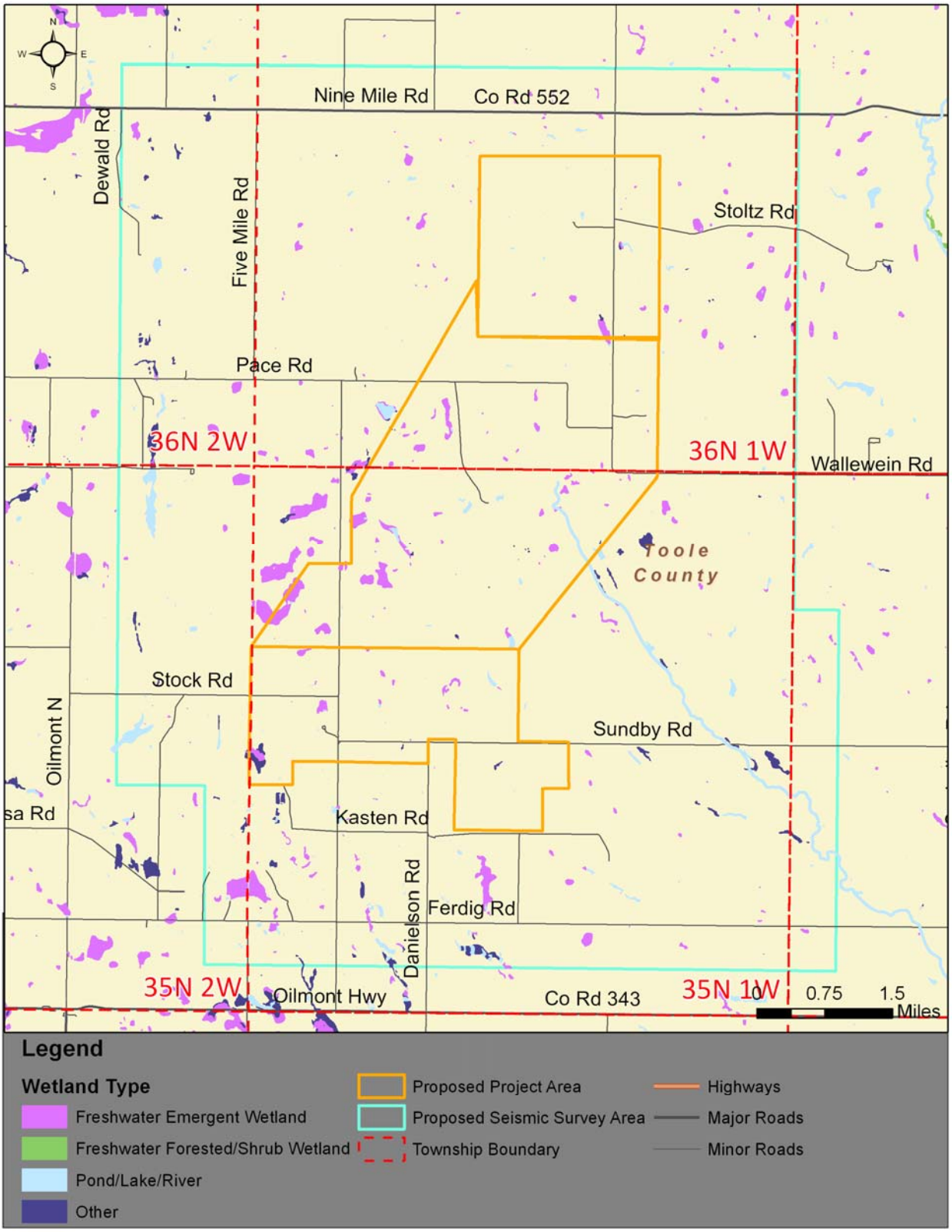


Figure 4.4.1-1. NWI Wetlands in the BSCSP's Proposed Project Area
Sources: (ESRI, 2010; USFWS, 2009)

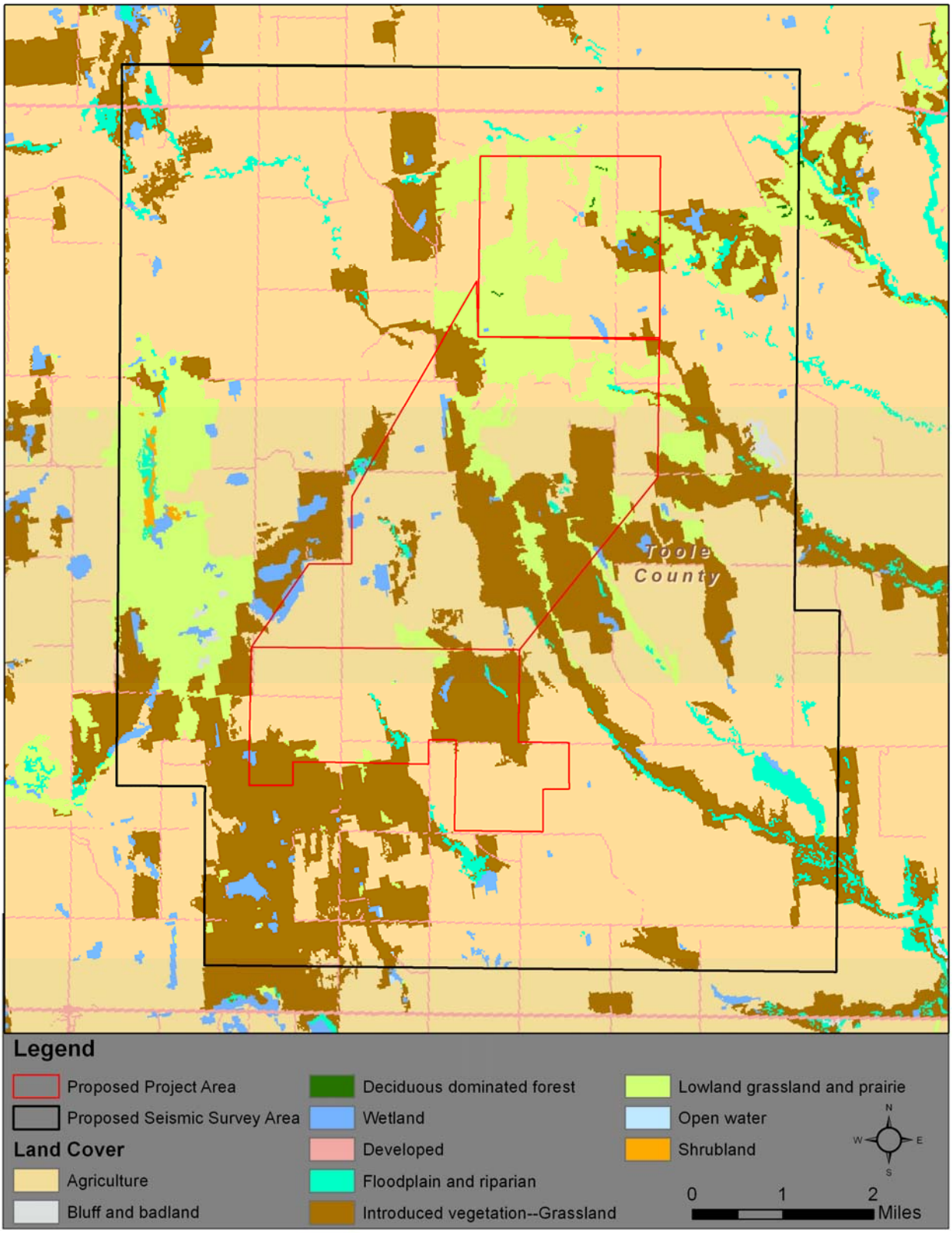


Figure 4.4.1-2. Floodplains in the BSCSP's Proposed Project Area
Sources: (ESRI, 2010; USGS, 2011b)

4.4.2 Effects of BSCSP's Proposed Project

DOE requires and BSCSP and their subcontractors plan for the avoidance of wetlands during seismic shoots. BSCSP does not plan for a wetland study (BSCSP and NETL, 2012). BSCSP consulted with the USACE, and the USACE determined that BSCSP did not need to perform a wetland study (Blank, 2012). USACE does not anticipate any impacts to wetlands (Blank, 2011).

The seismic crew would only cross water bodies at bridges or other pre-established crossings. The crew is trained in identifying wetlands and other water bodies. Some wetland areas may be accessed by foot traffic. The crews would place sensors around lakes and walk them across streams (BSCSP, 2011d). The short-term, seismic shoots and the longer term monitoring and injection wells and associated equipment would avoid wetlands (BSCSP, 2012b). BSCSP would enforce appropriate water and soil controls to avoid runoff into wetlands and other water bodies (see Sections 4.2 and 4.3). Any spills would be promptly cleaned up, which also reduces risks to wetlands. The access by foot traffic should cause negligible impacts from which the wetlands should recover quickly. Consequently, BSCSP's proposed project would not affect wetlands.

No activities would occur in the floodplains, and the same pollution controls listed above would protect floodplains. Consequently, no impacts to floodplains are anticipated.

4.4.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not proceed. Consequently, no changes to wetlands and floodplains would occur, so there would be no impacts to these resources.

4.4.4 Cumulative Effects

Human activities in this area have modified wetlands and floodplains in the past. Previous industrial activities, including agriculture and oil and gas operations, have changed drainage patterns and fragmented or drained wetlands. Current regulations minimize and mitigate impacts to these resources. All the projects listed in Section 1.4 would be subject to the same regulations as BSCSP's proposed project to protect or mitigate impacts to wetlands and floodplains. The West HiLine RMP may increase protection of wetlands through oil and gas stipulations, or may designate more protection for any wetlands or floodplains in the new wilderness areas. Given the regulations in place and the negligible project impacts, cumulative impacts would be expected to be less than the significance threshold.

4.5 Terrestrial Vegetation

4.5.1 Description

BSCSP's proposed project is located in the North Central Brown Glaciated Plains. Land use in this area is devoted to cattle ranching and farming. Dark brown soils of the area are used for crops and range, making this western plain an important grain farming area. Farming here is

characterized by very broad, largely undissected till plains and nearly level, poorly-drained, proglacial lake plains. Natural vegetation in the area consists of grama-needlegrass-wheatgrass and is distinct from the foothills prairie community found in adjacent ecoregions (USEPA, 2002).

A biological review and analysis was conducted in September of 2011 to assess the biological resources for BSCSP's DOE approved interim action: 3-D 9C seismic survey and some environmental monitoring. For the analysis, published vegetation descriptions and aerial photographs at a scale of 1:2000 were used to identify habitat types and estimate approximate areas of each coarse habitat in each square mile. Approximately 70 percent of the reconnaissance area was estimated to be cultivated habitat consisting of dryland crop (cereal grain) and tame pasture/hay fields (BSCSP, 2011d). This section provides a detailed description of the vegetation cover types that are found to occur within the general project area. In addition, this section provides a brief list of some of the common plant species observed in each cover type. Wetland discussion is presented in Section 4.4.

Vegetative communities in this EA were classified according to the 2011 U.S. Geological Survey, Gap Analysis Program (USGS, 2011b). The term disturbed, as used in this EA, describes areas of land where the normal function has been disrupted or removed. In general, disturbed areas are cleared areas associated with cultivated fields. In addition, extensive oil and gas exploration and extraction has taken place within the project area. Disturbed areas also include isolated buildings and grain elevators, roads, previous oil/gas well developments and associated facilities, pipelines, and transmission lines (BSCSP, 2011d).

Figure 4.5.1 shows the vegetative and land cover in the project area. Three main habitats, agricultural cropland, grassland prairies, and wetlands, exist in the project area. Other habitats within the project area occur on a very small scale and include deciduous dominated forests and shrublands. Because these habitats comprise a very small portion of the project area, they are not discussed in this analysis.

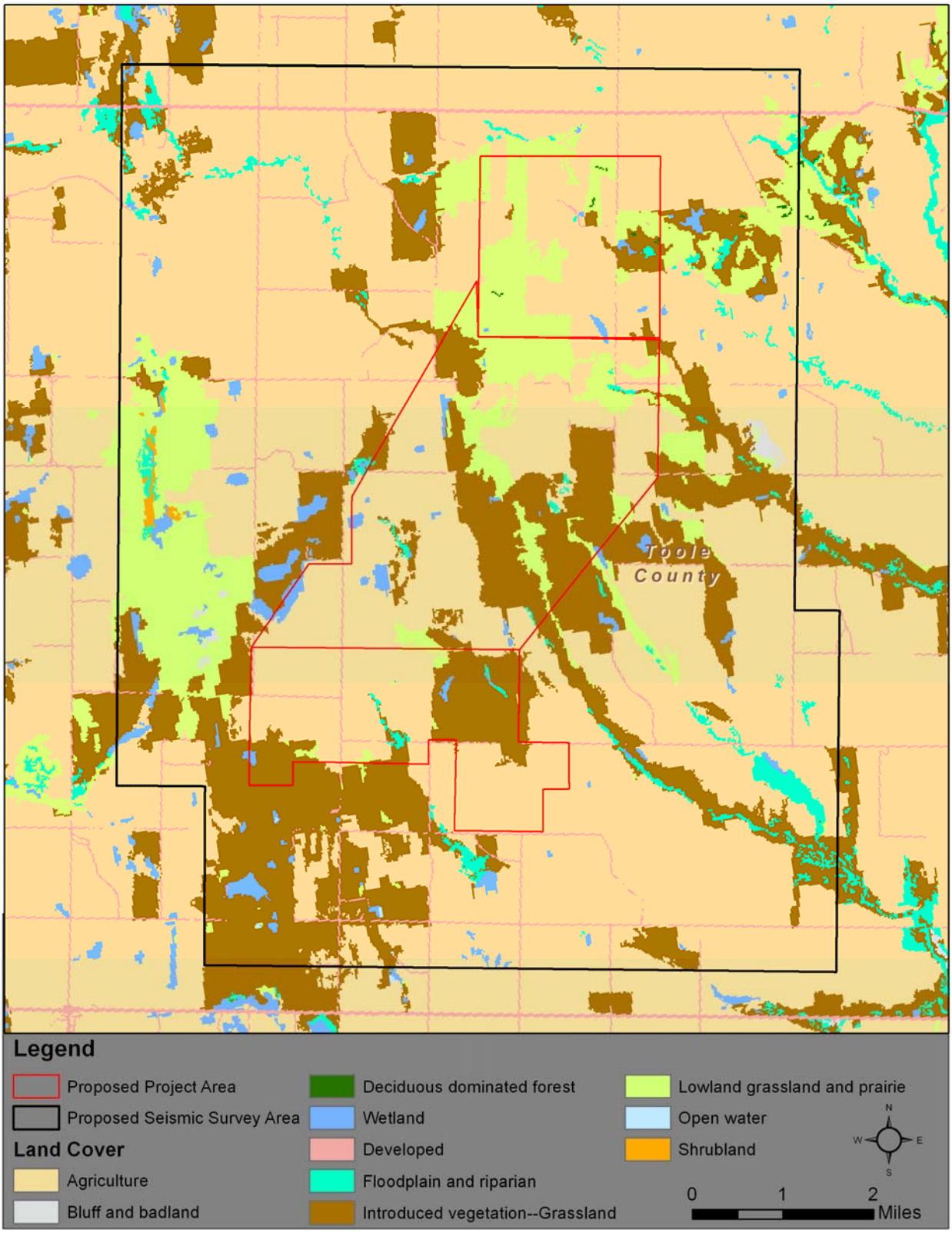


Figure 4.5.1. Existing Vegetation and Landcover in the Project Area
Sources: (ESRI, 2010; USGS, 2011b)

Grasslands Prairies

Lowland and introduced grasslands encompass the majority of non-agricultural fields in the project area. Previously cultivated acres may have been re-vegetated by non-native plants creating associations such as Kentucky bluegrass/western wheatgrass and pure stands of crested wheatgrass (Luna and Vance, 2010a). Non-native vegetation grasslands are most likely previously cultivated fields including fallow fields.

Two types of lowland grasslands could be present in the project area, the Great Plains Mixedgrass Prairie and the Great Plains Sand Prairie (Luna and Vance, 2010a; Luna and Vance, 2010b). The Great Plains Mixedgrass Prairie is characterized by a mixture of mid and short grasses occurring on fine and medium-textured soils with a growing season average of 115 days. Grasses in this area are dominated by western wheatgrass (*Pascopyrum smithii*) and other species include thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comate*). Near the Canadian border, these grasslands change into rough fescue (*Festuca campestris*) and Idaho fescue (*Festuca idahoensis*) (Luna and Vance, 2010b).

Common forbs within this system include yarrow (*Achillea millefolium*), scarlet globemallow (*Sphaeralcea coccinea*), western sagewort (*Artemisa ludoviciana*), boreal sagewort (*Artemisia frigida*), silver lupine (*Lupinus argenteus*), fuzzy beardtongue (*Penstemon eriantherus*), shining penstemon (*Penstemon nitidus*), prairie cinquefoil (*Potentilla gracillis*), Missouri goldenrod (*Solidago missouriensis*), and anddalea (*Dales* species) (Luna and Vance, 2010b).

Shrub species could include western snowberry (*Symphoricarpos occidentalis*), serviceberry (*Amelanchier alnifolla*), shrubby cinquefoil (*Dasiphora fruticosa*), creeping juniper (*Juniperus horizontalis*), silver sage (*Salvia argentea*), and Wyoming big sagebrush (*Artemisia tridentate var. wyomingensis*) (Luna and Vance, 2010b).

The Great Plains Sand Prairie is characterized by grasses that are well-adapted to coarse-textured soils. In the northwestern portion of the grassland's range, stand sizes are typically small and correspond to areas of exposed caprock sandstone. Needle and thread is the dominant grass species in this area. Other species frequently occurring in these areas include little bluestem (*Schizachyrium scoparium*), threadleaf sedge (*Carex filifolia*), prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*), and big bluestem (*Andropogon geradii*) (Luna and Vance, 2010a).

Forbs differ by region, but species of scurf pea (*Psoralidium* spp.) and Indian breadroot (*Pediomelum* spp.) are common. Other forbs that occur in this vegetation cover include narrowleaf purple coneflower (*Echinacea angustifolia*), sumac (*Pediomelm trilobata*), and horizontal juniper (*Juniperus horizontalis*), silver sage, soapweed yucca (*Yucca glauca*), and Wyoming big sagebrush (Luna and Vance, 2010a).

Agriculture Cropland

Cultivated agricultural croplands in the project area include dryland crops (cereal grain) and tame pasture/hay. Portions of the tame pasture/hay land cover may be enrolled in the Conservation Reserve Program (CRP) (BSCSP, 2011d). The CRP is a voluntary program that agricultural landowners can join to receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. The United States Department of Agricultural (USDA), Farm Service Agency (FSA) oversees the CRP (FSA, 2011). Little, if any, of the agricultural fields appears to be irrigated (BSCSP, 2011d).

Fallow fields are most likely dominated by introduced vegetation (Luna and Vance, 2011a) or native grasses of the Great Plains Mixedgrass and Great Plains Sand Prairies.

4.5.1.1 Protected Species

No critical habitats or federally listed plant species exist in the vicinity of the project area or Toole County. A review of the USFWS technical assistance website was conducted in November 2011 for federally listed threatened and endangered species and resulted in a conclusion that the BSCSP's proposed project would have "no effect" on listed plant species, their habitat, or proposed or designated critical habitats (USFWS, 2011a). The USFWS confirmed that no federally protected plant species occurs in the project area in an Informational Letter dated November 30, 2011 (Wilson, 2011).

A review of Montana's Natural Heritage Program (MTNHP) website indicated that one Montana Species of Concern (SOC), heart-leaved buttercup (*Ranunculus cardiophyllus*), has the potential to occur in Toole County (MTNHP, 2011a). The heart-leaved buttercup is fibrous-rooted perennial with erect, branched stems. This buttercup is found in moist meadows and grasslands associated with wetlands in the foothill zone (MTFWP, No date[a]). It is unlikely that this species occurs in the project area (BSCSP, 2011d).

4.5.1.2 Invasive Species

Executive Order 13112 - Invasive Species directs federal agencies to make efforts to prevent the introduction and spread of invasive plant species, detect and monitor invasive species, and provide for the restoration of native species. Invasive species are usually destructive, difficult to control or eradicate, and generally cause ecological and economic harm. A noxious weed is any plant designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property.

4.5.2 Effects of BSCSP's Proposed Project

Generally, the severity of vegetative impacts depends on the type of vegetation impacted, the size of the area cleared, the time required for vegetation to become re-established, and subsequent maintenance practices in cleared areas. BSCSP's proposed project would remove up to a maximum of 55 acres of vegetation for the well pads, pipeline construction, and compressor station (BSCSP, 2011b). Besides clearing up to 55 acres of vegetation for well pads, pipeline,

compressor station and associated equipment, BSCSP would construct five miles of aggregate roads to access the wells. The constructed aggregate roads would be sited away from seasonal wetlands. If necessary, construction crews would size and place culverts and water boards to allow spring flows to pass unrestricted across roads (BSCSP, 2011b). Any ROW would be reseeded after construction, and sediment fences would be constructed to prevent sediment flows to permanent or ephemeral watercourses. After construction, the grassland prairie habitat located on areas outside of the well pads, compressor station, and roads would be allowed to revert to former habitat type during operations.

The primary direct impact of the project on vegetative cover types would be the clearing and removal of grassland prairie vegetation within the drilling workspace at the injection and production wells and clearing for the service lines and pipeline ROWs. Heavy equipment could also crush vegetation and compact soil, essentially removing vegetation in areas where the equipment is used. Per the landowners request and any applicable state and federal requests or requirements, such as erosion control, the ROWs would be revegetated, and the species would depend on those requests and requirements (BSCSP, 2012b). However, since the majority of the area is cultivated or otherwise disturbed, the impacts should not be significant. Off road vehicle use could also trample and remove vegetation.

Excessive soil compaction impedes root growth and limits the amount of soil available for roots, decreasing a plant's ability to take up nutrients and water. Soil compaction also increases water runoff and soil erosion. Surface water runoff and sediment from areas disturbed by construction could adversely affect local vegetation by exposing soils and transporting sediment offsite (UMN, 2011). Because construction is short-term and the project area has already been disturbed, full recovery would occur in a reasonable time. In addition, several measures would be taken to minimize the amount of water runoff and soil erosion including re-seeding areas after construction and the use of culverts when necessary. Impacts on vegetation from soil compaction, water runoff, and soil erosion would not be expected to exceed the significance threshold.

During construction, adverse effects to local offsite vegetation may occur as a result of fugitive dust emissions from construction machinery and worker traffic along unpaved roads (Ko and Alberico, No date). Impacts from dust emission could include a reduction in photosynthesis from reducing the light penetrating through the leaves, as well as increasing growth of plant fungal disease (NZME, 2001). Vegetation in the area is already exposed to dust from agricultural practices, and dust generated from construction related activities would be short-term. After construction, vegetation is expected to recover in a reasonable time, and impacts to vegetation would not be expected to exceed the significance threshold.

Impacts to grassland prairies and agricultural croplands would be short term, as portions of these areas would typically return to their herbaceous status within one to two years following construction, cleanup, and restoration.

The unlikely event of migration of injected CO_2 to the surface could cause detrimental effects on vegetation near or at some distance from the project site. Small amounts of atmospheric CO_2 promotes plant growth, but increased concentrations in the soil could lead to root asphyxiation

and plant death (IEA, 2007). Impacts of seepage on ecosystems could also include altered biological diversity and changes to the composition and numbers of species in the local environment. It is highly unlikely that CO_2 would migrate into the soils in the project area in sufficient quantities to substantially affect soil chemistry. Additionally, the geology of the injection site in combination with compliance with applicable federal and state regulations make it unlikely that CO_2 would migrate into soils that would have an impact on vegetative resources (IEA, 2007). Finally, monitoring techniques such as hyperspectral imaging, soil gas flux monitoring and eddy covariance can detect increase soil CO_2 so mitigation actions set out in the risk assessment plan could be implemented in the highly unlikely event of upward migration.

The project would not affect the viability of the resources. Recovery would occur in a reasonable time, considering the size of the project and the affected resource's natural state. Therefore, impacts on terrestrial vegetation would not be expected to exceed the significance threshold.

4.5.2.1 Protected Species

As stated in Section 4.5.1.1 and per the USFWS website, no threatened or endangered vegetative species are known to occur within the project area.

Threatened and endangered species consultation with the USFWS was conducted via a review of the USFWS technical assistance website in November of 2011. This review for federally listed threatened and endangered species and informal consultation with the USFWS concluded that "species and critical habitat are not present" for the BSCSP's proposed project site and that no further consultation is needed (USFWS, 2011a; Wilson, 2011). The consultation response is included in Appendix B.

Although unlikely, if any sensitive vegetation were discovered during biological assessments, these areas would be avoided to the extent possible. Impacts to protected species are expected to be below the threshold level.

4.5.2.2 Invasive Species

Exotic plants or seeds could be brought to the site with fill material or on equipment. New introductions could allow exotic plants to become established and spread, especially in areas where the ground is disturbed by construction activities. Exotic plants currently growing in the area can also become established and spread on newly disturbed substrates. Steps would be implemented to reduce the risks of introducing invasive species, according to applicable regulations and landowner agreements. An example of planned preventative action is cleaning equipment between sites. Consequently, the impacts from invasive species should be less than the significance threshold.

4.5.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not be implemented. No impacts to terrestrial vegetation would occur if the project did not proceed.

4.5.4 Cumulative Effects

Vegetation in the project vicinity has been, and continues to be, subject to disturbance and damage from cultivation, livestock grazing, and current and past gas and oil development. Habitat disturbance associated with infrastructure as part of the proposed project would be limited, and portions of vegetation clearing would be temporary lasting only for the duration of the construction, injection, and monitoring period. Cumulative impacts from the proposed project when added to other past, present, and reasonably foreseeable future actions would be limited to a small portion of the vegetation population and would not affect the viability of the resource. Recovery of this resource from any temporary change would occur in a reasonable period of time and not exceed the impact significance threshold.

Other vegetative clearing projects currently occurring in Toole County and surrounding area include other oil and gas activities and construction of a 37,000-acre wind farm. These projects are described in detail in Section 1.4. Any vegetative disturbance associated with the BSCSP's proposed project would occur primarily in or adjacent to previously disturbed areas as much as possible and would not affect the viability of the resource when combined with other related projects. The most prominent cumulative impact to vegetation is land clearing. Because the project area is within a previously disturbed area, the vegetation clearing that would take place would not affect the viability of the resource. In addition, some areas of vegetation removal would convert back to pre-project habitat. Overall, cumulative impacts from the proposed project when added to other past, present, and reasonably foreseeable future actions would be minimally adverse.

4.6 Wildlife

4.6.1 Description

A number of native species of reptiles, amphibians, birds, and mammals have the potential to occur within the project vicinity in Toole County, Montana. Species that are common in lowland prairie and associated cropland as well as wetlands are described below. This information is not intended to represent an exhaustive list of all species that may be present or have habitat present within the project area. Habitats in BSCSP's proposed project area were determined and described based on aerial photographs and published reports (BSCSP, 2011d).

Common mammals that have the potential to occur within the project area include big brown bat *(Eptesicus fuscus),* bison *(Bos bison),* black-tailed prairie dog *(Cynomys ludovicianus),* bobcat *(Lynx rufus),* bushy-tailed woodrat *(Neotoma cinerea),* coyote *(Canis latrans),*deer mouse *(Peromyscus maniculatus),* dwarf shrew *(Sorex nanus),* eastern cottontail *(Sylvilagus floridanus),* gray wolf *(Canis lupus),* hayden's shrew *(Sorex haydeni),*hispid pocket mouse *(Chaetodipus hispidus),* hoary bat *(Lasiurus cinereus),* least chipmunk *(Tamias minimus),* least weasel *(Mustela nivalis),* little brown myotis *(Myotis lucifugus),* long-eared myotis *(Myotis evotis),* long-tailed vole *(Microtus longicaudus),* long-tailed weasel *(Mustela frenata),* masked shrew *(Sorex cinereus),* meadow jumping mouse *(Zapus hudsonius),* montane vole *(Microtus montanus),* mountain cottontail *(Sylvilagus nuttallii),* mountain lion *(Puma concolor),* mule deer *(Odocoileus hemionus),* porcupine *(Erethizon dorsatum),* prairie vole *(Microtus ochrogaster),*

preble's shrew *(Sorex preblei),* pronghorn *(Antilocapra americana),* raccoon *(Procyon lotor),* red fox *(Vulpes vulpes),* Richardson's ground squirrel *(Urocitellus richardsonii),* sagebrush vole *(Lemmiscus curtatus),* silver-haired bat *(Lasionycteris noctivagans),* swift fox *(Vulpes velox),* thirteen-lined ground squirrel *(Ictidomys tridecemlineatus),* townsend's big-eared bat *(Corynorhinus townsendii),* vagrant shrew *(Sorex vagrans),* western harvest mouse *(Reithrodontomys megalotis),* western jumping mouse *(Zapus princeps),* western small-footed myotis *(Myotis ciliolabrum),* white-footed mouse *(Peromyscus leucopus),* white-tailed deer *(Odocoileus virginianus),* and white-tailed jack rabbit *(Lepus townsendii)* (Luna and Vance, 2010a; Luna and Vance, 2010b; McIntyre et al., 2010).

Common birds that have the potential to occur within the project area include American crow *(Corvus brachyrhynchos),* American goldfinch *(Spinus tristis),* American kestrel *(Falco sparverius),* American tree sparrow *(Spizella arborea),* Baird's sandpiper *(Calidris bairdii),* Baird's sparrow *(Ammodramus bairdii),* bank swallow *(Riparia riparia),* barn swallow *(Hirundo rustica),* black-bellied plover *(Pluvialis squatarola),* black-billed magpie *(Pica hudsonia),* clay-colored sparrow *(Spizella pallida),* cliff swallow *(Petrochelidon pyrrhonota),* common grackle *(Quiscalus quiscula),* common nighthawk *(Chordeiles minor),* common poorwill *(Phalaenoptilus nuttallii),* common raven *(Corvus corax),* dickcissel *(Spiza americana),* eastern bluebird *(Sialia sialis),* eastern kingbird *(Tyrannus tyrannus),* european starling *(Sturnus vulgaris),* field sparrow *(Spizella pusilla),* gadwall *(Anas strepera),* golden eagle *(Aquila chrysaetos),* grasshopper sparrow *(Ammodramus savannarum),* great horned owl *(Bubo virginianus),* gyrfalcon *(Falco rusticolus),* hoary redpoll *(Acanthis hornemanni),* horned lark *(Eremophila alpestris),* killdeer *(Charadrius vociferus),* lapland longspur *(Calcarius lapponicus),* lark sparrow *(Chondestes grammacus),* long-billed curlew *(Numenius americanus),* long-eared owl *(Asio otus),* marbled godwit *(Limosa fedoa),* McCown's longspur *(Rhynchophanes mccownii),* merlin *(Falco columbarius),* northern harrier *(Circus cyaneus),* prairie falcon *(Falco mexicanus),* red-tailed hawk *(Buteo jamaicensis),* rock wren *(Salpinctes obsoletus),* rough-legged hawk *(Buteo lagopus),* rusty blackbird *(Euphagus carolinus),* sanderling *(Calidris alba),* Savannah sparrow *(Passerculus sandwichensis),* Say's phoebe *(Sayornis saya),* sharp-tailed grouse *(Tympanuchus phasianellus),* short-eared owl *(Asio flammeus),* snow bunting *(Plectrophenax nivalis),* snowy owl *(Bubo scandiacus),* Sprague's pipit *(Anthus spragueii),* stilt sandpiper *(Calidris himantopus),* Swainson's hawk *(Buteo swainsoni),* upland sandpiper *(Bartramia longicauda),* violet-green swallow *(Tachycineta thalassina),* western kingbird *(Tyrannus verticalis),* western meadowlark *(Sturnella neglecta),* wild turkey *(Meleagris gallopavo),* willet *(Tringa semipalmata),* and Wilson's phalarope *(Phalaropus tricolor)* (Luna and Vance, 2010a; Luna and Vance, 2010b; McIntyre et al., 2010).

Common reptiles that have potential to occur within the project area include common gartersnake (*Thamnophis sirtalis*), eastern racer *(Coluber constrictor),* gophersnake *(Pituophis catenifer),* greater short-horned lizard *(Phrynosoma hernandesi),* milksnake *(Lampropeltis triangulum),* prairie rattlesnake *(Crotalus viridis),* terrestrial gartersnake *(Thamnophis elegans),* and western hog-nosed snake *(Heterodon nasicus)* (Luna and Vance, 2010a; Luna and Vance, 2010b; McIntyre et al., 2010).

Common amphibians that have potential to occur in the project area include boreal chorus frog *(Pseudacris maculata),* great plains toad *(Bufo cognatus),* plains spadefoot *(Spea bombifrons),*

tiger salamander *(Ambystoma tigrinum)*, and woodhouse's toad *(Bufo woodhousii)* (Luna and Vance, 2010a; Luna and Vance, 2010b; McIntyre et al., 2010).

4.6.1.1 Habitat

The project area is characterized as gently rolling, semi-arid prairie. Most of the area has been converted to agriculture and/or used for livestock grazing. Most level-to-gentle slopes have been cultivated and comparatively steeper slopes and drainages remain in native grassland. Within the project area, disturbed areas include farmsteads, numerous all-season roads, unmaintained two-track vehicle trails, and past oil/gas development including two buried pipelines. There are no perennial streams or fish-supporting waters within the project area (BSCSP, 2011d).

Because vegetation type is an important environmental component that helps define wildlife habitat, and thus wildlife species distribution, the vegetation community types described in Section 4.5 have been adapted below to define wildlife habitat types. In 2008, MTFWP coordinated a landscape-scale evaluation of the value of fish, wildlife, and recreational areas throughout Montana. The results of this mapping effort (called the Crucial Areas Planning System (CAPS)) for the project area are discussed in BSCSP's Biological Resources Reconnaissance and Impact Analysis, Seismic Survey Area, Kevin Dome Storage Project. The CAPS mapping indicated that the project area and project vicinity have a low value as game habitat, comparatively low value for total species richness, moderate value for SOC, and a very low value for aquatics. These low to moderate values are considered a function of comparatively poor habitat diversity, reflecting that much of the area has been converted to agriculture (BSCSP, 2011d).

Grasslands and Prairies

Within the project area, native grasslands are comprised of shortgrass prairies that have not been cultivated and include Great Plains Mixedgrass and Great Plains Sand Prairies (see Section 4.5). These areas occur on steeper hills or along incised drainages that dissect the area. The grassland plains in Montana are home to a variety of wildlife species. Some of these species are year-round residents while others are seasonal visitors, such as migratory birds who migrate south for the winter. Mammals living in the grassland plains have specific adaptations to the vegetative habitat. For example, some mammals rely on speed to help them avoid predators, while others have adapted to burrow underground to stay warm in the winter and cool in the summer. Because trees are not abundant in this area, birds have adapted to the vegetation of this area by nesting on the ground or in the shrubs. Some birds rely on trees in isolate plains forests for nesting areas. Others have adapted to nesting below the ground in burrows. Amphibians and reptiles have adapted to the dry climate of this area and the long cold winters. Many amphibians and reptiles bury themselves in the soil, mud of a river, or in a rocky den site to keep warm (MTFWP, No date[b]).

Wetlands and Livestock Reservoirs

Wetland habitats and small reservoirs constructed for livestock use also occur within the project area. The NWI revealed that many drainages supported areas of small, narrow herbaceous

wetlands. The NWI also showed that there were isolated wetlands (sloughs) scattered through cultivated areas (BSCSP, 2011d). These wetlands may support similar wildlife species as the above-mentioned habitats, but they would also provide habitat for species that are dependent on sources of water. Species of birds, reptiles, amphibians, and mammals could utilize this type of wetland dependent on their life-cycle requirements. Because there are no perennial streams within the project area (BSCSP, 2011d), these wetlands are most likely Great Plains Closed Depressional Wetlands. These wetlands are completely isolated from both the regional groundwater system and inter-wetland surface drainage systems. They occur in depressional basins found in flat, enclosed upland areas or on level shallow lake basins (McIntyre et al., 2010).

Cultivated Vegetation

Cultivated vegetation in the project area includes dryland crops (cereal grain) and tame pasture/hay. Some of the tame pasture/hay vegetation may have been lands enrolled in the CRP and may provide additional grassland and prairie habitat for wildlife (BSCSP, 2011d). Fields enrolled in the CRP or left to fallow may also be dominated by introduced vegetation (Luna and Vance, 2010a). Croplands support wildlife populations primarily by providing food sources and are especially valuable when located adjacent to wildlife habitats.

Building and Other Disturbed Sites

Building and disturbed habitats consist of farmsteads, isolated buildings and grain elevators, roads, previous oil and gas well developments and associated facilities, pipelines, and transmission lines. Only a small percent of the project area includes this land cover (BSCSP, 2011d). Buildings and other disturbed sites generally provide poor to moderate quality wildlife habitat.

Specially Managed Habitat

Montana State Trust land is located within the project area and vicinity. Federal agencies with land in or within the vicinity of the project area include the BLM and USFWS. BLM land within and near the project area is part of the Malta District, and portions of the USFWS land near the project is used for waterfowl production (ESRI, 2010; USGS, 2011a).

4.6.1.2 Protected Species

A review of the USFWS technical assistance website for federally listed threatened and endangered species in November 2011 indicated that the federally listed endangered black-footed ferret (*Mustela nigripes*) and the candidate species, Sprague's pipit (*Anthus spragueii*) might occur in Toole County (USFWS, 2011a). In addition, a review of MTNHP website indicated that 25 Montana SOC have the potential to occur in Toole County, Montana. Table 4.6.1.2 contains all species that are federally listed or listed under MTNHP as a SOC and are identified as potentially occurring in Toole County, Montana.

A letter requesting preliminary USFWS comments and information was sent to the USFWS on November 7, 2011. In a letter dated November 30, 2011, the USFWS stated they are not aware of any black-footed ferret occurrences or habitat in the project area. Further, no proposed or designated critical habitat for proposed or listed species occurs in the project area. Although no federally listed threatened or endangered species are known to occur in the project area, the Sprague's pipit has been documented in the general project area and may occur within the proposed project area in suitable grassland habitat (Wilson, 2011).

Table 4.6.1.2. Federally Listed Species and MTNHP Species of Concern Potentially Occurring in Toole County, Montana

Scientific Name	Common Name	Federal Status	Global Rank	State Rank
Cynomys ludovicianus	Black-tailed Prairie Dog		G4	S3
Lasiurus cinereus	Hoary Bat		G5	S3
Sorex nanus	Dwarf Shrew		G4	S2S3
Ammodramus bairdii	Baird's Sparrow		G4	S3B
Anthus spragueii	Sprague's Pipit	Candidate	G4	S3B
Aquila chrysaetos	Golden Eagle		G5	S3
Athene cunicularia	Burrowing Owl		G4	S3B
Buteo regalis	Ferruginous Hawk		G4	S3B
Calcarius ornatus	Chestnut-collared Longspur		G5	S2B
Charadrius montanus	Mountain Plover		G3	S2B
Falco peregrinus	Peregrine Falcon	Species of Concern	G4	S3
Haliaeetus leucocephalus	Bald Eagle	De-listed due to recovery	G5	S3
Lanius ludovicianus	Loggerhead Shrike	Species of Concern	G4	S3B
Nucifraga columbiana	Clark's Nutcracker		G5	S3
Numenius americanus	Long-billed Curlew		G5	S3B
Rhynchophanes mccownii	McCown's Longspur		G4	S3B
Spizella breweri	Brewer's Sparrow		G5	S3B
Apalone spinifera	Spiny Softshell		G5	S3
Heterodon nasicus	Western Hog-nosed Snake		G5	S2
Phrynosoma hernandesi	Greater Short-horned Lizard		G5	S3
Bufo cognatus	Great Plains Toad		G5	S2
Spea bombifrons	Plains Spadefoot		G5	S3
Phoxinus eos	Northern Redbelly Dace		G5	S3
Salvelinus namaycush	Lake Trout		G5	S2
Polygonia progne	Gray Comma		G4G5	S2
Mustela nigripes	Black-footed Ferret	Endangered	G1	S1

Sources: (MTNHP, 2011b; USFWS, 2011a; USFWS, 2011b). Note: Ranking definitions are below, and G#G# or S#S# indicates a range of uncertainty about the status of the species (e.g., G1G3 means global rank ranges between G1 and G3) (MTNHP, No date).

G1, S1 -	At high risk because of extremely limited and/or rapidly declining population numbers, range, and/or habitat, making it highly vulnerable to global extinction or extirpation in the state.
G2 , S2 -	At risk because of very limited and/or potentially declining population numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
G3, S3 -	Potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas.

G4, S4 -	Apparently secure, though it may be quite rare in parts of its range and/or suspected to be declining.
G5 -	Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.
B -	Breeding - Rank refers to the breeding population of the species in Montana, appended to the State rank

The USFWS also stated that although the grizzly bear (*Ursus arctos*) is not currently included in their species list for Toole County, the proposed project occurs more than 40 miles east of the grizzly bear Northern Continental Divide Ecosystem Recovery Zone. The USFWS has observed incremental eastward movement and occurrences of this species on the plains in recent years, including use of cultivated areas (Wilson, 2011).

The MBTA (see Section 1.6) protects the migratory bird species found in and surrounding the project area from taking, killing, or possession. Bird species, including migratory birds, with the potential of occurring within the project area or vicinity are discussed above. The BLM has also identified two raptor nests on private lands. One nest is within the project area, while the other one is adjacent to the project area (Jaynes, 2011). Once infrastructure locations are determined, BSCSP will consult with USFWS and complete any recommended biological surveys.

The Bald and Golden Eagle Protection Act (BGEPA) prohibits any form of taking Bald or Golden Eagles, their parts, nests, or eggs, without a permit issued by the Secretary of the Interior. A take under the BGEPA is defined as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. The USFWS is not aware of any bald or golden eagles within the project area, although golden eagle nesting has been documented approximately eight miles to the west in the Kevin Rim area (Wilson, 2011).

Sprague's Pipit (*Anthus spragueii*)

The Sprague's pipit is a candidate species under the ESA and a SOC in Montana. The Sprague's pipit is a small, pale, and slender bird with white outer tail feathers, a thin bill, and a heavily streaked back. This migratory bird arrives in Montana in early May and starts breeding soon after. Fall migration begins at the end of August and few records of the pipit exist outside of this May to August time period in Montana. The pipit is an endemic grassland species and prefers native, medium to intermediate height prairie and short grass prairie landscapes. Its nests are located in depressions in the ground and concealed with clumps of grass. These ground nests are constructed entirely of dead grass and woven in a circular arrangement with no lining. The pipit prefers native grasses to introduced species. The pipit is extremely secretive and flies away in a long, undulating flight when approached. This bird also has been shown to be area sensitive, requiring relatively large areas of appropriate habitat (MTFWP, No date[c]). Populations have declined because of loss, degradation, and fragmentation of habitat, attributed to cultivation, wetland drainage, overgrazing, and invasion of non-native vegetation (NatureServe, 2010).

Sprague's pipit habitat is available but limited in the project area. Most native grasslands and wetland areas are smaller than 470 acres – the habitat size preferred by the pipit. Further, many of these areas are steep or adjacent to roads, oil and gas developments, or cultivated fields

(BSCSP, 2011d). Biological surveys to determine if the Sprague's pipit occurs within the project area would be conducted if recommended by USFWS.

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle has a white head and tail contrasting with its dark brown body and wings. The bald eagle is the second largest North America bird of prey. The bald eagle is a resident species in the forested, mountainous areas of the state. Other individuals migrate from more northerly latitude to either winter in Montana or migrate through the state to more southerly locations. Habitat consists of primarily riparian and forested areas along river and lakes, especially during the breeding season. Nesting sites are found within larger forested areas near large lakes and rivers (MTFWP, No date[d]). Suitable nesting habitat is not found within the project area due to the lack of large forested areas and large lakes or rivers. However, the bald eagle may migrate over the project area or use this area and the surrounding vicinity to forage.

Golden Eagle (*Aquilla chrysaetos*)

Adult golden eagles range in length from 33 to 28 inches and are brown with gold on their head and neck feathers. Although the golden eagle is considered a permanent resident in Montana, there has been documentation of migratory movements. The golden eagle can be found throughout western Northern America from the Arctic to central Mexico. The golden eagle nests on cliffs and large trees, using prairie and open woodlands to hunt (MTFWP, No date[e]). Although there is little to no available habitat within the project area, a golden eagle nest is known to occur approximately eight miles from the proposed site (Jaynes, 2011). Golden eagles may forage within the project site.

4.6.2 Effects of BSCSP's Proposed Project

The potential for impacts to wildlife resources would be greatest during the construction phase. As discussed in Section 4.5.2, some grassland prairie and cultivated cropland habitat may be cleared during the construction phase of the project, while wetlands in the project area would be avoided. Species that depend upon the grasslands prairie and cultivated cropland for food, habitat, or nesting would be displaced to surrounding grassland and cultivated cropland habitats. Small, less mobile species may suffer mortality during workspace clearing and grading, but these impacts would not be significant to the population as a whole, especially because the area has a low potential for species richness and most of the project is located in previously disturbed areas. Some nesting species, especially ground nesting birds, may suffer mortality during workspace clearing. Nesting success may be prevented or diminished for one annual breeding cycle for those adult birds that are able to disperse from the construction area. USFWS provided additional direction on July 10, 2012, which states that based on a proposed fall 2012 drilling schedule, nesting season would be avoided and no impacts to nesting birds would be anticipated (Appendix B).

Reserve tanks and reserve pits are not expected to contain oil (see Section 2.2.5). Based on this change in the project design from the scoping letter, NETL has received additional direction

from USFWS on July 10, 2012 (Appendix B), which states that netting of the pits will not be necessary to protect birds and wildlife (Wilson, 2012; BSCSP, 2012b).

The total disturbed area for the well pads, pipeline construction, and compressor station would not be expected to exceed 55 acres (BSCSP, 2011b). Besides clearing up to 55 acres of vegetation for well pads and associated equipment, BSCSP would construct five miles of aggregate roads to access the wells and possibly a natural gas well. The constructed aggregate roads would be sited away from seasonal wetlands and agricultural lands. If necessary, crews would size and place culverts and water boards to allow spring flows to pass unrestricted across roads (BSCSP, 2011b). If construction occurs in the winter, crews would reseed any ROW after construction, and construct sediment fences to prevent sediment flows to permanent or ephemeral watercourses. After construction, the habitat located on areas outside of the well pads, compressor station, and roads would be allowed to revert to former habitat type during operations.

Activities for construction, drilling, and installation of wells and pipeline, vehicle traffic, human presence, and noise would cause temporary displacement and disturbance of resident wildlife for the life of the project. Animals rely on meaningful sounds for communication, navigation, avoiding danger, and finding food. Relative to wildlife, noise pollution is defined as any human sound that alters the behavior of animals or interferes with their daily functions. The level of impact from noise on wildlife depends on decibel levels, durations, and the physical characteristics of the environment (Ouren et al., 2007). Noise pollution can harm the health, reproduction, survivorship, habitat use, physical distribution, abundance, or genetic distribution. It is likely that most species affected by human presence have already been displaced from the project area due to current or past human activities. However, species that continue to use the site are expected to return after construction and injection is completed, although there may still be some minimal disturbance during the additional two years of post-injection monitoring and any post-decommissioning use. These impacts would be localized and limited to the immediate area of the project site. In addition, efforts would be taken to decrease noise from the compressor facility and could include well-insulated buildings and/or noise deflectors.

Injury or mortality of wildlife may also result from collisions with vehicles and construction equipment. These effects normally remain localized and limited to the immediate vicinity of a project site and are not expected to impact the population of affected species as a whole. Birds are especially susceptible to collisions with stationary objects. To minimize collisions between vehicles and wildlife, mitigation efforts would be taken and could include erecting road signs and/or speed bumps to lower vehicle speeds where bird activity is frequent or removing plants from roadsides that attract birds (USFWS, 2005).

Dust generated from construction is not anticipated to harm wildlife. Construction impacts are short-term, and most wildlife species would be displaced from the project area during construction activities.

Introduction of pollutants into bodies of water and aquatic habitats could occur through disturbance of contaminated soils or sediments, accidental spills, and inadvertent releases of drilling fluids. Such pollutants could affect wildlife through acute or chronic toxicity, and sub-

lethal effects could affect reproduction, growth, and recruitment. Impacts to wetland and water resources are described in detail in Sections 4.3 and 4.4. However, the implementation of BMPs would reduce the risks of these impacts to acceptable levels.

The unlikely event of leakage of injected CO_2 to the surface could pose detrimental effects on wildlife near or at some distance from the project site. Effects of a leak would decrease in severity as distance increases from the leakage site. Organisms closest to the leak would suffer from acute or even lethal concentrations of CO_2 (IEA, 2007). Changes in subsurface biogeochemical processes could also lead to changes in soil pH causing negative effects to microbial populations, leading to changes in nutrients present, which would progress up the food chain. Changes in the quality of groundwater would have serious consequences on water resources. Both food chain and water resource impacts would likely have detrimental effects on animal health. Additionally, prolonged exposure to high CO_2 concentrations may result in increased risk of asphyxiation for some wildlife. Although buildup of CO_2 in surface water can affect odor, taste, water hardness, color, or trace element concentrations, it is highly unlikely that undetected migration of injected CO_2 would be of sufficient quantity or duration to alter water chemistry enough to affect water quality or habitats in the project area (IEA, 2007).

Any impacts on wildlife from BSCSP's proposed project would be limited to a small portion of the population and most mobile species would not be adversely affected by the permanent or temporary loss of small sections of habitat. The loss of individuals of any species would not affect the viability of the resource. Full recovery would occur in a reasonable time, considering the size of the project and the affected species' natural state. Therefore, impacts on wildlife would not be expected to exceed the significance threshold.

4.6.2.1 Protected Species

As stated in Section 4.6.1.2 and per the USFWS website, no threatened or endangered species are known to occur within the project area. However, the Sprague's pipit, a candidate species under the ESA and a migratory bird, has the potential to occur within the project area. Seismic activities would occur outside of the breeding period. To the extent practicable, well drilling, surveying, and construction activities would be scheduled outside of the breeding season. If construction activities were to take place during the migratory bird breeding period (approximately April to August), upon request by the USFWS, a biological survey would be conducted to identify migratory birds within the project area. If migratory birds were found to occur within the project area at any time during the project, DOE requires and BSCSP plans to take measures to avoid and mitigate impacts to these and other species. USFWS provided a list of common oil and gas recommendations to protect wildlife. As stated in Section 4.6.2, NETL has received additional direction from USFWS on July 10, 2012 (Appendix B), with recommendations tailored to the project. USFWS states that netting of the reserve pits will not be necessary to protect birds and wildlife, based on the absence of oil in the pits and other factors (Wilson, 2012).

In the unlikely event of a spill, spills would be immediately contained, cleaned up, and habitats would be restored to pre-spill conditions (Wilson, 2011). Golden and bald eagles nests are not anticipated to occur within the project area. During the life of the project, these species may

avoid utilization of the project area. Noise and earth moving activities would be minimized to the extent practical to reduce impacts to these and other migratory birds. Per the USFWS recommendation, BSCSP would utilize "bear resistant" garbage containers in case the grizzly bears expand their range to include the project site (Wilson, 2011; BSCSP, 2012b).

Threatened and endangered species consultation with the USFWS was conducted via a review of the USFWS technical assistance website in November of 2011. This review for federally listed threatened and endangered species and informal consultation with the USFWS concluded "species and critical habitat are not present" for the BSCSP's proposed project site and that no further consultation is needed (USFWS, 2011a; Wilson, 2011). The consultation letter is included in Appendix B.

When determining the location of the well locations and all supporting equipment, sensitive wildlife resources, including migratory birds and their habitat, would be avoided. Biological surveys would be conducted when recommended by USFWS to assist the BSCSP in avoiding these impacts. Impacts to migratory birds would be documented and mitigated in a migratory bird plan written in consultation with USFWS. This plan would reduce impacts to migratory birds to a level acceptable to USFWS and any other agency concerned with these species. Therefore, impacts to protected species would be expected to be below the threshold level.

4.6.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not be implemented. No impacts to wildlife would occur from this alternative, beyond impacts that would occur regardless of BSCSP's participation.

4.6.4 Cumulative Effects

Wildlife and habitat in the project vicinity have been, and would continue to be, subject to disturbance and damage from cultivation, livestock grazing, and current and past gas and oil development. Habitat disturbance associated with infrastructure as part of the proposed project would be limited, and wildlife displacement and disturbance would be temporary lasting only for the duration of the construction, injection, and monitoring period. Similar impacts could occur to any threatened and endangered species if they were present in the area. It is also possible that an unlikely leakage of CO_2 to the surface would have wider spread consequences on wildlife and their habitats. Cumulative impacts from the proposed project when added to other past, present, and reasonably foreseeable future actions would be limited to a small portion of the wildlife population and would not affect the viability of the resource. Recovery of this resource from any temporary change would occur in a reasonable period of time and not exceed the impact significance threshold.

Other projects currently occurring in Toole County include construction of a range fence and construction of a 37,000-acre wind farm. These projects are described in detail in Section 1.4. Any wildlife disturbance associated with the BSCSP's proposed project would occur primarily in or adjacent to previously disturbed areas and would not affect the viability of the resource when combined with other related projects. The most prominent cumulative impact to wildlife is

through habitat fragmentation. Because the project area is within a previously disturbed area, the amount of habitat fragmentation expected would be small and would not affect the viability of the resource. Further, some areas of vegetation removal would convert back to pre-project habitat. Overall, cumulative impacts from the proposed project when added to other past, present, and reasonably foreseeable future actions would be minimally adverse, because the area likely does not have many protected species, those sensitive species are protected by regulations, and the habitats are common.

4.7 Land Use

4.7.1 Description

BSCSP's proposed project site would be located near Sunburst, Montana, within Toole County. Toole County has a total area of 1,945 square miles (5,038 km^2) and is considered a medium-sized county. Silver Bow with an area of 718 square miles (1,860 km^2) is the state's smallest county, and Beaverhead with 5,571 square miles (14,429 km^2) is the state's largest county (CEIC, 2003a). Rolling prairie and bench lands primarily comprise Toole County (USDA, 2006).

In Toole County's neighboring counties of Glacier and Pondera, there is Blackfeet tribal land located 28 miles (45 km) from BSCSP's proposed project site. However, Toole County itself hosts no federally recognized tribal lands (CEIC, 2007).

The production, injection, and monitoring activities would occur on Montana's state trust or privately owned land. The pipeline route depends on the well locations (BSCSP, 2011b; IEAGHG and NETL, 2011; BSCSP et al., 2011). Both the production and injection areas contain two 40-acre (0.16 km^2) tracts of federal mineral estate. Future potential use of these federal lands includes leasing of the tracts and/or drilling and developing the oil and gas mineral estate (Parrott, 2011).

Land uses nearby to BSCSP's proposed project's site include dryland cropping and oil and gas mining activities (BSCSP, 2011d). A traditional land use in the project area is farming. Soils identified at the test site are considered characteristic of prime farmland (Figure 4.7.1). In 2007, the total number of farmland units within the county was 428, the average unit size was 2,605 acres, and the total farmland in Toole County was over a million acres (CEIC, 2004, USDA, 2007).

Within a four mile (6.4 km) radius of the project's center are eight underground storage tanks (USTs) and three leaking underground storage tanks (LUSTs), all privately owned. Within a 10-mile (16 km) radius, there are an additional 32 USTs, 8 LUSTs, and 4 hazardous waste combustion (HWC) sites (Lovelace, 2011).

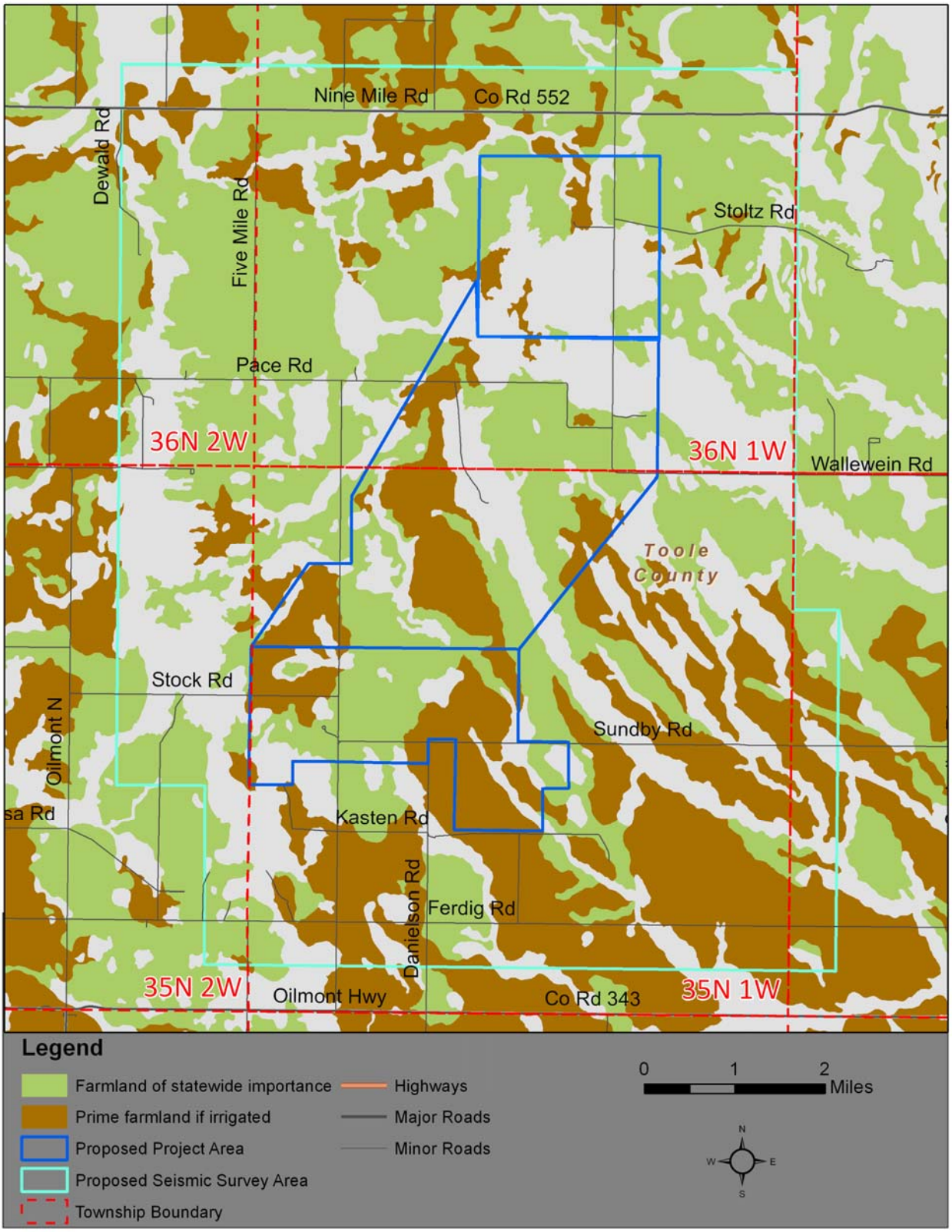


Figure 4.7.1. Prime Farmland in the Project Area
Sources: (ESRI, 2010; NRCS, 2010)

4.7.2 Effects of BSCSP's Proposed Project

Oil and gas developments have occurred near the project area for decades (see Section 1.4.2), so BSCSP's proposed project is compatible with historic and current uses. The project does not include USTs, and DOE requires and BSCSP plans to implement protective measures to ensure that their activities would not affect these tanks or HWCs.

The area used for the well pads, pipeline construction, and compressor station would not be expected to exceed 55 acres (0.2 km^2) (BSCSP, 2011b). During construction, BSCSP's proposed project would temporarily alter the physical character of the project area. During operations and monitoring, the project would only slightly alter the physical character of the area. According to BLM (Appendix F), the wells would not be on federal mineral estates. However, BLM would monitor migration of CO_2 as part of its drainage program. If migration into federal mineral estates occurs, compensation would be required. As long as no migration occurs, there would be no interference with other subsurface rights including developing oil and gas mineral estates nearby. DOE requires and BSCSP plans to take proper steps to secure or have an arrangement with any other subsurface rights holders that could be affected. BSCSP would make arrangements with the private landowners for use of their properties (IEAGHG and NETL, 2011). Further, land ownership would not be changing as part of this project.

Some of the lands of the project area are prime farmlands. The project would only temporarily convert some areas of farmland to project use. The permanent conversions would be a minimal area and in character with the historic oil and gas activities, given that the project impacts would be limited to less than 55 acres, and Toole County has a million acres in agricultural production.

Any change in land use would be limited, and affected areas would fully recover once the project and monitoring are completed. The recovery process would be expedited by the reclamation efforts in the agreements with the landowners (see Section 2.2.5). As a result, the potential for impact from BSCSP's proposed project to land use exists; however, the impacts would be less than the significance threshold.

4.7.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not move forward. The impacts to land use would be the same as they currently are. Therefore, impacts to land use would be beneath the threshold of significance.

4.7.4 Cumulative Effects

This project would take place in an area where oil and gas activities already occur. While these projects are more than 400 miles away, Denbury's Greencore Pipeline and PCOR Bell Creek Demonstration Project illustrate that BSCSP's proposed project would not set a precedent for these types of activities (carbon storage). Consequently, the activities associated with BSCSP's proposed project should not cause cumulative land use impacts. As discussed in Section 1.4.2, the project area has numerous other oil and gas activities but no other carbon storage activities

nearby. Consequently, DOE does not anticipate that impacts of this project, when combined with the other projects discussed in Section 1.4.2, would cause significant changes in land use.

Cumulative impacts with BSCSP's proposed project and Glacier Wind Farm, Rim Rock Wind Farm, and other projects listed in Section 1.4.1 are not expected, because the wind turbines would be an expansion of energy development, and the other projects would not change land use in the area. Cumulative impacts to land use would be beneath the significance threshold.

4.8 Socioeconomic Resources

This socioeconomic resources assessment considers elements of the human social environment that may be sensitive to changes resulting from implementation of BSCSP's proposed project. The assessment focuses on demographics, employment and income, infrastructure, parks and recreation, visual resources, noise, and environmental justice. BSCSP's proposed project would be located in central Toole County. For purposes of the socioeconomic analysis, the region of influence (ROI) is defined as Toole County, Montana. The towns of Kevin, Sunburst, and the city of Shelby within Toole County would likely serve as base locations for construction crews, operation crews, and activities (BSCP, 2011d).

4.8.1 Demographics

4.8.1.1 Description

According to the 2009 U.S. Census data estimates, Toole County has a population of 5,151, with a population density of 2.8 people per square mile (2.6 km^2) (Bearfacts, 2009; Census, 2010; CEIC, 2011a; CEIC, 2011b). The population density of Toole is sparse in comparison to the density of Montana at 6.8 persons per square mile (2.6 km^2). The least densely populated county in Montana is Carter with 0.3 persons per square mile (CEIC, 2011a).

The population of Toole County decreased by about 100 residents from 2000 to 2009 (Census, 2010). There are three incorporated locations within Toole County: the city of Shelby and the towns of Sunburst and Kevin (CEIC, 2003b). BSCSP's proposed production well site would be approximately 12 miles (19 km) northeast of Kevin, and about 20 miles (32 km) northeast of Shelby (See Figure 2.2.1-2). The injection site would be located about 8 miles (13 km) east of Sunburst (BSCSP, 2011b).

The towns within 15 miles (24 km) of the BSCSP's proposed project site followed the trend of Toole County between 2000 and 2009 and had declining populations (Census, 2010). The only city within the ROI is Shelby, which had an increasing population (Table 4.8.1.1-1).

Table 4.8.1.1-1. ROI Population Estimates for 2000 and 2009			
	Population Year 2000	**Population Year 2009**	**Percent Change**
Toole County	5,262	5,151	-2
Kevin Town	178	143	-20
Sunburst Town	414	332	-20
Shelby City	3,229	3,523	+9

Source: (Census, 2010)

While populations over the age of 25 within the ROI are more likely to have completed high school than the national average, the percentage having a college education is 3-8% lower. This may reflect the lack of facilities dedicated to offer higher education courses within the county, compared to the two high schools it hosts (Toole County, No date[b]).

Table 4.8.1.1-2. 2005-2009 Age and Education Data for the ROI, State, and Nation				
Area	**Median Age**	**Population Over the Age of 65 (%)**	**Population Over 25 with High School Education (%)**	**Population Over 25 with College Education (%)**
United States	37	13	85	28
Montana	39	14	90	27
Toole County	41	15	86	20
Kevin Town	NA	NA	NA	NA
Sunburst Town	42	16	94	24
Shelby City	40	14	91	19

Sources: (Census, No date[a]; Census, No date[b]; Census, No date[c]; Census, No date[d]; Census, No date[e])
Note: NA means this data was not available.

4.8.1.2 Effects of BSCSP's Proposed Project

The temporary additional workforce required by BSCSP's proposed project (See Table 4.8.2.2) is not expected to impose additional local government expenditures through a need for new roads, schools, or other infrastructure; and there is no expected negative impact to existing educational facilities. The anticipated result of additional funds generated through local taxes to educational facilities would be minor and beneficial. The minimal effect on local labor conditions and the economy is not expected to create any measurable draw for populations to move into or out of the area. There are only minor effects to populations and education within the ROI as a result of the BSCSP's proposed project, and these impacts would not exceed the significance threshold.

4.8.1.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not be implemented. Current trends in population and education would continue, and no changes to these trends because of this alternative would be anticipated. Therefore, the impacts from implementing the no-action alternative are expected to be below the significance threshold.

4.8.1.4 Cumulative Effects

BSCSP's proposed project is not expected to account for any noticeable population changes in the ROI as described in Section 4.8.1.2. The other projects listed in Section 1.4.1 are also not expected to require a migration of people to the area to fulfill the direct or indirect labor requirements; most of the required temporary direct labor would not employ the ROI residents, and materials would be imported as described in Section 4.8.2. The ROI's social infrastructure should be able to accommodate the actual local labor requirements from BSCSP's proposed project and the projects listed in Section 1.4, given the duration and scope of the projects and the loss of population in the area in the last decade. When considered in combination with other current and proposed projects in the area, the cumulative effects would not be expected to exceed the threshold of significance.

4.8.2 Employment and Income

4.8.2.1 Description

Toole County has a civilian labor force population of 2,145 people (Table 4.8.2.1). Industries in the county include oil and gas extraction, mining, agriculture, utilities, transportation, and warehousing. Productive oil fields of the 1920s and 1930s near Sunburst and Kevin are still in operation today (USDA, 2006). In the county, 71 miles (114 km) of pipelines for crude oil are in operation. Toole County also has an open Class II landfill (Toole County, No date[b]).

In 2009, there were an estimated 499 farms and 196 private nonfarm establishments in the county. At 160 employees, the largest employer in the county is the privately owned Crossroads Correctional Facility located in Shelby. In addition, U.S. Border Patrol employs local security professionals for the border crossing facility in Sweetgrass and stations located in both Shelby and Sunburst. The Sweetgrass border crossing facility is open 24/7 and is located along Interstate 15 (Toole County, No date[b]).

Currently, Glacier Wind Farm with 140 wind towers operates within Toole and Glacier County. Another wind farm is scheduled for construction on the Toole County border. Rim Rock Wind Farm will be located 25 miles north of the first wind farm and is expected to become operational in 2012. Together the wind farms are expected to produce more than 500 megawatts. NaturEner USA operates both wind farms and has headquarters in San Francisco, California. The company has additional facilities in Ethridge, Montana (Toole County, No date[b], NaturEner, No date).

According to the 2009 census data, Toole County had a total personal income (TPI) of $185,842,000 and ranked 31st in the state. This is an approximately 66% increase from 1999 TPI when Toole County ranked 34th in the state. Toole County's average annual growth rate from 1999 to 2009 was 5.2%, which is similar to the state's 5.5%. However, the percent change of TPI from 2008 to 2009 for Toole County was a 6.2% decrease, while the state experienced a 0.5% decrease and the nation had a 1.7% decrease (Bearfacts, 2009).

The per capita income within the ROI is roughly 70% of the national per capita income and 85% of the state per capita income (Census, No date[d]; Census, No date[e]). Despite this disparity,

the percentage of families and individuals living below the poverty level within the county is similar to national and state levels. This is primarily due to the less expensive cost of living associated with Toole County as indicated by the considerably cheaper housing values within Toole County (See Table 4.8.2.1). The most common industry in the state of Montana, City of Shelby, and town of Sunburst is education. In the town of Kevin, transportation warehousing and utilities is the most common industry (Census, No date[f]).

Table 4.8.2.1. 2005-2009 Income and Employment Conditions for ROI, MT, and U.S.

	Labor Force Estimates (People)	Per Capita Income ($)	Families Below Poverty Level (%)	Individuals Below Poverty Level (%)	Unemployment (%)	Owner-occupied Homes Median Value ($)
United States	150 million	27,041	10	14	7.9	185,400
Montana	501,225	22,881	10	15	5.7	162,100
Toole County	2,145	19,271	10	15	1.7	88,900
Sunburst Town	202	19,753	22	10	6.1	69,400
Shelby City	1,281	19,131	5	10	1.3	91,100

Sources: (Census, No date[a]; Census, No date[b]; Census, No date[c]; Census, No date[d]; Census, No date[e]; Census, No date[f])

4.8.2.2 Effects of BSCSP's Proposed Project

The scope and type of work to be performed, including construction, drilling, and monitoring, are all similar to standard industrial oil field activities that already exist in BSCSP's proposed project area and would not provide any exceptional amount of employment (Table 4.8.2.2).

Table 4.8.2.2. Estimates of Work Provided Per Task by BSCSP's Proposed Project

Phase of Project	Average Annual FTE
Site Characterization	19
Well Drilling/Completion	13
Transportation/Injection	3
Operational Monitoring	12
Project Injection Monitoring	10
Total	57

Source: (Tollefson, 2011e). Note: FTE is full-time equivalent.

Some of the above employment would occur outside of Toole County, such as Barnard College in New York. However, even if all the average annual FTEs for the project that occurred in one year represented new employment in Toole County, BSCSP's proposed project would represent approximately 3% of the County's labor force. Consequently, the actual employment would be expected to beneficial but less than significance threshold.

The total cost of BSCSP's proposed project is $81.4 million. However, BSCSP's cost share is mostly in-kind donations for project support, such as software, equipment, and expertise. Since no currency is being exchanged, the federal share ($63.8 million) is the basis of this analysis because the currency is the economic activity stimulant (BSCSP, 2012a). Over the eight-year

duration of BSCSP's proposed project, the average federal contribution is expected to be approximately $8 million. The approximately $8 million of federal cost share is only used for comparison to Toole County's economic activity for NEPA analysis. In fact, the majority of the project's costs would be incurred in the first few project years, and not all of the project costs are expected to transfer directly to the residents of Toole County. However, for purposes of comparison, the average annual federal contribution of $8 million would represent approximately 4.3% of Toole County's 2009 TPI of $185,842,000, which is about the annual average growth rate experienced in Toole County during the last decade. The true breakdown of expenses would result in less than this amount entering the county's economy. The county would receive less than the total project costs because some of the employment and activities would occur outside of the county, the supplies would mostly be imported to the area, and the resulting indirect spending would occur outside of the county. However, the employment and spending that would occur in Toole County would be beneficial and would result in some minor indirect expenditures, such as hotel and other service industries employees having some additional money. No negative socioeconomic effects are anticipated. Beneficial impacts may include a temporary increase in employment opportunities and local government revenue associated with sales and payroll taxes. Minor beneficial employment and economic impacts associated with the long-term operation of BSCSP's proposed project are anticipated. Therefore, the impacts from implementing the BSCSP's proposed project would be expected to be below the significance threshold.

4.8.2.3 Effects of No-Action

The no-action alternative would mean that DOE funds would not be used to support the proposed activities, including drilling, construction, monitoring, and data collection. Current trends in employment, production, and commercial activity would be expected to continue in their present pattern. No changes to the existing site condition or management would be anticipated, nor would any economic or employment changes within the ROI be anticipated. Therefore, the impacts from implementing the no-action alternative would be expected to be below the significance threshold.

4.8.2.4 Cumulative Effects

BSCSP's proposed project is not expected to account for any noticeable change to income or employment within the ROI as described in Section 4.8.2.2. Even if all 5% of the estimated annual BSCSP's proposed project cost was spent in Toole County and was in addition to Toole County's average annual growth rate of approximately 5%, this would represent an average annual growth rate of 10%, which would be minor. However, as described in Section 4.8.2.2, most of the project expenditures are likely to occur outside of the county, such as universities to analyze samples or manufacturing facilities that build compressors. Consequently, much less than 5% would be expected to be spent in Toole County from BSCSP's proposed project. Toole County experienced over 6% decrease in TPI from 2008 to 2009. Consequently, BSCSP's proposed project and the other projects in Section 1.4 could help return the county to previous economic levels or even return it to previous growth rates depending on how much of the projects' employment derive from the county's unemployed or new people relocating to the county, as well as the amount of project materials produced in the county. Given the types of

projects and the industries in Toole County, most of the materials would likely be imported into Toole County. Further, some of the projects listed in Section 1.4 are in neighboring counties or elsewhere in Montana, which further reduces the economic benefits to the ROI. Consequently, the projects listed in Section 1.4 would likely have only minor beneficial contributions to Toole County's economy. Therefore, when considered in combination with other current and proposed projects in the area, including oil and gas projects, the cumulative effects would be expected to be minor and would not exceed the threshold of significance.

4.8.3 Infrastructure

4.8.3.1 Description

The only utility service (from the categories of water, wastewater, gas, electricity, and communications) available at the current site is natural gas. The utility components discussed in this section include water supply, wastewater system, natural gas, and solid waste management.

Utilities. The BSCSP's proposed project would be in the Kevin Township of Toole County, Montana. Utilities are provided for Shelby and surrounding communities by the following companies listed in Table 4.8.3.1-1.

Table 4.8.3.1-1. Toole County, Montana Utility Providers

Company Name	Utility
Big Flat Electric Co-Op	Electricity
Energy West	Gas
Northern Telephone Co-Op	Telephone
Qwest Communications	Cable/Telephone/Internet
Northwestern Energy	Electricity/Gas
Northern Energy	Propane
Galata County Water District	Water

Source: (dexknows, 2011)

Galata County Water District is currently a partner in the North Central Montana Regional Water System Project that was designed to ensure a safe and sustainable water supply for residents of North Central Montana through community partnerships (Rocky Boy's, 2011).

Transportation. Interstate (I) 15 travels north/south through Toole County and is the main thoroughfare from Shelby to Sunburst. County Road 215 travels east/west and changes names at the I-15 interchange traveling west from Oilmont (Oilmont Highway) to Kevin. Average daily traffic counts (AADT) are very low as shown in Table 4.8.3.1-2 for the intersections near the proposed site. Kevin North becomes Sunburst Road and is a direct secondary route from Kevin leading to the sites at Kevin Dome two miles east of Sunburst. Toole County is primarily rural, with two-lane roads (MDOT, 2009).

Table 4.8.3.1-2. Intersections Near Proposed Site and AADT	
Intersection	**AADT**
I-15 and County Road 215	555
I-15 and Oilmont Highway	409
I-15 Sunburst Interchange East	2,330
I-15 Sunburst Interchange West	2,240

Source: (MDOT, 2009)

The nearest railroad spur is approximately six miles west of the proposed well sites. The closest airport, which services the region, is the Toole County Airport approximately 25 miles south of the proposed sites. Toole County offers public transportation to the Shelby, Great Falls, Sweet Grass area with limited stops and service times available (Toole County, No date[c]). Several operating and abandoned pipelines and transmission right-of-ways are present within the general project area.

4.8.3.2 Effects of BSCSP's Proposed Project

BSCSP's proposed project would have short-term, minor, and adverse effects on traffic, road use, and infrastructure. Short-term effects would be primarily due to installation of pipeline segments along the pipeline corridor, workers' commutes, and the delivery of equipment and supplies to the well sites. Long-term negligible effects would be primarily due to monitoring and maintenance activities for all areas associated with BSCSP's proposed project. All of these impacts would be less than the significance threshold.

Transportation. An approximate five-mile aggregate access road within the proposed project area may be necessary during BSCSP's proposed project. The majority of site preparation and installation-related traffic is likely to occur in the early morning and late evening, outside peak traffic periods. Due to the limited number of workers and temporary nature of the drilling and installation activities, roadways would not experience congestion-related delays.

During pipeline installation, construction at cross roads, and utility easements work would be accomplished in accordance with applicable crossing permits and approval requirements. After which, they would be restored to preconstruction conditions. If considerable time would be required for an installation of components, provisions would be made for detours and other measures to permit traffic flow during construction and pipeline installation. Existing power line segments would be crossed by methods acceptable to the operator of the individual rights-of-way.

Utilities. The infrastructure required to support BSCSP's proposed project is outlined in Section 2.2.5. It includes the injection well, monitoring wells, compressor station, and pipeline installation. Altamont Energy would supply potable and non-potable water, solid waste disposal, and natural gas to the proposed site. These effects would be minor.

4.8.3.3 Effects of No-Action

The no-action alternative would have no impacts to infrastructure because no additional equipment would be required for installation of new systems and associated drilling activities.

Infrastructure, utility, and transportation resources would remain unchanged when compared to existing conditions. As a result, minimal differences exist between BSCSP's proposed project and no-action alternatives with respect to infrastructure.

4.8.3.4 Cumulative Effects

Cumulative impacts associated with implementation of BSCSP's proposed project would be negligible. The area and its associated road network has been part of ongoing oil and gas field operations as well as industrial agricultural operations. There are no planned or reasonably foreseeable actions proposed for the area that may affect local road use or traffic patterns. The introduction of a temporary increase in traffic during construction can be easily accommodated by the existing road systems with only minor disruptions. BSCSP's proposed project would not noticeably affect or disrupt the normal or routine functions of public institutions, roads, electricity, and other public utilities and services in BSCSP's proposed project area. Continuing operations of the BSCSP project following construction would have no additional impact and would not exceed the impact significance threshold.

4.8.4 Parks and Recreation

4.8.4.1 Description

Sweet Grass Hills Special Recreation Management Area (SRMA) was also designated as an area of critical environmental concern (ACEC) in 1996 and as a traditional cultural property (TCP) in 2005 because of the land's religious importance to and cultural use by Native Americans (BLM, 2010a; BLM, 1996). The SRMA as defined within the Final Sweet Grass Hills EIS is northeast of BSCSP's proposed project site (BLM, 1996). Unlike BLM lands in BSCSP's proposed project area, the Sweet Grass Hills SRMA forbids the use of off road recreational vehicles. The most popular use of Sweet Grass Hills SRMA is hiking (BLM, 1997).

The town of Sunburst hosts Engel Memorial Park. It is 1.5 acres in size and is located 8 miles (13 km) from BSCSP's proposed project site (ESRI, 2010).

The city of Shelby about 20 miles (32 km) from BSCSP's proposed project site hosts 11.5 acres of parks, including Lincoln Park, Aronow Park, Johnson Memorial Park, and Champions Park (Shelby, 2011a; Shelby, 2011b). Champions Park hosted a famous world heavyweight championship in 1923 where Jack Dempsey boxed with Tommy Gibbons. The site is being developed into an interpretive center memorializing the famous match (Champions Park, 2006). Roadrunner Recreational Trail is also in Shelby with several miles of paved trails. Roadrunner Recreational Trail has two trail loops of two or five miles available. The trail provides non-motorized activities such as bicycling, walking, wildlife viewing, and snowshoeing. The trail views include Sweet Grass Hills (Montana, No date).

South of Shelby, roughly 25 miles (40 km) from BSCSP's proposed project site along the Pondera County border, is Williamson Park Campground that is open to Recreational Vehicle Camping and river fishing. Along the western side of Williamson Park is Marias Valley Golf and Country Club. It hosts 18 holes on its nearly 300 acre (1.2 km^2) property (Russell, No date).

Conservation easements through the federal Fish and Wildlife Service protect 9,251 acres (37 km^2) of Toole County (Toole County, No date[b]).

4.8.4.2 Effects of BSCSP's Proposed Project

BSCSP's proposed project activities would occur on USFWS, BLM, state, and private lands. No designated parks are within or immediately adjacent to the project area. Due to the distance between the parks and BSCSP's proposed project, impacts to the parks would not be expected. The exception would be visual impacts. BSCSP's proposed project site is in the viewshed of some of the ROI recreational areas. However, the proposed infrastructure and activities are similar in nature to the current surrounding oil and gas activities. Consequently, recreational users of the area have likely acclimated to these types of activities occurring in the viewshed, which reduces impacts. BSCSP's proposed project is mostly on private land, which should reduce any interference with hunting. The permitting processes would identify and mitigate any conflicts with other users on state and federal lands.

BSCSP's proposed project does not include any permanent structures on BLM or USFWS lands. BSCSP plans to use BLM lands within the project area only temporarily for seismic surveying. This would not interfere with any substantial recreational use of these BLM lands. Recreational use on BLM lands including the Sweet Grass SRMA would not be affected to an extent that warrants more detailed analysis (Jaynes, 2011). Consequently, only negligible impacts to parks and recreation are expected to result from BSCSP's proposed project. Therefore, impacts from implementing BSCSP's proposed project are expected to be below the significance threshold.

4.8.4.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not be implemented. No change would be expected to occur in the existing condition or uses of the parks or BSCSP's proposed project site. Therefore, the impacts to parks and recreation would be expected to be below the significance threshold.

4.8.4.4 Cumulative Effects

BSCSP's proposed project is not expected to account for any noticeable change to parks and recreation within the ROI as described in Section 4.8.4.2. When considered in combination with other current and proposed projects in the ROI, minor impacts may be possible to visual aspects of recreation within the ROI. The wind turbines from the Glacier Wind Farm project and future wind turbines from the Rim Rock Wind Farm, along the Toole and Glacier County border, as well as the oil and gas projects may be visible from some recreational sites depending on weather and other conditions described in Section 4.8.5. These visual impacts are expected to influence only a small portion of recreational experiences and would not exceed the threshold of significance given distances between the projects and the parks. Some of the proposed projects are expansions of the current energy production activities in the area, which means some of the recreational users would be acclimated to these activities. The same permitting and review processes on federal and state lands would protect recreational users from substantial impacts from projects listed in Section 1.4. Further, some of the proposed projects are on private lands,

which reduce the accessibility of those lands for recreation. When considered in combination with other current and proposed projects in the ROI, cumulative recreational impacts would not be expected to exceed the threshold of significance.

4.8.5 Visual Resources

4.8.5.1 Description

The term "visual resources" is often used interchangeably with "scenic resources" or "aesthetics." The core notion of visual resources or a "viewshed" denotes an interaction between a human observer and a landscape being observed. The inherently subjective response of the observant human viewer to the various natural and/or artificial elements of a given landscape and the arrangement and interaction between them is at the heart of a visual resources impacts analysis. Consequently, the observer is more responsive to items that are visually inconsistent with those expected at a given site, given the surroundings and the history of the site. A related term, visual quality, is what viewers like and dislike about the visual resources, which comprise a particular scene.

BSCSP's proposed project area is mostly farmland with some hills. Over 70 percent of the project area is in agriculture (see Section 4.7). In the distance, the Sweet Grass Hills are visible (BSCSP et al., 2011). The majority of the project infrastructure would occur on private land and one section of state land (BSCSP, 2012a). As shown in Figure 1.4.2, oil and gas development is extensive in BSCSP's proposed project area. According to BLM, the area is Class IV visually (Jaynes, 2011). Class IV areas are the BLM designation for the lowest relative value of visual quality, and areas of this character are allowed major changes (BLM, No date). The closest Class I visual area is the Bob Marshall Wilderness Area, which is 70 miles southwest of the project (ESRI, 2010; USEPA, 2011f).

The visual map below (Figure 4.8.5.1) depicts a maximum viewshed taking into account topography. Vegetation and weather are two factors that can reduce the maximum viewshed from the below depiction. The viewshed analysis is 360 degrees from a single point. The viewshed analysis was conducted at the highest point (West Butte) located northeast of the proposed seismic survey and project boundaries. The distance from the seismic survey project boundary to this butte is six miles. The analysis shows that the project, production, pipeline, and proposed seismic areas are visible from the apex of West Butte, but they would not be placed any closer than shown on the map in Figure 4.8.5.1.

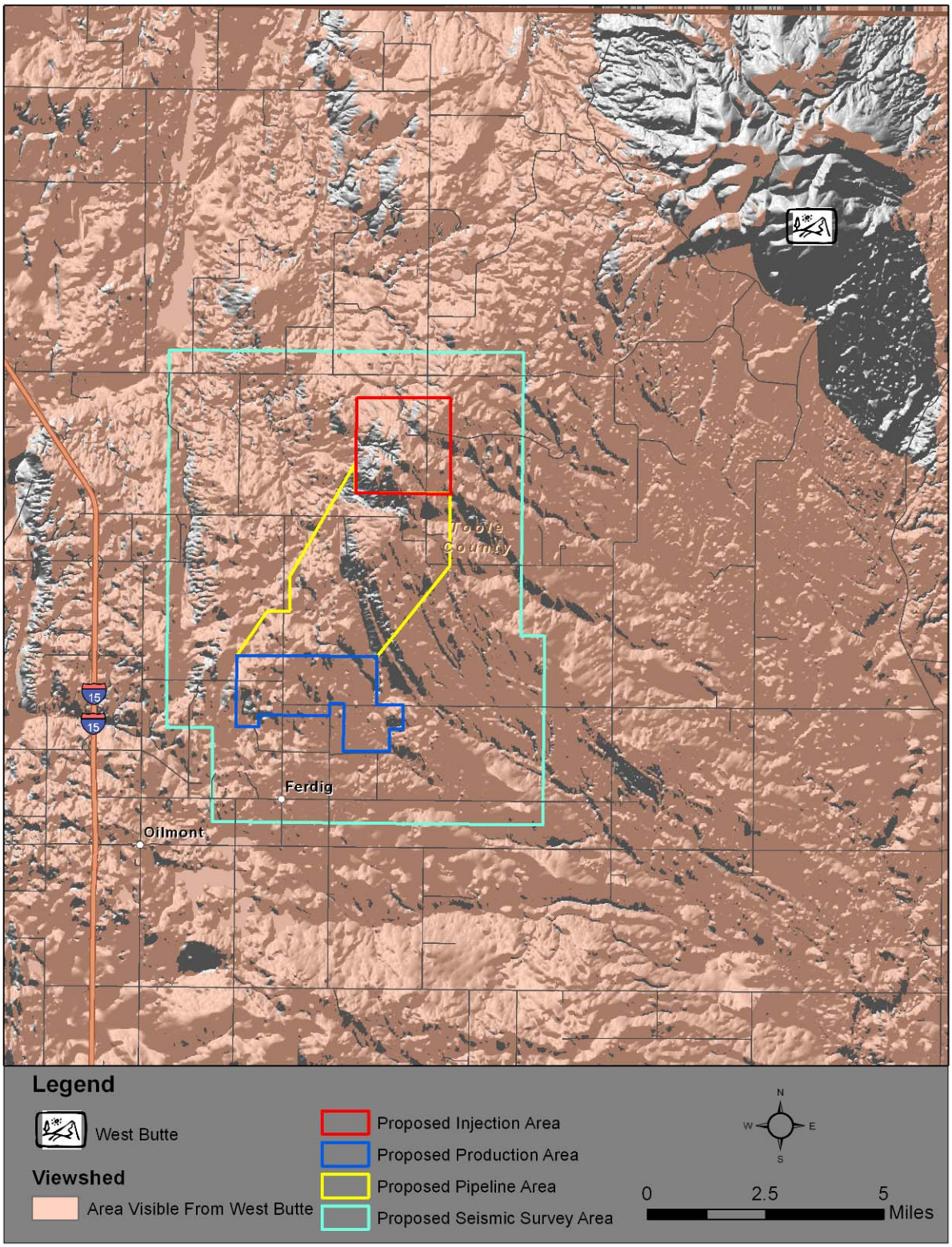


Figure 4.8.5.1. Viewshed Analysis Map from West Butte
Sources: (ESRI, 2010; USGS, 2009)

4.8.5.2 Effects of BSCSP's Proposed Project

BSCSP's proposed project's construction would introduce heavy equipment and some infrastructure into the project area. Heavy equipment is already present at the project site with the agriculture and oil and gas operations. The additional infrastructure would be consistent with the industrial nature nearby (see Section 1.4.2). As described in Section 1.4.2, there are over 2,000 wells within a five-mile radius of BSCSP's proposed project area and many thousands of miles of pipelines. Consequently, BSCSP's proposed project's few miles of pipeline and less than a dozen new wells with associated equipment would be a minor increase in existing elements of the visual landscape. They would be expected and consistent with the current landscape, reducing the visual impacts. After any post-project use of the wells, the wells and associated equipment would be decommissioned according to all applicable regulations, permits, and landowner agreements. There should be no permanent changes to the visual landscape visible from a distance. Allowing some of the areas to convert back to pre-project land cover would reduce the visual impacts' duration, especially with any re-vegetation per the landowner agreements. Further, BSCSP's proposed project is in a rural area with few visitors, reducing the number of affected viewers.

As depicted in Figure 4.8.5.1, most of the surrounding landscape is visible from the top of West Butte, the closest of the Sweet Grass Hills to the project. The quantity of these human activities visible from West Butte depends on weather, vegetation, and location of the viewer. However, the view from West Butte already contains the industrial activities of oil and gas and agriculture in proximity to the elements planned in BSCSP's proposed project. With very similar activities nearby, viewers would expect BSCSP's proposed project components, which would reduce the potential for the visual changes to be objectionable. The proposed project would be consistent with BLM's Class IV visual classification for the area. However, Native American Indian Tribes have expressed concern about the potential visual impact that project activities would have on their use of the Sweet Grass Hills for religious and cultural reasons. Details regarding cultural resource impacts are in Section 4.10.

BSCSP's proposed project should not change the visual classification of the area, and the temporary visual changes should not be objectionable to a number of local residents and frequent visitors. Consequently, the impacts to visual resources would be expected to be less than the significance threshold.

4.8.5.3 Effects of No-Action

Under the no-action alternative, BSCSP's proposed project would not proceed. Consequently, no changes to the current visual landscape would occur, so there would be no impacts to visual quality.

4.8.5.4 Cumulative Effects

The Kevin Dome area has had agriculture and oil and gas operations for several decades (Sections 1.4.2 and 4.7). More new wells and associated infrastructure are expected in the area regardless of this project. A recent project that has introduced new elements in Kevin Dome's

viewshed is the recently completed Glacier Wind Farm, which is visible in route to the project but not from the project itself. Some of the projects listed in Section 1.4.1 are not visible from BSCSP's proposed project site. The West HiLine RMP may result in management that would improve visual quality. The magnitude of benefits will depend on the finalized plan, and visual improvements are not currently listed as a major issue. The proposed Rim Rock Wind Farm would be closer to BSCSP's proposed project and the Sweet Grass Hills than the current wind farm. The projects listed in Sections 1.4.1 and 1.4.2 that are visible from BSCSP's proposed project site would be activities that would also be expected in the area based on past and current uses. The only possible exception would be the Rim Rock Wind Farm, which may be visible from the proposed project depending on final design. When considered in combination with other current and proposed projects in the ROI, cumulative visual impacts would not be expected to exceed the threshold of significance.

4.8.6 Noise

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities that are part of everyday life, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz (Hz) are used to quantify sound frequency. The human ear responds differently to different frequencies. A-weighing, described in A-weighted decibels (dBA), approximates this frequency response to express accurately the perception of sound by humans. Sounds encountered in daily life and their approximate level in dBA are provided in Table 4.8.6.

Table 4.8.6. Common Sounds and Their Levels

Outdoor	Sound level (dBA)	Indoor
Snowmobile	100	Subway train
Tractor	90	Garbage disposal
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: (Harris, 1998)

The dBA noise metric describes steady noise levels. Very few noises are, in fact, constant; therefore, a noise metric, day-night sound level (DNL), has been developed. DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 P.M. to 7 A.M.). DNL is a useful descriptor for noise because (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition,

equivalent sound level (L_{eq}) is often used to describe the overall noise environment. L_{eq} is the average sound level in dB.

The Noise Control Act of 1972 (Public Law 92-574) directs Federal agencies to comply with applicable Federal, state, interstate, and local noise control regulations. In 1974, the USEPA provided information suggesting that continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. The State of Montana, Toole County, and Kevin Township do not regulate noise.

4.8.6.1 Description

Existing sources of noise near the pipeline and drilling site include light traffic conditions with very few automobiles and trucks passing, high-altitude aircraft over flights, and natural noises such as wind gusts, and animal and bird vocalizations. The majority of the areas surrounding these locations can be categorized as rural or remote. The background sound at the well sites is likely distant traffic noise from I-15. There are no noise sensitive receptors (churches, schools, hospitals, or residences) in the immediate vicinity of BSCSP's proposed project. Existing noise levels (DNL and L_{eq}) were estimated for the areas associated with BSCSP's proposed project using the techniques specified in the *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term Measurements with an Observer Present* (Table 4.8.6.1) (ANSI, 2003).

Table 4.8.6.1. Estimated Background Noise Levels

Estimated Existing Sound Levels (dBA)			Description
ADNL	L_{eq} (daytime)	L_{eq} (nighttime)	
Less than 45	Less than 43	Less than 37	Very Quiet Rural/Remote

Source: (ANSI, 2003)
Note: ADNL is A-weighted day-night average sound level.

4.8.6.2 Effects of BSCSP's Proposed Project

Short-term, negligible and long-term, minor effects to the noise environment would be likely with the implementation of BSCSP's proposed project. The effects would be primarily due to construction equipment and truck noise during drilling of the wells and pipeline installation, and the operation of the proposed compressor.

Individual pieces of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. Table 4.8.6.2 presents typical noise levels (dBA at 50 feet) that USEPA has estimated for the main phases of outdoor construction.

Table 4.8.6.2. Noise Levels Associated with Outdoor Construction

Construction Phase	L_{eq} (dBA) at 50 feet from Source
Ground Clearing	84
Excavation, Grading	89
Foundations	78

Table 4.8.6.2. Noise Levels Associated with Outdoor Construction	
Structural	85
Finishing	89

Source: (USEPA, 1974)

With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction and drilling sites. The zone of relatively high construction noise levels typically extends to distances of 400 to 800 ft (122 – 244 m) from the site of major equipment operations. Locations within 1,000 ft (305 m) would experience appreciable levels of heavy equipment noise.

Drilling. The BSCSP's proposed project would involve drilling operations for the new injection, production, and monitoring wells. Components of the drilling equipment include the drill rig, mud pumps, and diesel generators. The actual drilling equipment would operate 24-hours per day, seven days per week, for up to six months total. These effects would be temporary and less than the significance threshold. The nearest noise sensitive area (NSA) is approximately 2.5 miles (4.0 km) from the drilling sites. It is expected that at this distance heavy equipment noise may be audible, however, not highly intrusive or annoying. The noise would end after the drilling phase. These effects would be less than the significance threshold.

The generator and combined diesel driven systems would have standard exhaust mufflers. Barriers could be installed around the noisy components to diminish the noise; however, they would not likely be necessary given the distance to the nearest NSA. Drilling noise would likely dominate the soundscape for all onsite personnel. Personnel, particularly equipment operators, would don adequate personal hearing protection to limit exposure and ensure compliance with Federal health and safety regulations.

Pipeline Line Construction. Individual phases of installation generally would proceed at rates ranging from several hundred feet to one mile per day. Due to the assembly-line method of construction for the pipeline, activities may last several weeks in one area on an intermittent basis. These activities typically would be short-term and limited to daylight hours. Construction equipment would be operated on an as-needed basis during those periods and would be maintained to manufacturer's specification to minimize noise impacts. Construction is mainly in a rural area with few noise receptors near the proposed construction right-of-way. These effects would be less than the significance threshold.

Noise from Seismic Survey. A description of the Vibroseis truck's function is outlined in Section 2.2.3. The noise related to the seismic survey is from the vibrators of the large Cummins diesel engines. The ground borne vibration would be felt within 100 feet of the survey equipment, which due to the assembly-line method would be occupied for a couple of minutes at each site. These activities typically would be limited to daylight hours. These effects would be less than the significance threshold.

Operational Noise. The compressor facility is in the preliminary design stages. Therefore, a complete equipment list and associated manufacturers' specifications are not finalized. However, the only major noise-producing equipment expected is a 500-1000 hp [372-745

kilowatt (kW)] compressor. This compressor would be natural gas fired, completely enclosed, and operate 24 hours per day 7 days per week. Noise levels that would be generated by operation of the compressor at the nearest NSA were calculated and on average would be below the background levels. Depending on wind conditions, it is possible that they would be audible, but distant, during the nighttime. Because of the limited amount of noise and the distance to the nearest NSA, these effects would be less than the significance threshold. Detailed noise calculations are in Appendix C.

BSCSP's proposed project would increase traffic noise slightly on the surrounding roads from limited operational activities at the well sites and maintenance activities of the pipeline. Increases would be localized, concentrated predominantly on the main roads near Kevin Dome, and would not constitute a perceptible change in the overall noise environment when compared to existing conditions. These effects would be negligible.

Decommissioning. Noise from decommissioning activities would be similar in nature to construction noise. However, these activities and associated noise would be less intense and shorter in duration. These effects would be less than the significance threshold.

4.8.6.3 Effects of No-Action

The no-action alternative would have no impacts to noise because no additional site preparation, drilling, pipeline installation, or compressor operations would occur. Noise levels would remain unchanged when compared to existing conditions.

4.8.6.4 Cumulative Effects

BSCSP's proposed project would introduce short-term incremental increases to the noise environment. All noise associated with BSCSP's proposed project would be in addition to other on-going commercial operations and projects in the area. These increases would be relatively minor and have a negligible cumulative effect on the overall noise environment, which is less than the significance threshold.

4.8.7 Environmental Justice

Executive Order 12898 on Environmental Justice recognizes the importance of using the NEPA process to identify and address, as appropriate, any disproportionately high and adverse health or environmental effects of federal programs, policies, or activities on minority populations and low-income groups. The provisions of Executive Order 12898 apply equally to Native American programs. Consistent with Executive Order 12898, the CEQ called upon federal agencies to actively scrutinize the following issues with respect to environmental justice:

- The racial and economic composition of affected communities;
- Health-related issues that may amplify Project effects on minority or low-income individuals; and
- Public participation strategies, including community or tribal participation in the process (ENTRIX, 2010).

The USEPA provides guidance on determining whether there is a minority or low-income community that should be addressed in a NEPA analysis. Minority population issues must be addressed when they comprise over 50 percent of an affected area or when the minority population percentage of the affected area is substantially greater than the minority percentage in the larger area of the general population. Low-income populations are those that fall within the annual statistical poverty thresholds as defined by the U.S. Department of Commerce's Bureau of the Census Population Reports (ENTRIX, 2010). If minority or low-income groups within the affected community are not expected to experience disproportionately high and adverse effects, then the impact is not expected to exceed the significance threshold.

4.8.7.1 Description

The largest minority groups within Toole County are American Indian and Alaska Natives at 3% of the county population, Hispanic or Latino at 2.1% of the residents, and Black or African American at 0.7% of the residents (Census, No date[a]). In the city of Shelby, the percentage of minority populations roughly matches that of the county. The town of Sunburst was identified in Table 4.8.2.1 to have higher per capita income than both the city of Shelby and Toole County. The town of Shelby hosts a smaller percentage of minority races. In Sunburst, the percentage of residents identified as American Indian and Alaska Native drops to 1.9%, while no individuals identify their race as Hispanic or Latino and Black or African American (Table 4.8.7.1).

Table 4.8.2.1 contains poverty statistics. All localities but Sunburst had similar populations in poverty to the state and nation. The town of Sunburst has more than twice the percentage of families in poverty than the state and nation (see Section 4.8.2.1).

Table 4.8.7.1. Self-Identified Race of the Populations in ROI in 2005 to 2009

Area	White (%)	American Indian and Alaska Native (%)	Hispanic or Latino (%)	Black or African American (%)
Toole County	95.1	3.0	2.1	0.7
Sunburst Town	98.1	1.9	0.0	0.0
Shelby City	93.4	3.8	3.2	1.1

Sources: (Census, No date[a]; Census, No date[b]; Census, No date[c]). Note: percentages do not add to 100 because Hispanic can be more than one race and people can identify with multiple races.

4.8.7.2 Effects of BSCSP's Proposed Project

As described in Section 2.2.3, seismic survey crews would stay in Shelby, Montana hotels. This would provide business in Shelby with greater opportunity for revenue than elsewhere in the county that have lower minority populations. While this opportunity for revenue may not benefit the minority populations of Shelby directly, it is expected to be of minor indirect benefit to the community.

As described in Section 2.2.5, wastes from BSCSP's proposed project are disposed onsite, in the High Plains Landfill, and hauled off to an Altamont Energy injection facility. None of these actions would be expected to produce any hazardous conditions for residential populations.

BSCSP's proposed project would not be expected to produce any actions that disproportionally disadvantage any minority or low-income populations. The impacts on environmental justice from implementing BSCSP's proposed project are expected to be below the significance threshold.

4.8.7.3 Effects of No-Action

Under the no-action alternative, the BSCSP's proposed project would not be implemented. No changes to local demographic composition or community setting and character would be anticipated under this alternative. Therefore, the impacts on environmental justice from implementing the no-action alternative are expected to be below the significance threshold.

4.8.7.4 Cumulative Effects

BSCSP's proposed project is not expected to account for any noticeable effect on minority populations or low-income groups within the ROI and BSCSP's proposed project is not on or adjacent to tribal lands. Further, BSCSP's proposed impacts would be mostly minor or beneficial (see Table 1.5). The other projects listed in Section 1.4 would likely have overall beneficial or minor adverse impacts to the community with all regulatory and permitting compliance. Any adverse impacts from any of the projects would likely be experienced evenly across the populations. Impacts to tribal resources are analyzed in Section 4.10. When considered in combination with other current and proposed projects in the area, the cumulative effects would be expected to be minor and would not exceed the threshold of significance.

4.9 Human Health and Safety

4.9.1 Description

Section 4.1 above discusses the potential for local air quality impacts because of BSCSP's proposed project. Air pollution causes human health problems. Air pollution can cause breathing problems; throat and eye irritation; cancer; birth defects; and damage to immune, neurological, reproductive, and respiratory systems (USEPA, 2011g). National and state ambient air quality standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. In addition, OSHA regulations specify appropriate protective measures for all employees.

Spills from construction and operation are also a source of possible impacts to human health and safety. Spills can introduce soil contamination and allow exposure pathways to workers and the public. The risks and effects of a spill depend on its composition. A common material used in construction and operation at this site is diesel fuel, which can be spilled. Diesel irritates the lungs and is a skin irritant. Enough diesel exposure can cause death or nervous system damage (ATSDR, 2011). Similarly, waste management is a source of possible human health and safety risks from exposure to contaminants (see Section 4.11).

One potential impact to human health and safety within the project site is CO_2 migration to the surface. CO_2 is heavier than ambient air, colorless, and odorless, which makes it an invisible

hazard (DOE, 2007a). Since it is denser than ambient air, leaked CO_2 would typically pool in hollows and confined spaces until dispersed by wind or other ventilation methods (DOE, 2007a; IPCC, 2005). CO_2 is not normally considered a toxic gas in the generally accepted sense of the term. It is normally present in the atmosphere at a concentration of approximately 0.03%. However, if individuals are exposed to high concentrations for extended periods of time, there are certain risks and health hazards that warrant attention. CO_2 under pressure or at high concentration levels can cause suffocation and permanent brain injury from lack of air (DOE, 2007a). Headache, impaired vision, labored breathing, and mental confusion can also occur from exposure to CO_2. The pressure drop from CO_2 leaks from vessels (pipes) creates a cold hazard, and even the vapor can cause frostbite (IPCC, 2005). Generally, the pooling and large, rapid releases of the CO_2 are the situations of concern for human health and safety instead of small gradual leaks due to concentration level differences (Oldenburg and Unger, 2005; IPCC, 2005; DOE, 2007a).

No general CO_2 exposure standards exist yet for the general public (DOE, 2007a). The immediately dangerous to life and health level of exposure for CO_2 is 5% or 40,000 ppm. For up to several hours, exposure to 0.5 to 1.5% CO_2 in the air typically is not harmful for people with normal health. However, people with impaired health (such as cerebral disease), children, and people involved in complex tasks are more susceptible to the effects of CO_2 exposure. CO_2 exposure impedes people's performance of complex tasks by causing labored breathing, headache, and mental confusion. The occupational standard of maximum allowable concentration of CO_2 in air for eight hours of continuous exposure is 0.5%, and for a short period, it is 3.0% (IPCC, 2005).

Subsurface CO_2 migration in high concentrations can result in risks to human health through contamination of potable water. If the CO_2 migrates to underground aquifers in high concentrations, groundwater can become contaminated (see Section 4.3) due to mobilization of chemicals (such as metals) into the aquifers. By following proper installation and monitoring, as established through permitting requirements (such as USEPA's UIC program), the risks to human health from potable water contamination would be reduced to a *de minimis* levels. Similar to air emissions of CO_2, gradual releases of CO_2 into water sources typically do not cause substantial harm to human health, but rapid releases could (DOE, 2007a).

In the event of a sudden, complete failure of pipe, all the CO_2 in the pipe would be released. The result would be dry ice formation at the break due to the sudden expansion and release of a large gas cloud as the supercritical fluid is converted to CO_2 gas. While the CO_2 gas is non-toxic and non-explosive, a sudden, large release might displace air for nearby workers in the immediate area, but due to the distance and safety measures in place, it is unlikely to present such a hazard beyond the immediate area of the release.

Between 1994 and 2006, there were 31 CO_2 pipeline accidents reported, and there were no injuries or fatalities from these incidents in the United States (DOE, 2007b). Some historical causes of CO_2 pipeline incidences are relief valve failure (4 failures), weld/gasket/valve packing failure (3 failures), corrosion (2 failures), and outside force (1 failure). The incident rate from 1990 to 2002 for CO_2 pipelines in the United States was 0.0002 $mile^{-1}year^{-1}$ (0.00032 $km^{-1}year^{-1}$)

(IPCC, 2005). This rate of failure is comparatively small. For comparison with natural gas pipelines, see Table 4.9.1.

Table 4.9.1. Comparison of Natural Gas Pipelines to CO_2 Pipelines from 1995 to 2005

Category	Natural Gas	CO_2
Miles (km) of Pipeline	304,001 (in 2003) (490,000)	3,300 (5,300)
# of Incidents	960	12
Incidents per mile (km) of pipeline	0.0032 (0.0020)	0.0036 (0.0023)
Property Damage per Incident	$484,000	$42,000
Injuries from Incidents	82	0
Fatalities	29	0

Source: (DOE, 2007a)

DOE requires and BSCSP plans to determine the necessary purification steps and any other safety requirements based on the gas analysis results from the first production well (Tollefson, 2011d; Tollefson, 2011f; Tollefson, 2011g). Potential impurities include nitrogen; small amounts of lower hydrocarbons, such as methane and ethane; and possibly trace amounts of hydrogen sulfide. The impurities may be injected along with the CO_2, such as nitrogen (Tollefson, 2011d). The CO_2 stream would comply with all state and federal safety requirements.

All of the workers on the project would be subject to the same types of health risks that are generally associated with their professions (DOE, 2007a). BSCSP would have hydrogen sulfide safety equipment and would develop and implement a safety plan for the project (BSCSP, 2011b). Further, BSCSP would prepare a risk assessment plan, using a probabilistic assessment of an event's occurrence, as determined by a panel of experts. The risk scenarios would be based on the identification of features, events, and processes that constitute risk to the project. DOE requires and BSCSP plans for the development of mitigation strategies for these scenarios. This process would be ongoing to incorporate the gathered information about the site characteristics (IEAGHG and NETL, 2011).

The construction industry had the most fatal work injuries of any industry in 2010. The 2010 fatal work injury rate per 100,000 full-time equivalent workers was 9.5 for construction workers compared to the 3.5 for all workers (BLS, 2011a). The construction incident rate of total recordable cases of non-fatal occupational injuries and illnesses in 2010 was 4 per 100 full-time workers (BLS, 2011b).

4.9.2 Effects of BSCSP's Proposed Project

BSCSP's proposed project includes production of CO_2; pipe laying; transportation of CO_2; drilling of wells; and injection of supercritical CO_2 as well as monitoring activities, which includes data collection from airplanes. These activities all present risks to human health and safety. The materials and equipment used for construction and operation would meet applicable

industry standards and regulatory requirements. Public notice of the proposed project would be provided, and public hearings would be held as required by applicable regulations. Compliance with applicable regulations and industry standards would reduce risks to human health and safety.

The equipment used for the implementation of the BSCSP's proposed project represents only minimal risks to human health and safety under normal operating conditions. Thus, if BMPs, required maintenance, and applicable regulations are followed, the equipment should pose little risk to human health and safety. Drilling into pressurized formations could release flammable gases like methane. Preventative measures to minimize well blowouts or venting of dangerous gases would be implemented. Measures to avoid the equipment failure caused by high pressure would be executed (DOE, 2007a).

Since most of the construction and operation activities of the BSCSP's proposed project are on state and federal lands, the increase in traffic from workers and delivery of equipment and materials would be partially limited to onsite locations, which reduces risk to pedestrians and the general public. The project is also in a rural area away from towns and most people, which further reduces the potential of exposure to the general public. The air traffic would be coordinated with all applicable groups including nearby airports, and all applicable safety practices would be implemented to avoid accidents. Regardless, BSCSP's proposed project would still represent an increase in traffic, which increases the potential for accidents. However, this incremental increase in traffic would be very limited and would be a *de minimis* increase to the existing movement of materials for commercial operations in the area (see Section 4.8.3).

I-15 is the major highway near the project site (see Section 4.8.3). Additional travel would not substantially increase the volume of traffic on local roadways as described in Section 4.8.3 and would not have a significant impact on human health and safety concerns.

Air emissions from the BSCSP's proposed project are not anticipated to be significant (see Section 4.1). As noted above, the constituents of the CO_2 stream are currently unknown. However, DOE requires and BSCSP plans to determine the necessary steps to treat the CO_2 prior to injection. This reduces the risk of additional air pollutants from contaminants in case of a leak. Following the mitigation measures and BMPs would reduce any impacts to human health from air quality. Further, workers would follow applicable OSHA procedures, which would further reduce the impact to human health. Therefore, the risks to human health and safety due to air emissions would be expected to fall below the impact significance thresholds.

DOE requires and BSCSP plans to employ proper soil erosion and runoff prevention and minimization techniques as part of the project (see Sections 4.2 and 4.3). This would reduce the human health and safety risks from water contamination from runoff and spills. BMPs would be followed to minimize storm water pollutants. Produced water from the drilling would be placed in tanks and unlined pits. The drilling fluids and solids would be removed prior to decommissioning. BSCSP would replace the subsoil. They would reclaim these pits using the stockpiled topsoil and reseed the area per surface owner requirements. This procedure is standard practice for the area (Tollefson, 2011a). All wastewater including operational produced water would be disposed of in compliance with all applicable regulations and proper permits.

Wastewater would be collected and hauled to an injection system facility operated by Altamont Energy (BSCSP, 2011a). Following proper BMPs and regulations would reduce the risk of impacts to human health from wastewater to below the significance threshold.

Materials used in the BSCSP's proposed project that may present a risk to human health and safety would be CO_2, as well as the fuels, lubricants, and solvents from equipment and processes. If safety procedures and BMPs were followed, most spills and leaks from equipment and processes would be of low concentrations as well as nonhazardous and not toxic. This would represent a low risk to human health and safety (DOE, 2007b). Under normal conditions, hazardous and toxic materials can be used safely when appropriate safety precautions are followed (DOE, 2007a). Thus, the minimal concentrations of contaminants in the collected CO_2, as well as any other hazardous and toxic substances used in the samples and at laboratories, would be a minimal risk to human health and safety if proper procedures are in place (see Section 1.6 for applicable regulations).

The MVA plan of the BSCSP's proposed project would avoid, detect, and correct any unintended CO_2 emissions. The geological seals of the project site make CO_2 migration unlikely. The seismic surveys being conducted would determine if any faults exist. The risk of earthquakes and landslides is low for BSCSP's proposed project area (see Section 4.2). Given the amount of CO_2 trapped for millions of years in Kevin Dome, a fault to the surface or to the upper strata is unlikely. One possible leakage pathway is the many old wells present in the area. Procedures and materials have improved since the construction and use of these earlier wells. However, many of these wells (at 2,000 ft or less) are shallower than BSCSP's proposed wells (over 3,000 ft), which reduces the risks (IEAGHG and NETL, 2011; Byrd, 2011). The nearest identified underground sources of drinking water are all at depths of 100 feet or less, which reduces risks for water contamination given the number of seals between the injection formation and these wells (GWIC, 2012; BSCSP, 2012a). Further, groundwater and other monitoring would be conducted to detect migration and initiate corrective action if necessary (see Section 4.3). Such monitoring would allow for early detection and appropriate measures to be initiated in the event of migration. These measures reduce the risk to human health and safety. The maximum surface injection pressure would be balanced with the anticipated fracture pressure for the area. This reduces the possibility of CO_2 migration from fractures (see Section 4.2).

Pipeline inspection and monitoring would reduce the risks of failures and thus to human health. One of the major concerns regarding pipeline safety is water and other contaminants causing corrosion leading to pipe failure (DOE, 2007a). However, the CO_2 would be treated to reduce the risk of pipeline failure. The compression facility would remove the necessary amount of water from the CO_2 stream as well as any other harmful contaminants (see Section 2.2.6). Pipelines are operated in accordance with regulations and include appropriate shut-off systems in case of rupture. Further, BSCSP would have CO_2 monitors inside the well shacks and compressor station. There would also be downhole pressure and temperature gauges (Tollefson, 2011e). All the monitoring for CO_2, that is an integral part of BSCSP's proposed project, would reduce the risk for CO_2 releases, and the mitigation measures would reduce the consequences of any incidents.

DOE requires and BSCSP plans for the creation of a Risk Management (RM) plan for the project to ensure the safety and training of all personnel involved in the project including subcontractors. BMPs would be followed. All personnel entering the location would be required to meet minimum documented safety training standards detailed in the RM plan. Hearing protection would be required (BSCSP, 2011b; BSCSP and NETL, 2012). The workers on the project would be subject to the same types of health risks that are generally associated with their professions. Any further safety equipment needed for the possible hazards would be used, such as a respirator or dust mask for someone working with equipment that generates dust. Noise levels for the general public would not be expected to be substantially increased, so noise is not expected to affect the public's health (see Section 4.8.6). Following safety protocols would minimize occupational hazards (DOE, 2007a).

A rapid release of CO_2 has a very low probability due to monitoring, proper siting, and BMPs (DOE, 2007a). The risks to human health and safety from a rapid release of CO_2 as a result of activities associated with BSCSP's proposed project would depend on amount released and conditions (such as wind direction and strength) at the time of the release (DOE, 2007b). A sudden and rapid release of CO_2 from equipment, such as a wellhead being removed, would likely be detected quickly. The processes for containing well blowouts would be employed to stop such a release. Workers onsite would be the primary group affected. If concentrations of CO_2 greater than 7 to 10% in the air were created, it would cause immediate danger to humans. Depending on the amount released and the pressure, the leak could take hours to days to contain, but it could take as little as minutes. However, the leaked CO_2 amount is likely to be minimal compared to the amount injected due to dispersion of CO_2 in the ground away from the injection site (Heinrich et al., 2004; IPCC, 2005). Once the release is over, no lingering effects would occur (Heinrich et al., 2004). Further, the oil and gas industry employs engineering and administrative controls to manage these types of hazards regularly (IPCC, 2005). In fact, CO_2 injection has occurred safely for over twenty years with oil and gas activities (NETL, 2008). Operational error rather than mechanical error has been the cause of most incidents (Heinrich et al., 2004). Thus, adherence to BMPs and following industry standards would be important to prevent incidents. Therefore, while the risk of accidents exists, the risks to human health and safety, with the proper response plans and monitoring, would be below the significance threshold.

The primary human health risk from BSCSP's proposed project to the public would be pipeline leaks releasing CO_2, which is described above. Buffer areas around the project area are mostly farmlands. This reduces the impacts to the general public as it allows more time to respond to leaks and dispersion of CO_2 before it could affect the general public. A local emergency response plan would help reduce the risk of impact to the workers and the general public (DOE, 2007a). Decommissioning of the facility would present the same types of risks associated with operation; but with proper safety procedures, the impact to human health and safety from decommissioning should be minimal.

Overall, the risks would be minimized by having appropriate safety and operating procedures including monitoring and inspections (DOE, 2007a). Given the low failure rate of CO_2 pipelines, proper siting, safety procedures, and extensive monitoring activities, the overall risk to human health and safety would not be expected to exceed the significance threshold.

4.9.3 Effects of No-Action

Under the no-action alternative, there would be no construction, operation, or decommissioning of the BSCSP's proposed project. Thus, none of the risks listed in the previous section would occur, which would mean no impacts to human health and safety. Therefore, implementing the no-action alternative would not be expected to exceed the significance threshold.

4.9.4 Cumulative Effects

While other projects are planned in the region (see Section 1.4), only one of the projects is in the same area as BSCSP's proposed project. This reduces the possibility of interactive human health and safety risks. The project at the same site as BSCSP's proposed project is a differential absorption LIDAR for spatial mapping of CO_2 project. This project involves testing monitoring equipment. It was granted a categorical exclusion by DOE. Some interactive human health and safety impacts could occur during transport of equipment. However, there would be measures to ensure that the nearby agricultural and other activities would not interfere with BSCSP's proposed project or endanger others. For example, the compressor facility would be enclosed in a fence, which would keep out livestock.

PCOR Bell Creek Demonstration Project would have similar safety risks as BSCSP's proposed project, but due to distance between the projects (over 400 miles), there should not be adverse interactive human health and safety impacts.

The past, present, and future agricultural activities pose minimal risks with safety procedures adherence and maintained equipment. Oil and gas activities pose similar risks as BSCSP's proposed project. All projects listed in Section 1.4 would also follow applicable safety and environmental regulations. These regulations reduce risks to human health and safety by protecting workers and the general public. The cumulative impacts of existing activities in and around BSCSP's proposed project site do not represent a substantial risk to human health and safety, given existing and proposed mitigation and safety procedures in place. As a result, the cumulative impacts with implementing BSCSP's proposed project would not be expected to exceed the significance threshold.

Since the current projects in the area do not pose a substantial risk to human health and safety, the no-action alternative does not represent any additional risks to human health and safety; and the cumulative impacts to human health and safety for the no-action alternative would not be expected to exceed the threshold of significance.

4.10 Cultural Resources

Cultural and historic resources are protected by laws and regulations, including the NHPA and the Archaeological Resources Protection Act. Section 106 of the NHPA and implementing regulations (36 CFR 800) outline the procedures to be followed in the documentation, evaluation, and mitigation of impacts to cultural resources, as well as consultation with Native American tribes. The Section 106 process applies to any federal undertaking that has the

potential to affect cultural resources. The Montana State Historical Society is the SHPO for Montana (MT, No date). NETL intends to integrate the Section 106 compliance process with the NEPA process to satisfy the Section 106 requirements.

4.10.1 Description

4.10.1.1 Tribal Concerns

There are no Native American reservations in Toole County, MT; however, two federally recognized tribes have land claims in the county. They are the Blackfeet Tribe of the Blackfeet Indian Reservation and the Fort Belknap Indian Community of the Fort Belknap Reservation of Montana (NPS, 2011; HUD, 2008). The closest Indian reservation is Blackfeet Reservation, which is 28 miles southwest of the proposed production area (ESRI, 2010). Due to the potential interests of Native American tribes in the region, NETL sent consultation letters to all of the Tribes in Montana and SHPO as part of the NEPA scoping process (see Appendix D).

BSCSP sent emails and hardcopy certified mail letters inviting all of Tribes of Montana to a permitting and site visit meeting on October 26, 2011 NETL sent letters on October 17, 2011 soliciting Tribal concerns based on the list provided by the regional office of the Bureau of Indiana Affairs (Buckhouse, 2011). Consultation letters regarding the EA were also sent to all of the Tribes in Montana on November 7, 2011 (see Appendix D for letter and recipients).

Alvin Windy Boy Sr. and his archeologist from the Chippewa Cree Tribes of Rocky Boy's Reservation attended the permitting and site meeting in October 2011. During this October meeting, Mr. Windy Boy of the Rocky Boy THPO mentioned two concerns with the project area. First was the importance of sweetgrass to his Tribe. The second was the use of the nearby Sweet Grass Hills for Tribal ceremonies including a coming of age ceremony that was still being practiced to this day by his Tribe (BSCSP et al., 2011). Francis Auld is the THPO for Confederated Salish and Kootenai Tribes of the Flathead Reservation, and he communicated as part of his pre-consultation letter response that the Sweet Grass Hills was "a place that is highly significant to many Tribes" (Auld, 2011) (Appendix D). Similar tribal concerns were also raised for a BLM project in the Sweet Grass Hills: sweetgrass use, use of Sweet Grass Hills as an important site for Tribal ceremonies, and area being "highly significant to many Tribes" (Auld, 2011; BSCSP et al., 2011).

The project area contains evidence of human use from pre-contact to historic times (Wesson, 2011; Wesson, 2012). Evidence of pre-contact activity in the nearby Sweet Grass Hills includes vision quest structures, buffalo hunting complexes, and extensive habitation sites. Tipi rings, lithic debris, and stone cairns have been documented within the project area as well as within the Sweet Grass Hills (Wesson, 2012; Wesson, 2011; BSCSP, 2012b). All three buttes comprising the Sweet Grass Hills are known to contain pre-contact stone features believed to be associated with vision questing. The Sweet Grass Hills vicinity was an important hunting area, mostly for buffalo. Several tribes inhabited the Indian Reservation, created by the Treaty of 1855, which included the Sweet Grass Hills. The reservation was modified by the 1887 agreement and as a result, the Sweet Grass Hills are not included in reservation lands (BLM, 1996).

Native Americans in the Montana area frequently use sweetgrass (*Hierochloe odorata*) for incense and fragrance. Braids of the long leaves are burned for religious and peace ceremonies as well as various other rituals. Some groups also use sweetgrass for baskets, bowls, trays, and mats (Leif, 2010).

For the past 100 years, ranching, farming, and mining have occurred in the area. Sections 1.4.2 and 4.7.1 have more land use details. In the Sweet Grass Hills area, mining activities included gold and silver, of which some was illegally conducted. Coal mining occurred on West Butte until World War II. Despite these disturbances, Native Americans have continued to use the Sweet Grass Hills area for religious purposes including gathering of sacred materials and vision questing (BLM, 1996). West Butte (closest to the project) has been used for recent coming-of-man ceremonies (BSCSP et al., 2011). The Sweet Grass Hills is eligible for listing on the NRHP (BLM, 1996; BLM, 2010b).

As stated in the Sweet Grass Hills EIS (BLM, 1996), Native American traditionalists identified the Sweet Grass Hills as an important location for traditional religious practices. Sweet Grass Hills is a TCP, and Sweet Grass Hills is a Traditional Cultural Property District eligible for NRHP (BLM, 2010a; BLM, 1996). TCPs are properties "associated with the cultural practices or beliefs of a living community that are rooted in that community's history or important for maintaining its cultural identity" (NPS, 2010).

BSCSP's proposed project would not occur on or adjacent to the Sweet Grass Hills. However, as noted in Section 4.8.5.1, BSCSP's proposed project would be in the viewshed of the Sweet Grass Hills. To provide context for Auld (2011) and Alvin Windy Boy's concerns regarding BSCSP's proposed project (BSCSP et al., 2011), this paragraph notes the Tribal concerns expressed to BLM during the preparation of the Sweet Grass Hills Amendment EIS (BLM, 1996). Tribes expressed concerns to BLM about visual and audible intrusions to the natural environment that would disrupt traditional cultural practices. Representatives from the Assiniboine, Blackfeet, Chippewa-Cree, Gros Ventre, Kootenai, and Salish all expressed individual and tribal government concerns about preserving the sacredness of the Sweet Grass Hills. Fasting and vision questing are critical practices for the traditional Plains Indian cultures' spirituality, which is integral to daily life. The practice of vision questing is common to all groups known to have ranged into the Sweet Grass Hills. A vision quest is an individual petitioning supernatural powers for aid. Being alone while fasting, praying, and making offerings is generally part of the vision questing. Certain conditions are required for successful fasting, vision questing, and other forms of traditional worship. For example, "fasting and vision questing require isolation from audible and visual interferences or disturbances" (BLM, 1996). During vision quests, individuals were given instructions for medicine bundles. Some still active medicine bundles came from the Sweet Grass Hills. According to a Blackfoot elder, the Sweet Grass Hills are the most important place for collecting the most powerful sweetgrass and sweetpine. The Sweet Grass Hills retain its sacredness for some Native American groups despite the past disturbances. Some of the religious practices, particularly of the Chippewa-Cree Tribe, must remain secret to preserve sanctity (BLM, 1996).

Further, during the October permitting meeting, Alvin Windy Boy noted that even if you cannot see the disturbance, the spirit of the land is still disturbed. The Chippewa-Cree, Blackfeet,

Assiniboine, Gros Ventre, Salish, and Kootenai all expressed that "any alteration of the natural landscape of the Sweet Grass Hills is unacceptable and unmitigatable" (BLM, 1996). As part of BLM's effort for the Sweet Grass Hills Amendment for mining in the area and to protect cultural practices, Tribes stated that physical disturbance to the land itself and visually intrusive modern constructions are incompatible with their values. "Roads are visually intrusive and also have the potential to provide access to other disruptive activities" (BLM, 1996).

4.10.1.2 Project Area Cultural Resources

A Class I files and records search was conducted on October 24, 2011, at the Montana SHPO office through the Montana SHPO Cultural Resources Annotated Bibliography System Report (CRABS) and the Cultural Resource Information Systems Report (CRIS) to identify known cultural resources within the project area and a 1-mile buffer (BSCSP and NETL, 2012). In conjunction with the SHPO file search, an online land records search was conducted in December 2011, using the BLM General Land Office Records website (Tollefson, 2011c).

The file search identified 16 previous inventories and 24 previously recorded sites within the project area and a 1-mile buffer. The previous inventories include block and linear surveys for management parcels, well pads, flood expansion, pipelines, land exchanges, transmission projects, leases, and other oil and gas development areas. Of the 24 previously recorded sites, 18 are prehistoric, and 6 are historic. The historic sites consist of energy development (e.g., wells and pipeline) and artifact scatter sites. Known prehistoric sites within the project area and a 1-mile radius from the October 2011 file search include 12 sites consisting of stone circles; 4 stone circle and cairn sites; 1 stone circle, cairn, and drive line site; and 1 stone circle and hearth site (BSCSP and NETL, 2012).

Of the prehistoric sites in the file search, only one has been formally determined eligible for inclusion on the NRHP, and the rest of the previously recorded prehistoric sites (17) within the project area and a 1-mile radius were left as undetermined or unresolved regarding their NRHP eligibility. One of the historic sites has been formally determined eligible for inclusion on the NRHP, one was determined not eligible, three are listed as undetermined, and one is listed as unresolved (BSCSP and NETL, 2012).

A subcontractor of BSCSP also contacted the MDNRC archaeologist Patrick Rennie regarding unrecorded cultural resource site leads located on State of Montana lands. Only one site lead, a stone circle, was noted on State lands (Tollefson, 2011c).

An intensive pedestrian survey for cultural resources is currently being conducted for source and receiver lines located in portions of the seismic project area that have not been cultivated (see Section 4.10.2.1 for more details). Block areas considered for proposed production and injection wells have also been inventoried for cultural resources. As of June 17, 2012, approximately 163 miles of seismic source and receiver line, as well as an additional 590.6 acres for proposed infrastructure, have been subjected to intensive inventory. These efforts have resulted in the identification of 57 previously unknown archaeological sites. Thirty-one sites are prehistoric, 19 are historic, three are multicomponent sites, and four are of unknown age. All of the 31 newly recorded prehistoric sites are stone feature sites, consisting of 29 stone circle sites and two stone

feature sites. The historic site types newly recorded within the project area include one depression and artifact scatter, three artifact scatter sites, one foundation, eleven homestead/farmstead sites, one rock art site, and two oil field sites with features and artifacts. The three multicomponent sites include prehistoric stone circles and historic depressions or isolated finds. The unknown sites are all cairns. NRHP eligibility recommendations will be made for each newly recorded site and presented in the forthcoming cultural resources inventory report that would be finalized before the Final EA. Pursuant to the Section 106 process, DOE, in consultation with BLM and MDNRC, will make formal determinations of NRHP eligibility for all cultural resources identified within the project area and forward these determinations to SHPO for concurrence (BSCSP, 2012b).

Isolated features found in the project area as of June 17, 2012, include 16 earthen features (check dams, contour furrows, or drain ditches) and one historic pump jack. An additional 12 isolated finds have been discovered in the project area including six historic artifacts isolates, one historic plow, one historic cultivator, one historic oil drum, one historic timber box, one historic debris, and a multicomponent isolate of prehistoric and historic debris. Isolated resources are not typically considered eligible for the NRHP (BSCSP, 2012b).

The cultural resources inventory for the seismic project will be completed in the summer of 2012. Additional cultural resource inventories would be conducted for the primary pipeline, gathering lines, and other proposed project components that have not yet been sited.

4.10.2 Effects of BSCSP's Proposed Project

The potential for impacts to cultural resources would be greatest during the construction phase, although the use of heavy equipment during the seismic survey also has the potential to affect cultural resources. Discovery of previously unknown cultural resources can occur during construction activities in historically undisturbed areas. The construction noise and earthmoving activities can also deteriorate the use of an area for Native American tribal activities (DOE, 2007a).

Potential effects to a cultural resource are assessed with regard to the resource's NRHP eligibility status. Resources such as historic buildings and archaeological sites that are either listed on the NRHP or potentially eligible for NRHP listing are considered "historic properties." Project effects to historic properties may be considered adverse or less than adverse, depending on the potential changes to resource integrity resulting from a proposed project. Resources of undetermined or unresolved NRHP eligibility status are, by default, considered "historic properties" for purposes of assessing project effects to cultural resources. Resources ineligible for NRHP inclusion (recommended or determined) and isolated finds are not considered to be historic properties. Any project effects to resources not eligible for NRHP listing are not considered significant and do not constitute an 'effect' under Section 106 (BSCSP and NETL, 2012).

4.10.2.1 BSCSP's Ongoing and Future Planned Cultural Surveys

The area of potential effect (APE) on cultural resources for seismic survey activities is defined as a 100-foot-wide corridor centered on proposed source and receiver lines as well as some unimproved access routes located on previously uncultivated lands. These 100-foot-wide corridors correspond with the proposed overland travel corridors that have been used and would be used by vibroseis vehicles during the seismic survey. The placement of all source and receiver points on uncultivated lands has occurred or would also occur within these corridors. When archaeological sites are identified along proposed access routes or source or receiver lines, a reroute is surveyed to provide a clear path for vibroseis vehicles to avoid the resources by at least 100 feet (50 feet on BLM lands), in the event that they are determined to be eligible for NRHP inclusion or unevaluated for NRHP eligibility. Cultural resources identified during the process of identifying reroutes are also recorded, and avoided if they are NRHP-eligible or unevaluated. Together, the combined final travel corridors represent the project APE for the seismic survey. All staging, parking, and equipment laydown areas associated with the seismic survey have been and would continue to be located on previously disturbed or cultivated private lands.

The APE for the proposed infrastructure components is defined as follows:

- Well pads: 10-acre square area centered on the proposed well pad;
- Access roads and pipeline: 30-m-wide (100-foot-wide) corridor centered on the proposed centerline; and
- Bore areas: 30-m (100-foot) buffer around footprint of ground disturbance (BSCSP, 2012b).

The APE for other proposed project components would be defined upon design of such components. Cultural resources inventories have been completed for the uncultivated portions of the two areas proposed for well pad construction. Inventories for pipelines and other proposed project infrastructure have not yet been conducted (BSCSP, 2012b).

4.10.2.2 Potential Project Impacts

Construction activities with potential to disturb cultural resources include transporting and utilizing heavy equipment, drilling, and installing pipelines and other infrastructure. These activities can cause an adverse impact to cultural resources by altering drainage patterns, creating fugitive dust, and crushing or destroying the resources. Altered drainage patterns and runoff can deteriorate cultural features and deposits through erosion or move artifacts, thus altering their provenience and information value. Fugitive dust can cover or otherwise alter rock art. Heavy equipment such as vibroseis vehicles can compress archaeological deposits and crush cultural features on the ground surface. Spills from refueling equipment can also damage cultural resources, reducing the integrity and information value of the resources. Further, ground-disturbing construction activities such as grading for well pads and access roads, or trenching for pipelines, can alter or destroy the context of the cultural resources (DOE, 2007a). Decommissioning would require heavy equipment but would be of a relatively short period relative to the operation and construction phases. Thus, decommissioning would have the same type of possible impacts as described above but to a lesser magnitude.

Past cultivation and oil and gas activities have disturbed much of the project area. Further, DOE requires and BSCSP plans to conduct cultural surveys of the APE where the proposed activities would occur in undisturbed areas. Archaeological monitoring of ground-disturbing construction would occur within cultivated lands when the proposed ground disturbance would extend deeper than the current or historical activities (BSCSP et al., 2011; BSCSP, 2012b). These reports would be provided to the SHPO for concurrence (BSCSP, 2012b). The risk of impacts to cultural resources would be reduced through resource avoidance measures (see Section 4.10.2.1).

Historic properties are defined in 36 CFR 800 as any prehistoric or historic cultural resources, including but not limited to districts, sites, TCPs, buildings, structures, or objects, that are considered eligible or unevaluated for NRHP nomination. Isolated artifacts and features are generally not considered eligible for NRHP inclusion, and as such, are not considered to be historic properties.

In general, all historic properties would be avoided by project design. One exception, which allows limited seismic work on uncultivated lands covered in snow, is discussed below. Site-specific exceptions to the standard site avoidance protocol would also be considered by SHPO on a case-by-case basis. Examples of potential site-specific exemptions include, but are not limited to, the following scenarios (BSCSP, 2012b).

- Source/receiver lines and vehicle travel routes may be permitted to bisect sites or pass within 100 feet of a site boundary on existing roads, if all portions of the road(s) within the site boundary and within 100 feet of the site boundary have been inventoried for cultural resources and no features or deposits contributing to the site's eligibility features are located within the roads themselves. The site record must be updated for these resources even if the roads are the only portion of the site inventoried.
- Source/receiver lines and vehicle travel routes may be permitted to bisect historic-period sites or pass within 100 feet of a site boundary for historic-period sites, if all features would be avoided.

Interaction with the MT SHPO

MT SHPO-approved avoidance measures will be employed to reduce the potential for adverse effects to historic properties (BSCSP, 2012b).

In early December 2011, NETL and the MT SHPO granted BSCSP's requests to perform the seismic survey on cultivated lands before the cultural surveys were completed, as no cultural surveys would be conducted on cultivated lands and the potential for effects to cultural resources on cultivated lands were considered to be negligible due to previous disturbance (Gwilliam, 2011a; Wilmoth, 2011a). On December 16, 2011, the MT SHPO granted BSCSP's request to work on uncultivated lands prior to submittal of a cultural resources inventory report due to the snowfall interrupting the cultural study with certain conditions stated below (Wilmoth, 2011b). BSCSP cited potential costly project overruns and long delays for the necessity of the exception to the earlier agreement. Additionally, they noted that BLM sometimes allows work without archeological studies when the snow is over five inches deep since the snow can protect the cultural resources. The work agreed upon by SHPO and DOE on uncultivated lands would be

walking the geophone receivers and securing them in place with snow or sand bags. No digging, drilling, or ground disturbance would occur. No vehicles would be allowed on uncultivated lands (Gwilliam, 2011b; BSCSP, 2012b). The lack of vehicles and invasive ground disturbance eliminates the potential for impacts to historic properties on these uncultivated lands where a cultural survey was conducted. The snow cover exception was employed in two cases (BSCSP, 2012b):

- For receiver lines on uncultivated lands that had already been inventoried for cultural resources with a negative result (i.e., the lines were free of cultural resources), but the report had not been completed and submitted to SHPO.
- For receiver lines on uncultivated lands that had not yet been inventoried for cultural resources (BSCSP, 2012c).

4.10.2.3 Tribal Coordination and Potential Impacts

DOE sent consultation letters to Tribes and the Bureau of Indian Affairs' Regional Office to inform them of the project, invite input, and request information of any known sites or issues in the project area for interim action requested by BSCSP (October 17, 2011) and the EA (November 7, 2011). From the interim action responses, Francis Auld, THPO for Confederated Salish and Kootenai Tribes of the Flathead Reservation, communicated that the Sweet Grass Hills was "a place that is highly significant to many Tribes" (Auld, 2011). No concerns about resources were received from the NETL consultation letters. However, the Northern Cheyenne Tribe responded with a statement of no interest to BSCSP's informational letter (Fisher, 2011) (See Appendix D). More coordination occurred after inadvertent effects to cultural resources were discovered (see Section 4.10.2.4).

At an October 2011 site visit meeting, the Rocky Boy THPO expressed concerns about the disturbance of the land for the pipelines and other features even if the components cannot be seen, referring to "the spirit of the land." He also mentioned the use of the nearby Buttes for his grandfather's coming-of-man ceremony as well as a recent young man's ceremony. He spoke of the use of sweetgrass by their Tribe (BSCSP et al., 2011).

BSCSP's proposed project would introduce some new infrastructure in the viewshed of the Sweet Grass Hills. However, given the distance between BSCSP's proposed project components and the nearest butte, the noise from the drilling, construction, and compressor would not be audible in the Sweet Grass Hills. Thus, there would not be any audible intrusion on the Native American practices from BSCSP's proposed project. The visual intrusion would be minimal given the distance between the nearest butte and the project site. West Butte is six miles from the seismic survey boundary and eight miles from the boundary of the proposed monitoring and injection area. Further, as discussed in Section 4.8.5, the visual elements added to the viewshed by BSCSP's proposed project would be in character and minimal compared to the existing oil and gas activities in the area. Since most of the lands are private, any vegetation clearing would not affect traditional plants because these would be inaccessible to Tribes for collection and use in their cultural practices. DOE requires and BSCSP plans to ensure that the activities on public lands do not interfere with any sweetgrass or other collection of items for traditional cultural practices (BSCSP, 2012c). Consequently, the impacts to the Tribal resources and Sweet Grass

Hills particularly would be expected to be below the significance threshold after mitigation from the effects of the interim action (see Section 4.10.2.4).

4.10.2.4 Effects During Activities Performed as an Interim Action

The first activity of the project was a seismic survey, which was approved through an interim action request (see Section 2.2.2). The originally proposed seismic acquisition grid of source and receiver lines was modified to avoid all previously recorded sites within the Phase I area by at least 100 feet (see Section 4.10.2.1) (BSCSP, 2012b).

Due to the compressed schedule, SHPO allowed BSCSP to proceed with phases of the seismic survey once cultural resources inventory had been completed within a given portion of the project area but before a formal cultural resources inventory report was submitted to DOE or SHPO for review. Additional conditions of this phased approach were that all archaeological sites identified during the inventory would be avoided by a minimum of 100 feet (50 feet on BLM lands). In addition, a letter report summarizing the preliminary results of the inventory with mapping showing the buffered site boundaries and re-routed source and receiver lines would be provided by DOE to SHPO for review and approval prior to seismic work. This procedure was followed for Phase I of the seismic survey (Wesson, 2011; BSCSP, 2012b); but not for subsequent phases or portions of the project.

Prior to February 28, 2012, SWCA inventoried approximately 84.2 miles of source and receiver line in non-cultivated areas on private lands and lands managed by the MDNRC within the northeastern portion of the project area. All source and receiver lines were inventoried for cultural resources using a 100-foot-wide corridor (50 feet each side of the line). As a result of the cultural survey, SWCA recorded 23 cultural resources. In February 2012, SWCA archaeologists noted vibroseis truck disturbances within the site boundaries or avoidance buffers of four cultural resource sites, and in one case, they observed the vibroseis trucks operating within a site. In most cases, the vehicles flattened vegetation and left shallow linear depressions in the soil. Overall, the disturbance was minimal and limited to slight compaction of soils; the large balloon tires on the vibroseis trucks did not leave deep ruts in the soil. However, at one site, individual stones within two stone circle features were damaged (Wesson, 2012; BSCSP, 2012b).

On February 22, 2012, MSU held a conference call with DOE personnel to inform DOE of the disturbance to cultural resources. The Montana SHPO was also informed. DOE subsequently informed all Montana tribes and the National Advisory Council on Historic Preservation. On March 1, 2012, MSU came to the decision to demobilize the seismic field crew to allow DOE time to follow proper procedures related to the cultural disturbances. The crew left the area on March 8, 2012, after removing remaining cables, geophones, and other equipment (BSCSP, 2012b).

A letter report summarizing the disturbances was developed and submitted to DOE and Montana SHPO (Wesson, 2012). Although none of the resources in question had been evaluated for eligibility for the NRHP and no formal determinations of NRHP eligibility had been made, DOE assumed that the affected resources were potentially eligible for the NRHP and would therefore

be considered historic properties for the purposes of NHPA compliance. Similarly, although no formal determination of effect was made for the affected sites, DOE assumed that the effects were adverse for the purposes of NHPA compliance and prescribed mitigation measures to reduce the effects to a less than adverse level. DOE also requested comments and recommendations for mitigation from SHPO and all tribes in the state of Montana (BSCSP, 2012b).

The cultural resource mitigation and a process to prevent future cultural resource impacts are in progress in consultation with the SHPO, Tribes of Montana and DOE. Steps already performed include cultural surveys by a qualified archaeologist of the affected and already surveyed area. A "Kevin Dome Project-Cultural Resources Consultation Meeting" occurred on June 7 and 8, 2012 in Shelby, Montana. This meeting was organized to provide an opportunity for the Tribes of Montana to observe affected cultural resources and provide comments on suggested mitigation steps to resolve these occurrences and prevent future disturbances of cultural resources in the project area (BSCSP, 2012b). All of the Tribes of Montana were sent consultation letters and were also sent invitations to this meeting.

The phased approach to cultural resources inventory and review employed for Phase I of the seismic survey (interim action) was predicated on avoidance of all archaeological sites, regardless of NRHP status, by at least 100 feet (50 feet on BLM lands), with the exceptions listed above. This protocol will not extend to subsequent phases-of the seismic survey and other portions of the project; rather, the normal Section 106 process will be implemented. DOE requires and BSCSP plans for, the avoidance of all cultural resources.

4.10.2.5 Summary of Impacts

DOE and BSCSP are working with Native American tribes, the SHPO, BLM and MT DNRC to ensure compliance with Section 106 of NHPA. BSCSP is developing a programmatic agreement among DOE, BSCSP, the Advisory Council on Historic Properties and SHPO in consultation with the Native American tribes of Montana, BLM, and MDNRC to mitigate previous adverse effects and to satisfy Section 106 requirements for future activities. Compliance with the terms of the programmatic agreement would ensure that cultural resource impacts would be less than significant.

The vast majority of the project work is on private land. Over 70 percent of the seismic project area has been or is currently in cultivation. Consequently, any unknown surface or near surface cultural resources would likely have been previously destroyed in these areas. All off-road traffic would remain on historically or currently cultivated areas or limited to portions of the project APE on uncultivated lands that have been inventoried for historic properties with a negative result. Existing improved roads within uncultivated lands may be used for all vehicle travel without requiring a cultural resources inventory. However, any existing, unimproved two-track roads within uncultivated lands that would be used for vibroseis or other heavy equipment access would be subject to cultural resources inventory prior to use (BSCSP, 2012b).

As described in Section 4.10.2.1, all identified historic properties would be avoided by at least 100 feet (50 feet on BLM lands) except for some exceptions where the integrity of the cultural

resources would be maintained as described in Section 4.10.2.2. With these avoidance procedures and the increased assurance measures planned in the programmatic agreement currently being developed, no other impacts to eligible, potentially eligible, or listed NRHP sites (historic properties) should occur within the project boundary. The programmatic agreement will address unanticipated discoveries and effects. For example, if any impacts were to occur or previously unknown cultural resources to be found despite the extensive cultural surveys in progress (such as during ground disturbing construction of project infrastructure), the activity would be stopped, and the SHPO, any relevant Tribes, or other agencies consulted. If the cultural resources were found to be historic properties or human remains, then the construction component or other activity would need to be relocated elsewhere or other acceptable mitigation performed as per consultation with the SHPO and any relevant Tribes or agencies.

Given the location near existing oil and gas operations and the avoidance measures described previously, there should be no substantial impacts to visual resources for any known previously recorded NRHP sites (see Section 4.8.5). By locating project features away from cultural resources, the BSCSP's proposed project should not have any direct impacts. These previously recorded sites are in or near an existing cultivated area with oil wells, so the impacts of BSCSP's proposed project should be no greater than what they have experienced in the past and would generally be temporary since the project life is less than 10 years (see Sections 4.8.5 and 4.8.6). Impacts to Tribal resources were discussed in Section 4.10.2.3. Based on the information above, the impacts from implementing BSCSP's proposed project would not be expected to exceed the significance threshold after mitigation is completed.

4.10.3 Effects of No-Action

Under the no-action alternative, BSCSP' proposed project would not proceed. Thus, there would be no construction, operation, or decommissioning activities and no impacts to cultural resources.

4.10.4 Cumulative Effects

As impacts to cultural resources are generally local (heavy machinery disturbing resources, etc.), BSCSP's proposed project and the no-action alternative both are unlikely to contribute to impacts to cultural resources outside the vicinity of the project area, and those local impacts would not be expected to exceed the threshold of significance after mitigation. The exception is the Sweet Grass Hills, and impacts to Tribal practices at Sweet Grass Hills were discussed in Section 4.10.2.3. BSCSP's proposed project should not substantially affect Tribal practices on the Sweet Grass Hills, especially as the project is not on or directly adjacent to these buttes.

While some other projects are planned in the general area (see Section 1.4), these projects are not in the project's immediate area. The exceptions are the differential absorption LIDAR for spatial mapping of CO_2 project and possibly future oil and gas operations. The former project would be on cultivated land and not harm cultural resources since any cultural resources would likely have been destroyed due to previous activities (BSCSP and NETL, 2012). Per NHPA, the future oil and gas activities in the project area would occur on already disturbed land, previously surveyed land, or have the appropriate cultural surveys performed. Siting under these conditions

minimizes impacts since cultural resources potentially eligible, eligible, or listed for the NRHP (historic properties) would be avoided.

As discussed in Section 4.8.5, the wind turbines projects introduce a new element into the viewshed, but these wind turbines should be compatible to most viewers given the existing oil and gas land uses. These wind energy projects are further away from Sweet Grass Hills than BSCSP's proposed project further reducing the potential for cumulative impacts. Since impacts to cultural resources are generally local, these other projects listed in Section 1.4 would not likely impact any cultural resources in BSCSP's proposed project area. For example, the HiLine RMP would protect resources on and in proximity to BLM land but would not extend to the lands utilized by BSCSP's proposed project, except for the seismic survey. Since no substantial impacts to cultural resources are expected from either alternative, BSCSP's proposed project and the no-action alternative would only represent an incremental addition to the cumulative impacts to cultural resources in the project area or the vicinity of the project area after mitigation. Therefore, the cumulative impacts would not be expected to exceed the significance threshold.

4.11 Waste Management

4.11.1 Description

Waste management covers domestic waste as well as hazardous waste. The state of Montana has the primary responsibility for enforcing its hazardous waste management program. However, the USEPA has the authority to exercise its inspection and enforcement authorities in accordance with the RCRA (USEPA, 2011h). Toole County's Shelby Landfill is a Class II landfill, meaning it can accept up to 20 tons of municipal waste daily (Toole County, No date[b]; BLM, 2002).

In accordance with national and state law, the existing agricultural and cultivation facilities located within Toole County and around the proposed project site operate under proper spill prevention procedures. All solid wastes generated at the facilities are collected and transported by certified handlers and disposed of at permitted facilities. Only staff members trained in hazardous materials and waste handling RCRA procedures are allowed to maintain onsite hazardous materials, hazardous wastes, and prepare waste manifests (USEPA, 2011i).

4.11.2 Effects of BSCSP's Proposed Project

The proposed project is not expected to generate any substantial amounts of hazardous waste. All of the national laboratories, private facilities, and universities that would be involved in the project have waste management policies in place that would be followed for any activities related to this project (Tollefson, 2011d).

A number of wastes would be produced during the drilling and construction stage of the BSCSP's proposed project. The project would create:

- Domestic sewage;
- Domestic solid waste;
- 3,500 barrels of drilling fluid/mud (includes water) per well;
- 800 barrels of cuttings per well;

- 300 barrels of lost circulation materials per well;
- Less than 500 pounds of municipal solid waste; and
- Other nonhazardous drilling products, such as lime (BSCSP, 2011a).

The disposal of used oil is subject to the same protective regulations as other hazardous wastes. It should be put into a clean plastic container with a tight lid and should not be mixed with other substances. Used oil would be disposed of by a certified disposal facility.

Well-logs would use radioactive sources that are strictly regulated by the Department of Transportation (DOT), OSHA, and the Nuclear Regulatory Agency (NRA). If high frequency tracer analyses would be needed for PFT analyses, chromatographs would be brought to the site. If the sample frequency was low and real-time information would not be needed, samples would be taken onsite and shipped to New York for analysis involving no hazardous materials (Tollefson, 2011d). Optima grade nitric acid would be used to preserve samples. The volume would be very small, but personnel would be required to wear goggles and nitrile gloves (see Section 4.9). The wastes would be disposed according to laboratory procedures (Tollefson, 2011d).

A freshwater-based drilling mud would be used for well drilling operations. Reserve pits would hold the returned drilling fluids and solid wastes during drilling operations. Each pit would be approximately 12 feet by 20 feet and 8 feet deep and are included in the well pad size (BSCSP, 2011a). For each of the wells, 2,800 barrels of freshwater would be mixed with the drilling mud mix. The total drilling fluid would be approximately 3,500 barrels (Tollefson, 2011d). When the pits are constructed, crews would stockpile topsoil and use it to reclaim the pit, once they had removed and disposed of drilling fluids and solids and replaced the subsoil. The pits would be reclaimed with the topsoil created during their construction (BSCSP, 2011a).

Parts of the tracer injection system might have to be disposed of as a low-level radioactive waste because it would have been exposed to ^{14}C for a number of years. Samples collected during this exercise would be neutralized, diluted, and disposed down the drain in the laboratories after meeting maximum contaminant level limits (Tollefson, 2011d).

During construction, a variety of hydrocarbon products, such as solvents, lubricating oils, grease, and diesel fuel, would be consumed. Spills and leakages of chemicals could result in contaminated soil, which crews would need to dispose of properly. Additionally, the drilling process would generate drill cuttings. These drill cuttings would be disposed of onsite as allowed by the state. Municipal solid wastes would be disposed of offsite to High Plains Landfill in Toole County, Montana. Drilling mud would be reclaimed onsite by Altamont Energy. Wastewater would be hauled to an injection system facility operated by Altamont Energy (BSCSP, 2011a).

The existing waste facilities have the capacity to handle this project and would not be expanded as a result of this project (Tollefson, 2011d). Non-laboratory wastewaters containing contaminants in the field from compression and dehydration would be stored in a wastewater tank. No septic systems would be part of this project, only portable toilets (BSCSP, 2011a).

During decommissioning and post-project activities, crews would utilize or dispose of solvents, lubricating oils, grease, and diesel fuel. Spills and leakages of these chemicals could result in contaminated soil, which crews would need to dispose of. Post-project oil operations and their waste disposal would be subject to the same state and federal waste management regulations as BSCSP's proposed project. All waste must be stored and disposed of properly to avoid the risk of spills and contamination. If staff members comply with all regulatory requirements and waste disposal procedures, the waste management arising from this project would not cause air, water, or soil to be contaminated with hazardous material that poses a threat to human or ecological health and safety. Therefore, it is not expected that waste management arising from this project would exceed the significance threshold.

4.11.3 Effects of No-Action

Under the no-action alternative, BSCSP would not generate any wastes from well drilling, pipeline construction, or monitoring activities. As a result, no impacts to waste management would be expected.

4.11.4 Cumulative Effects

As described in Section 1.4.1, there are a number of other projects located near the BSCSP's proposed project site. Based on the anticipated quantity and nature of the waste produced by these projects, the waste facilities should have the capacity to handle the cumulative waste, and expansion would not be expected as a result of these projects. If necessary, the projects would have to transport waste to an appropriate facility with capacity for the created wastes. If responsible parties comply with all regulatory requirements and appropriate waste disposal procedures, it is not expected that the cumulative waste impacts would exceed the significance threshold.

4.12 Sustainability

EO 13541 on Federal Sustainability, issued on October 5, 2009, states in part that it is the policy of the Federal government "to create a clean energy economy" and that "Federal agencies shall increase energy efficiency; measure, report, and reduce their greenhouse gas emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and stormwater management; eliminate waste, recycle, and prevent pollution; design, construct, maintain, and operate high performance sustainable buildings in sustainable locations; and strengthen the vitality and livability of the communities in which Federal facilities are located."

Section 2(f)(iv) of the EO states that each agency shall "advance regional and local integrated planning by identifying and analyzing impacts from energy usage and alternative energy sources in all Environmental Impact Statements and Environmental Assessments for proposals for new or expanded Federal facilities under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*)."

The BSCSP's proposed project reviewed by this EA is part of a larger national effort to move this country to a more sustainable future. Efforts are underway to provide solutions to climate

change. Part of the solution could be the carbon storage that this EA evaluates. BSCSP would also employ other sustainability measures. Where possible, equipment and materials would be reused or recycled. MSU has Sustainability Programs in effect on campus and has taken measures to improve facility resource efficiency. The laboratories would also practice sustainability. For example, BSCSP expects to generate a considerable amount of glass sample bottles that can be recycled after measurements have been performed. BSCSP also reuses all of their Teflon lab ware (Tollefson, 2011d).

5.0 CONSULTATION AND COORDINATION

5.1 Preparation for Development of this Environmental Assessment

A kick-off meeting of the RCSP Phase III program was held on May 14, 2008 at the NETL office in Morgantown, West Virginia, with representatives from NETL, BSCSP, and Mangi Environmental Group, to begin the EA process. The project managers of the team charged with the development of this EA conducted a site visit in Montana on October 26, 2011. This site visit also included a permitting meeting where state and federal agencies attended to coordinate concerns on project information BSCSP and NETL provided (BSCSP et al., 2011). Subsequent to that meeting, the team reviewed available information necessary for the completion of the EA and submitted data gaps to NETL.

5.2 Agency Coordination

The Council on Environmental Quality's regulations for implementing NEPA allows federal agencies to invite comment from tribal, state, and local agencies, as well as other federal agencies in the preparation of EAs. The purpose of this coordination is to obtain special expertise with respect to environmental and cultural issues in order to enhance interdisciplinary capabilities, and otherwise ensure successful, effective consultation in decision-making.

5.2.1 U.S. Fish and Wildlife Service

The mission of the USFWS is to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. See Appendix B for letters sent to and received from this agency.

5.2.2 State Historic Preservation Office (SHPO)

The NHPA requires DOE to consult with the SHPO prior to any construction to ensure that no historical properties would be adversely affected by a proposed project. DOE must also afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed project. See Appendix E for the letter sent to the SHPO.

5.2.3 Bureau of Indian Affairs

The American Indian Religious Freedom Act, 42 USC § 1996, establishes policy to protect and preserve the inherent and Constitutional right of Native Americans to believe, express, and exercise their traditional religions. The law ensures the protection of sacred locations, access of Native Americans to those sacred locations and traditional resources that are integral to the practice of their religions, and establishes requirements that would apply to Native American sacred locations, traditional resources, or traditional religious practices potentially affected by construction and operation of proposed facilities. See Appendix D for letters sent to and received from the Bureau of Indian Affairs and Tribal Councils.

5.2.4 Other Agencies

Other consultation letters and responses are in Appendix F.

6.0 LIST OF PREPARERS

Mangi Environmental Group

Jim Mangi: Contract Management, Project Oversight

Meghan Morse: Project Manager, Document/Administrative Record Management, Cultural Resources, Human Health and Safety, Chapters 1 and 2, Wetlands and Floodplains, Visual, and Sustainability

Dave Henney: Project Support, Geology and Soils, and Water Resources

Antoine McGrath: Land Use, Socioeconomics, Parks and Recreation, CEQ, Legal Framework, and Projects Considered for Cumulative Impacts

Tim Lavallee: Air Quality, Infrastructure, and Noise

Carrie Oberholtzer: Terrestrial Vegetation and Wildlife

Tori Hudgins: Waste Management

Julie Sepanik: Maps

Chelsie Romulo: Paleontological Research

Pam Sarlouis: Document Assistance

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8.0 GLOSSARY

^{14}C (Carbon-14) – A form of carbon that is radioactive and has six protons and eight neutrons.

Air Quality – The characteristics of the ambient air (all locations accessible to the general public) as indicated by concentrations of the six air pollutants for which national standards have been established, and by measurement of visibility in mandatory Federal Class I areas.

Alluvial Fan – A fan-shaped deposit formed where a fast flowing stream flattens, slows, and spreads typically at the exit of a canyon onto a flatter plain.

Ambient – The natural surroundings of a location.

Anemometer – An instrument that measures force of wind.

Anthropogenic – Effects, processes or materials are those that are derived from human activities.

Anticline – An arch of stratified rock in which the layers bend downward in opposite directions from the crest.

Antiform – An anticline-like structure whose stratigraphic sequence is not known.

Aquifer – An underground layer of rock and sand that contains water.

Asphyxiation – Suffocation; the condition of being deprived of oxygen.

Attainment Areas – A zone within which the level of a pollutant is considered to meet United States National Ambient Air Quality Standards.

A-weighted Decibels – An expression of the relative loudness of sounds in air as perceived by the human ear.

Basement – Rocks below a sedimentary platform or cover, or more generally any rock below sedimentary rocks or sedimentary basins that are metamorphic (transformed by extreme heat and pressure) or igneous (volcanic) in origin.

Bench Lands – Long, narrow, and relatively level or gently inclined strips or platforms of land bounded by steeper slopes above and below.

BMPs – (Best Management Practices). Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources, including construction sites. They also help prevent or mitigate other safety and environmental issues.

Brine – Water saturated with or containing large amounts of a salt.

Cairns – Man-made stack of stones.

Candidate – Plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Caprock – A geological term for a harder or more resistant rock type overlying a weaker or less resistant rock type.

Carbon Sequestration – The capture and storage of carbon long-term in an effort to avoid release of that carbon as carbon dioxide in the atmosphere.

Carbon Storage – Securely holding for long-term (generally millions of years) CO_2 underground or in vegetation.

Categorical Exclusion – One of three forms of NEPA documentation. A categorical exclusion is granted to a "category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a Federal agency in implementation of

these regulations." Any project granted a categorical exclusion must not have any extraordinary circumstances that would create significant impacts from an otherwise normally excluded action (40 CFR 1508.4.).

Class II Landfill – A landfill that receives less than 20 tons on average of daily municipal solid waste, no groundwater pollution is evident, not connected to or over 50 miles from a Class I municipal solid waste landfill, and severs a community that for three months or more are isolated from a Class I landfill or have no other practicable waste management alternative (BLM, 2002).

CO_2 Flood – If a well has been produced before and has been designated suitable for CO_2 flooding, the first thing to do is to restore the pressure within the reservoir to one suitable for production. This is done by injecting water (with the production well shut off) which will restore pressure within the reservoir to a suitable pressure for CO_2 flooding. Once the reservoir is at this pressure, the next step is to inject the CO_2 into the same injection wells used to restore pressure. The CO_2 gas is forced into the reservoir and is required to come into contact with the oil. This easier movement of oil to the production well. Normally the CO_2 injection is alternated with more water injection and the water acts to sweep the oil towards the production zone.

Colluvium – Soil and debris that accumulate at the base of a slope by mass wasting or sheet erosion.

Contamination – Introduction into water, air, and soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use.

Cratonic or Craton – The part of a continent that is stable and forms the central mass of the continent.

Criteria Pollutants – The Clean Air Act requires USEPA to set standards for six common air pollutants. These commonly found air pollutants (also known as "criteria pollutants") are found all over the United States. They are particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead.

Crosswell Seismic – A technique, used in prospecting for crude oil and natural gas, in which a powerful sound is produced at different levels in one well and its vibrations recorded in one or more other wells.

Cultural Resources – Archaeological sites, historical sites (e.g. standing structures), Native-American resources, and paleontological resources.

Cumulative Effects – Those effects on the environment that result from the incremental effect of the action when added to past, present and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions.

Cumulative Effects – Those effects on the environment that result from the incremental effect of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions.

Day-night Sound Level – The A-weighted equivalent sound level for a 24-hour period with an additional 10 dB imposed on the equivalent sound levels for night time hours of 10 p.m. to 7 a.m.

Decibel – A unit of measurement that expresses the magnitude of a physical quantity (usually intensity) relative to a specified or implied *reference level*. The decibel is useful for a wide variety of measurements in science (for this application, it is sound).

Decommissioning – Formal process for abandoning a project components in accordance with applicable laws and regulations.

Dolostone – Sedimentary rock composed of primarily calcium, magnesium, carbon, and oxygen.

Dryland Crop (cereal grain) – Cropping without irrigation, usually in areas of relatively low rainfall.

Ecoregion – Relatively large units of land or water containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change.

Emergent Wetlands – Have erect, rooted, herbaceous water loving plants, except mosses and lichens (USGS, 2006a).

Endangered Species – A species whose numbers are so small that the species is at risk for extinction. A federal list of endangered species can be found in 50 CFR 17.11 (wildlife), 50 CFR 17.12 (plants), and 50 CFR 222.23(a) (marine organisms).

Environmental Justice – The fair treatment and meaningful involvement of all people without regard to race, national origin, or income in the development, implementation, and enforcement of environmental laws, regulations, policies and programs.

Equivalent Sound Level – The level of a steady-state noise without impulses or tone components that is equivalent to the actual noise emitted over a period of time.

Escarpment – A steep slope or long cliff that occurs from erosion or faulting and separates two relatively level areas of differing elevations.

Exotic – A species not historically present in an area also known as non-native species.

Extirpation – Removal of an entire populations of species from a particular region or area.

Fallow Field – Plowed fields that are left unseeded during a growing season.

Fold – When one or a stack of originally flat and planar surfaces, such as sedimentary strata, are bent or curved as a result of permanent deformation.

Fold-and-Thrust Belt – A fold and thrust belt is a series of mountainous foothills, adjacent to an orogenic belt, that form due to compression.

FTE – (Full-time Equivalent). One person working full-time for one year.

Geosyncline – A large-scale depression in the earth's crust containing a thick series of sediments.

Giga – is a unit prefix for 10^9 or 1,000,000,000.

Grama – Pasture grass of plains of South America and western North America.

Greenhouse Gas – Greenhouse gases are the gases present in the earth's atmosphere that reduce the loss of heat into space and therefore contribute to global temperatures.

Habitat – A place where particular plants or animals occur or could occur.

Hazardous Waste/Materials – Waste substances that can pose a substantial or potential hazard to human health or the environment when improperly managed.

Hertz – The frequency of sound waves.

Historic – Items that are older than 50 years but have occurred since the recording of history or invention of writing. Items may be historic if before they are 50 years old if associated with an important event or person.

Impermeable – Not permitting passage, (such as a fluid) through its substance.

Invasive – An exotic species that both invades native communities and impacts those native communities by displacing or replacing native species. A species that tends to spread prolifically and undesirably or harmful.

Kilowatt – A measurement of electric power.

Laccolith – A mass of igneous rock, typically lens-shaped, that has been intruded between rock strata causing uplift in the shape of a dome.

Lithic debris – Fragments of stone tools.

Lineaments – A linear feature on the earth's surface, such as a fault.

NAAQS – (National Ambient Air Quality Standards), Standards established by the USEPA that apply for outdoor air throughout the country. Primary standards are designed to protect human health, with an adequate margin of safety, including sensitive populations such as children, the elderly, and individuals suffering from respiratory disease.

Native – A species that historically occurs in an area or one that was not introduced (brought) from another area.

NEPA – (National Environmental Policy Act), Requires all agencies, including Department of Energy, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (40 CFR 1500).

New Source Performance Standards – Are pollution control standards issued by the USEPA. The term is used in the Clean Air Act Extension of 1070 to refer to air pollution emission standards, and in the Clean Water Act referring to standards for discharges of industrial wastewater to surface waters.

Nonattainment Areas – The Clean Air Act and Amendments of 1990 define a "nonattainment area" as a locality where air pollution levels persistently exceed national standards or that contributes to ambient air quality in a nearby area that fails to meet standards. Designating an area as nonattainment is a formal rulemaking process, and USEPA normally takes this action only after air quality standards have been exceeded for several consecutive years.

Noxious Weed – Any plant designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property.

Orogenic or Orogeny – The process of mountain formation, especially by the upward displacement of the earth's crust.

Paleontological Resources – Fossilized remains, traces, or imprints of organisms found generally in sedimentary rock. These do not include any resources associated with humans, which would be considered archeological resources per 16 USC 470aaa(4).

Palustrine Wetlands – Wetlands that are nontidal and dominated by trees, shrubs, and other vegetation as well as tidal wetlands under 0.5 percent salinity (USGS, 2006b).

Particular Matter – Small solid particles and liquid droplets in the air.

Permeability – Formations that transmit fluids readily, such as sandstones, are described as permeable and tend to have many large, well-connected pores.

Plume – A continuous emission from a point source of contamination that has a starting point and a noticeable pathway.

Porosity – The amount of small spaces or voids within a solid material. Porous materials can absorb fluids.
Prairie – A large open area of grassland.
Prehistory – Time before recorded history, generally written records or more broadly before the invention of writing.
Proglacial – Occurring or formed in front of a glacier.
Quantum – The smallest amount of many forms of energy.
Reduce – To bring down, as in extent, amount, or degree; diminish.
Region of Influence – The physical area that bounds the socioeconomic features of interest for the purpose of analysis of impacts.
Right-of-Way – An easement or a privilege to pass over the land of another, whereby the holder of the easement acquires only a reasonable and common use of the property.
Runoff – The non-infiltrating water entering a stream or other conveyance channel shortly after a rainfall.
Sediment – Particles derived from rock or biological sources that have been transported by water.
Sedimentary Rock – Rock formed by the sedimentation of any other rock type and can occur on the surface or in a water body.
Sequestration – A means of mitigating the contribution of fossil fuel emissions to global warming, based on capturing carbon dioxide from large point sources such as fossil fuel power plants, and storing it away from the atmosphere by different means.
Species – All organisms of a given kind; a group of plants or animals that breed together but are not bred successfully with organisms outside their group.
Structural Culmination – The highest point along a structural axis or fold system in geology, away from which the folds plunge.
Supercritical CO_2 – Carbon dioxide that is in a fluid state while also being at or above both its critical temperature and pressure.
Tame Pasture/Hay – Cultivated grass fields.
Threatened Species – A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Till – Unsorted geological material deposited directly by glacial ice and showing no stratification.
Till Plains – An extensive flat plain of glacial till that form when a sheet of ice becomes detached from the main body of a glacier and melts in place depositing the sediments it carried.
Traditional Cultural Property – "a property associated with the cultural practices or beliefs of a living community that are rooted in that community's history or important for maintaining its cultural identity" (NPS, 2010).
Unconsolidated shore – Areas with (1) less than 75 percent areal cover of stone, boulders, or bedrock; (2) less than 30% areal cover of vegetation other than pioneering plants; and (3) any of the following water regimes: irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded (USGS, 2006c).
Vuggy Porosity – This is secondary porosity generated by dissolution of large features (such as macrofossils) in carbonate rocks leaving large holes, vugs, or even caves.

Wetland – Area inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Appendices
Appendix A: Air Emission Calculations

Table A-1. Drilling Emissions

Heavy Equipment Use

Equipment Type	Number of Units	Days on Site	Hours Per Day	Operating Hours		
Bore/Drill Rigs	2	60	24	2880		
Generator Sets	4	60	24	5760		
Other Construction Equipment	3	60	24	4320		
Drilling Equipment Emission Factors (pounds (lbs)/hour)						
Equipment	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Bore/Drill Rigs	0.5281	1.3416	0.1295	0.0017	0.0591	0.0591
Generator Sets	0.3461	0.6980	0.1075	0.0007	0.0430	0.0430
Other Construction Equipment	0.4504	1.1575	0.1215	0.0013	0.0503	0.0503
Drilling Equipment Emissions (tons)						
Equipment	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Bore/Drill Rigs	0.7605	1.9319	0.1865	0.0025	0.0851	0.0851
Generator Sets	0.9968	2.0103	0.3095	0.0020	0.1238	0.1238
Other Construction Equipment	0.9728	2.5002	0.2624	0.0027	0.1087	0.1087
Total Equipment Emissions	**2.7300**	**6.4424**	**0.7585**	**0.0073**	**0.3176**	**0.3176**
Drilling Worker Commutes						
Number of Workers	13					
Number of Trips Per Day	2					
Miles Per Trip	10					
Days of Drilling	150					
Total Miles	39000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	411.39	43.01	42.09	0.42	3.32	2.06
Total Emissions (tons)	**0.2057**	**0.0215**	**0.0210**	**0.0002**	**0.0017**	**0.0010**
Total Drilling Emissions (tons)						
Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Heavy Equipment	2.7300	6.4424	0.7585	0.0073	0.3176	0.3176
Worker Commutes	0.2057	0.0215	0.0210	0.0002	0.0017	0.0010
Total Drilling Emissions	**2.9357**	**6.4639**	**0.7795**	**0.0075**	**0.3193**	**0.3187**

Source: (CARB, 2007)

Table A-2. Pipeline Construction Emissions

Equipment Use

Equipment Type	Number of Units	Days on Site	Hours Per Day	Operating Hours
Graders Composite	1	150	7	1050
Excavators Composite	1	150	7	1050
Rubber Tired Dozers Composite	1	150	7	1050
Off-Highway Trucks Composite	1	150	7	1050
Air Compressors	1	150	4	600
Cement & Mortar Mixers	1	60	7	420
Cranes	1	60	7	420
Generator Sets	1	150	7	1050
Tractors/Loaders/Backhoes	1	60	7	420

Equipment Emission Factors (lbs/hour)

Equipment	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Graders Composite	0.6561	1.6191	0.1936	0.0015	0.0840	0.0840
Excavators Composite	0.5828	1.3249	0.1695	0.0013	0.0727	0.0727
Rubber Tired Dozers Composite	1.5961	3.2672	0.3644	0.0025	0.1409	0.1409
Off-Highway Trucks Composite	0.8499	2.7256	0.2730	0.0027	0.0989	0.0989
Air Compressors	0.3782	0.7980	0.1232	0.0007	0.0563	0.0563
Cement and Mortar Mixers	0.0447	0.0658	0.0113	0.0001	0.0044	0.0044
Cranes	0.6011	1.6100	0.1778	0.0014	0.0715	0.0715
Generator Sets	0.3461	0.6980	0.1075	0.0007	0.0430	0.0430
Tractors/Loaders/Backhoes	**0.4063**	**0.7746**	**0.1204**	**0.0008**	**0.0599**	**0.0599**

Equipment Emissions (tons)

Equipment	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Graders Composite	0.3445	0.8500	0.1016	0.0008	0.0441	0.0441
Excavators Composite	0.3060	0.6956	0.0890	0.0007	0.0382	0.0382
Rubber Tired Dozers Composite	0.8379	1.7153	0.1913	0.0013	0.0740	0.0740
Off-Highway Trucks Composite	0.4462	1.4310	0.1433	0.0014	0.0519	0.0519
Air Compressors	0.1135	0.2394	0.0370	0.0002	0.0169	0.0169
Cranes	0.1262	0.3381	0.0373	0.0003	0.0150	0.0150
Generator Sets	0.1817	0.3665	0.0564	0.0004	0.0226	0.0226
Tractors/Loaders/Backhoes	0.0853	0.1627	0.0253	0.0002	0.0126	0.0126
Total Equipment Emissions	**2.4413**	**5.7985**	**0.6812**	**0.0052**	**0.2753**	**0.2753**

Source: (CARB, 2007)

Table A-2. Pipeline Construction Emissions						
Delivery of Equipment and Supplies						
Number of Deliveries	2					
Number of Trips	2					
Miles Per Trip	100					
Days of Construction	150					
Total Miles	60000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0219	0.0237	0.0030	0.0000	0.0009	0.0007
Total Emissions (lbs)	1316.95	1422.75	179.56	1.54	51.36	44.36
Total Emissions (tons)	**0.6585**	**0.7114**	**0.0898**	**0.0008**	**0.0257**	**0.0222**
Worker Commutes						
Number of Workers	13					
Number of Trips	2					
Miles Per Trip	10					
Days of Construction	150					
Total Miles	39000					
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001
Total Emissions (lbs)	411.39	43.01	42.09	0.42	3.32	2.06
Total Emissions (tons)	**0.2057**	**0.0215**	**0.0210**	**0.0002**	**0.0017**	**0.0010**
Total Construction Emissions (tons)						
Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Construction Equipment	2.4413	5.7985	0.6812	0.0052	0.2753	0.2753
Delivery of Equipment and Supplies	0.6585	0.7114	0.0898	0.0008	0.0257	0.0222
Worker Commutes	0.2057	0.0215	0.0210	0.0002	0.0017	0.0010
Total Construction Emissions	**3.3054**	**6.5313**	**0.7921**	**0.0062**	**0.3026**	**0.2985**
Source: (CARB, 2007)						

Table A-3. CO_2 Calculations		
Drilling and Construction	**Amount**	**Units**
Total Fuel	14000	Gallons
Total Fuel	52995.6	Liters
Emission Factor	2.6304	Kg CO_2 per liter
Total Emissions	139399.6	Kg
Total Emissions	154	tons
Electricity Usage	**Amount**	**Units**
Power	0	Kilowatt hour (kWh)
Emission Factor	13140	Kg CO_2/kWh
Total Emissions	0	Kg
Total Emissions	0	tons
Worker Commutes	**Amount**	**Units**
Number of Workers	20	Workers
Number of Trips	2	Trips
Miles Per Trip	30	Miles
Days of Operation	549	Days
Total Miles	658800	Miles
Emission Factor	1.1	lbs/mile
Total Emissions	724371.8	lbs
Total Emissions	362.2	tons
Total CO_2 Emissions		
Activity/Source		
Drilling and Construction	154	tons
Electricity Usage	0	tons
Worker Commutes	362	tons
Operational Emissions	3,041	tons
Total Emissions	**3,557**	tons
Source: (CARB, 2007)		

Table A-4. Operational Emission Calculations					
Total Natural Gas Combustion					
51,000,000	ft^3/year	52,020,000,000	btu/year		
51	mmcf/year	52,020	mmbtu/year		
Criteria Pollutants	**NO_x**	**CO**	**VOC**	**PM**	**SO_x**
Emission Factor (lbs/MMBTU)	1.94	0.353	0.12	0.0384	0.000588
Emissions (tpy)	50.5	9.2	3.1	1.0	Less than 0.1
Greenhouse Gas Emissions	**CO_2**	**CH_4**	**N_2O**		
Emission Factor (lbs/mmbtu)	116.87	0.0011014	0.000022		
Emissions (tpy)	3,039.8	0.0286	0.0006		
Global Warming Potential (GWP)	1	21	310	**Total CO_2e**	
CO_2 Equivalents	3,040	0.6016	0.1774	3,041	

Source: (USEPA, 1995) AP-42 Section 1.4 Natural Gas Combustion. Note: ft^3 is cubic feet; mmcf is million cubic feet; btu is British thermal units; mmbtu is million British thermal units; CH_4 is methane; and CO_2e is carbon dioxide equivalents.

Appendix B: USFWS Consultation

Note: Jim Lange, USFWS Benton Lake National Wildlife Refuge's Land Manager, also received a copy of both of the below letters.

Pre-Consultation Letter:

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

October 17, 2011

Mr. Mark Wilson
USFWS Ecological Services
585 Shepard Way
Helena, MT 59601

SUBJECT: Environmental Assessment for a Large Volume Injection of Carbon Dioxide to Assess Commercial Scale Geologic Sequestration in Saline Formations of the Big Sky Carbon Sequestration Partnership – Phase III, Kevin Dome Project, Toole Co., Montana

Dear Mr. Wilson,

Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). With the support of the U.S. Department of Energy's (DOE's) National Energy Technology Laboratory (NETL), BSCSP proposes to conduct a large-scale demonstration of the sequestration of carbon dioxide from a natural source, referred to as the "Phase III Kevin Dome Project" or BSCSP's proposed project in Toole County, Montana. Federal funding would be committed by NETL for the fieldwork contemplated, and the federal action (i.e. DOE's proposed action) is to provide approximately $63.8 million of federal funding (out of a total estimated $81.4 million project cost) to implement BSCSP's proposed project. The project infrastructure would include several production wells, one injection well, four monitoring wells, a compressor station, and a 6 to 10 mile pipeline.

Due to the need to determine the specific site locations of the project components, BSCSP has requested permission to conduct a preliminary three-dimensional and nine-component seismic survey during the winter of 2011-2012, as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the environmental assessment's (EA's) planned completion next year.

Based on the scope of the proposed project, NETL plans to prepare an EA in accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA) to analyze, document, and disseminate information on the potential environmental consequences of the proposed project. A consultation letter for the above EA would be sent requesting your input for the larger EA effort.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with these regulations and DOE's procedures, the EA will examine the potential environmental impacts

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
william.gwilliam@netl.doe.gov • Voice (304) 285-4401 • Fax (304) 285-4216 • www.netl.doe.gov

of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating informal consultation and requesting any additional information you may have on properties of biological significance within the vicinity of the Phase III Kevin Dome Project and any comments or concerns you have on the potential for this project to affect these resources. This information is being requested to aid in the preparation of the EA and NETL's review of the interim action as well as to meet DOE's obligations under Section 7 of the *Endangered Species Act*. If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Sincerely,

W. J. Gwilliam

William J. Gwilliam
Physical Scientist/NEPA Document Manager

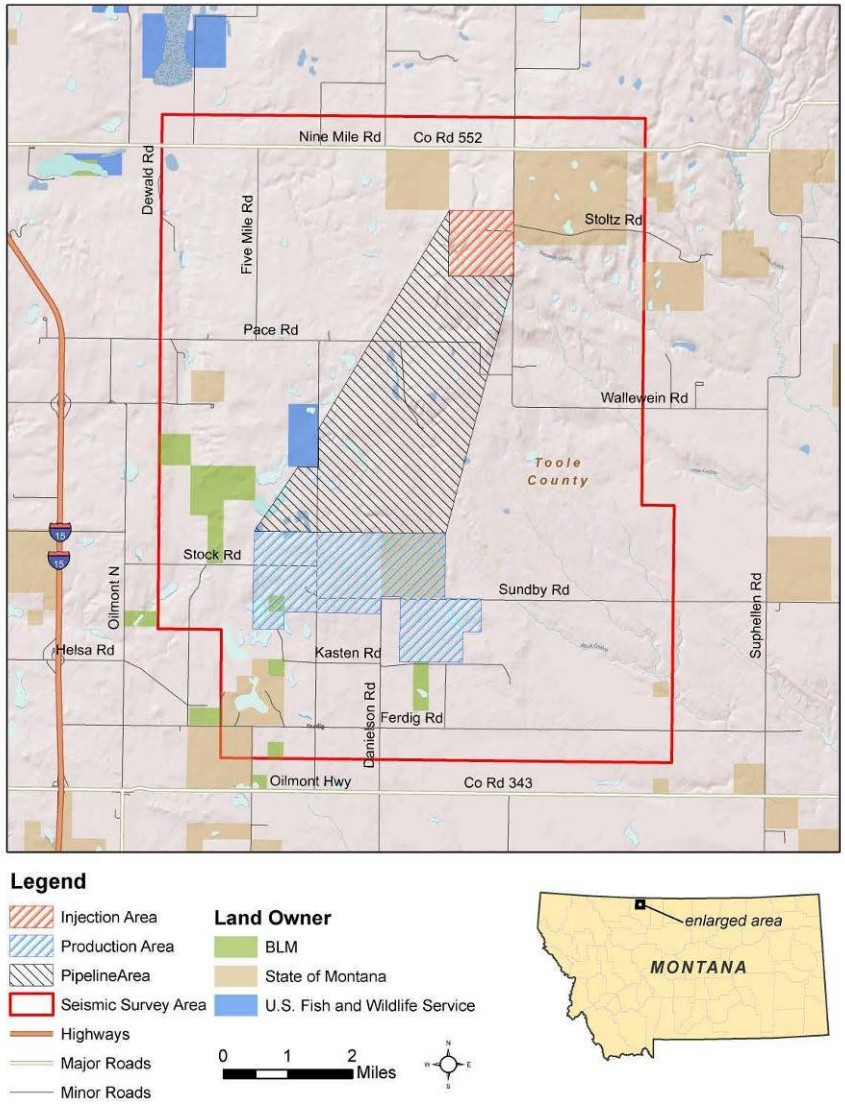
P.S. I look forward to seeing you at the project permitting kick-off meeting in Shelby, Montana (invitations sent separately by Lindsey Tollefson of BSCSP) on October 26, 2011.

Attachments

E-mail cc:

M. Morse
L. Spangler
L. Tollefson
W. Aljoe

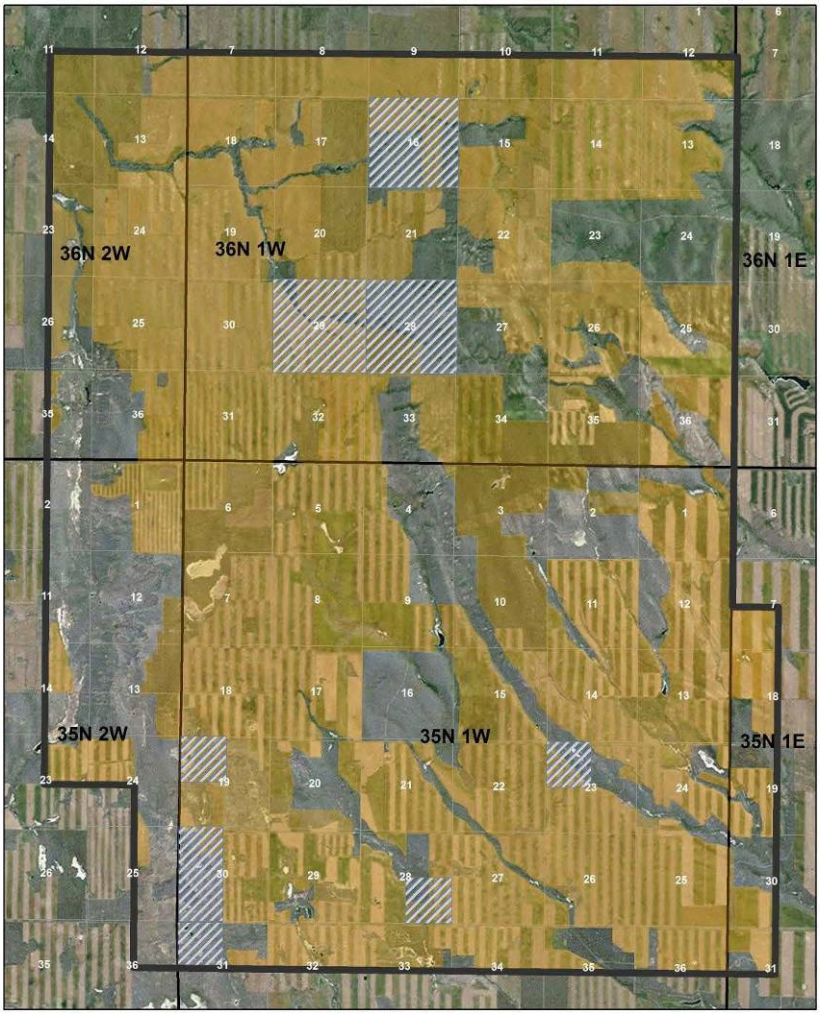
3



Project Map

4

Cultivated Areas (highlighted orange) within the buffered Seismic Survey Area. Approximate locations of archeological surveys from the CRIS and CRABS public databases are shown with hatch lines.



Cultivated Land and Areas Where Cultural Resource Surveys Have Been Conducted

Consultation Letter for the EA:

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

November 7, 2011

Mr. Mark Wilson
USFWS Ecological Services
585 Shepard Way
Helena, MT 59601

SUBJECT: Environmental Assessment for a Large Volume Injection of Carbon Dioxide to Assess Commercial Scale Geologic Storage in Saline Formations of the Big Sky Carbon Sequestration Partnership – Phase III, Kevin Dome Project, Toole Co., Montana

Dear Mr. Wilson,

Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). With the support of the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), BSCSP proposes to conduct a large-scale demonstration carbon dioxide (CO_2) storage from a natural source, referred to as the "Phase III Kevin Dome Project" or BSCSP's proposed project in Toole County, Montana. Federal funding would be committed by NETL for the fieldwork contemplated, and the Federal action (i.e. DOE's proposed action) is to provide approximately $63.8 million of Federal funding (out of a total estimated $81.4 million project cost) to implement BSCSP's proposed project. Based on the scope of the proposed project, NETL plans to prepare an environmental assessment (EA) in accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA) to analyze, document, and disseminate information on the potential environmental consequences of the proposed project.

At a rate of approximately 250,000 metric tons (275,000 short tons) per year, BSCSP proposes to inject up to 1 million metric tons (1,100,000 short tons) of supercritical CO_2 over the 4-year project injection period into the Duperow formation in Kevin Dome. BSCSP's proposed project's infrastructure would include up to five CO_2 production wells, one injection well, four monitoring wells, a compressor station, and 6 to 10-miles of 2-inch stainless steel pipeline (See enclosed map). The total disturbed area for the well pads, pipeline construction, and compressor station would not be expected to exceed 50-acres. There could be up to 5-miles of new aggregate roads. As part of this project, many monitoring and sampling activities would be implemented including crosswell seismic, walkaway vertical seismic profiling, surface seismic, fluid sampling from the reservoir using u-tubes in the monitoring wells, and surface techniques such as eddy covariance and soil flux chamber measurements.

All wells would be drilled to a maximum of 5,200-feet (ft). The ten well pads would be 200-ft by 200-ft including reserve pits. The processing facility would be about 40 by 60-ft with a concrete base and be located near the production well(s). The pipeline would be buried 6-ft underground and would transport the CO_2 from the processing facility to the injection well. Any

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
william.gwilliam@netl.doe.gov • Voice (304) 285-4401 • Fax (304) 285-4216 • www.netl.doe.gov

road or ephemeral waterways would be bored rather than trenched. All power would be provided by propane, natural gas, and diesel generators. Within the production area (see enclosed map), BSCSP may drill a shallow natural gas well to supply power to the compressor station.

The production, injection, and monitoring activities would occur on Montana's state trust land or privately owned land. The proposed injection site is about 8-miles east of Sunburst, and the proposed production well site is approximately 12-miles northeast of the town of Kevin. Many of the activities related to pipeline construction would occur on lands held in fee title by private landowners, but BSCSP would work with these owners for access. The seismic work would be performed on private, state, and U.S. government owned lands pending landowner permission or acquisition of required state and Federal permits.

The exact locations of all the project components are pending the permitting process and the results of the seismic survey, which is being reviewed as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the EA's planned completion next year. The interim action is currently planned to be granted by middle of November. A three-dimensional, nine-component seismic survey of no more than 75 square miles is proposed for winter 2011/spring 2012 with any remaining surveying occurring during fall and winter 2012, depending on weather. The seismic survey will be suspended between March 15 and August 15 to protect migratory birds, minimize surface impacts, and allow access to plowed land which comprises approximately 70 percent of the survey area. Some minimal environmental surface monitoring is also being proposed as an interim action. The seismic activity would utilize Vibroseis trucks with sand tires. The receiver lines would be spaced 660-ft apart, and the sources lines would be placed 880-ft apart. The vibrators would be placed in a hole 2-inches in diameter and 5-inches deep. The area would be surveyed for threatened and endangered species, wetlands, and cultural resources before the activities would occur. The seismic survey lines are dependent on obtaining landowner permission and the results of the cultural and biological surveys planned for this winter. After the 4-years of injection, BSCSP will monitor for another 2-years. Afterwards, commercial viable wells would be transferred to Vecta with all other wells being properly plugged and compressor facility idled.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with these regulations and DOE's procedures, the EA will examine the potential environmental impacts of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating consultation and requesting any additional information you may have on environmental and other concerns in the vicinity of the Phase III Kevin Dome Project. This information is being requested to aid in the preparation of the EA as well as to meet DOE's obligations under Section 7 of the *Endangered Species Act* and other regulations. We would appreciate comments by December 9, 2011. If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Please copy Meghan Morse to communications:

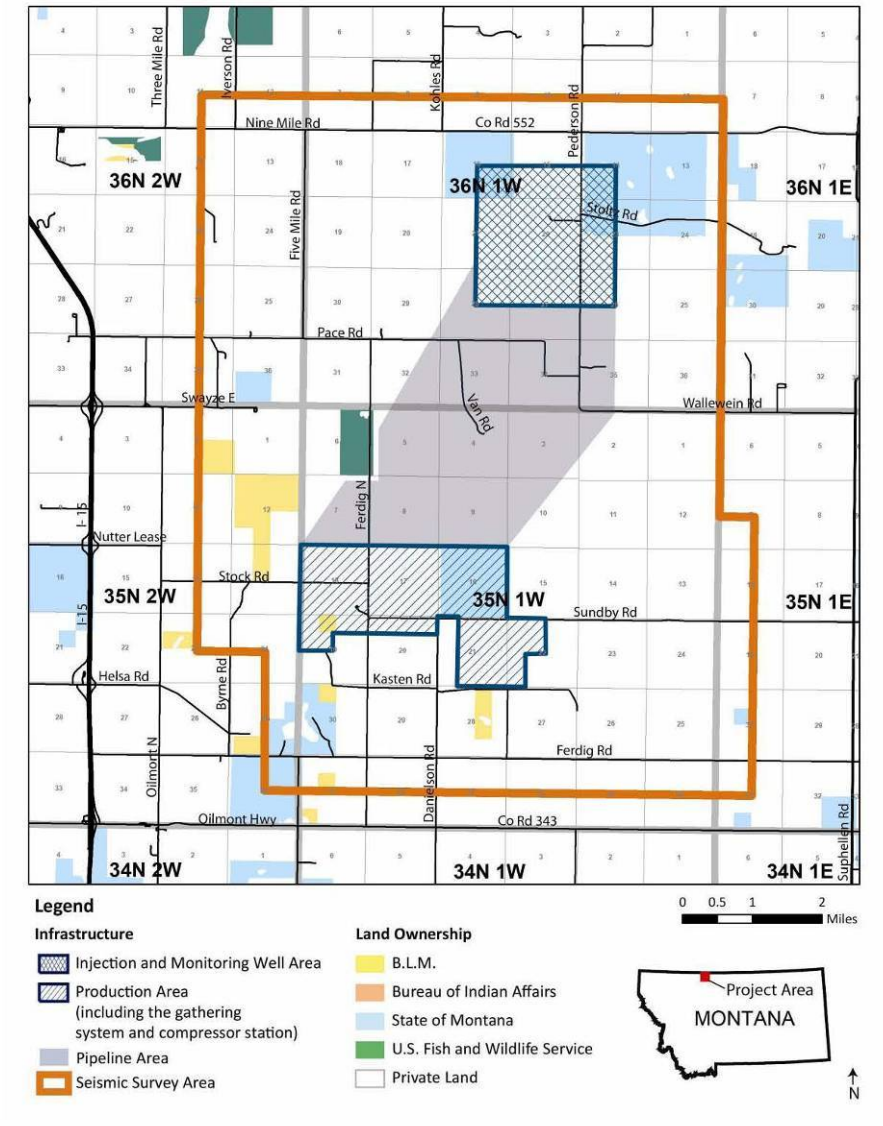
Meghan Morse
7927 Jones Branch Drive, Suite 150
McLean, VA 22102
Email: mmorse@mangi.com

For more information on the project and carbon storage, please visit the following websites: http://www.netl.doe.gov/technologies/carbon_seq/, www.bigskyco2.org, and http://www.netl.doe.gov/technologies/carbon_seq/faqs.html#storage.

Sincerely,

William J. Gwilliam
Physical Scientist/NEPA Document Manager

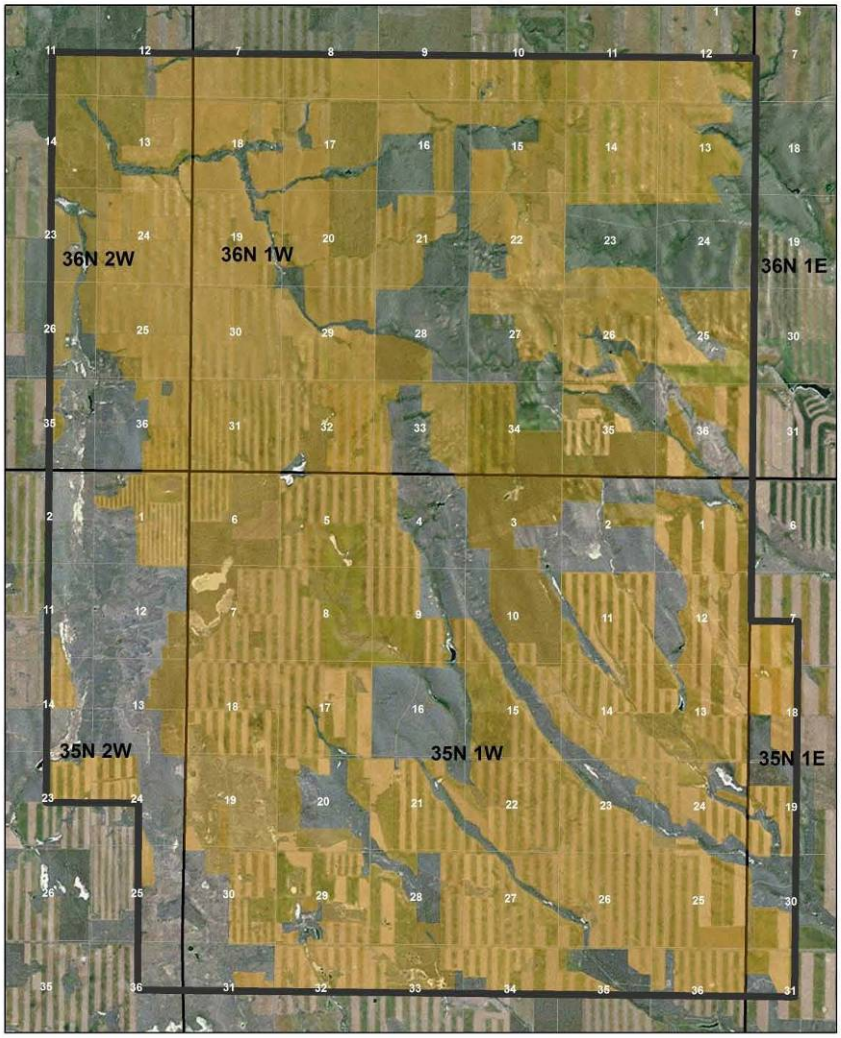
Attachments


Three Mile Rd
Iverson Rd
Kohles Rd
Pederson Rd
Nine Mile Rd
Co Rd 552
36N 2W
36N 1W
36N 1E
Five Mile Rd
Stolte Rd
Pace Rd
Swayze E
Van Rd
Wallewein Rd
Ferdig N
I-15
Nutter Lease
Stock Rd
35N 2W
35N 1W
35N 1E
Sundby Rd
Helsa Rd
Byrne Rd
Kasten Rd
Ferdig Rd
Oilmont N
Danielson Rd
Oilmont Hwy
Co Rd 343
Suphellen Rd
34N 2W
34N 1W
34N 1E
Legend
Infrastructure
Injection and Monitoring Well Area
Production Area (including the gathering system and compressor station)
Pipeline Area
Seismic Survey Area
Land Ownership
B.L.M.
Bureau of Indian Affairs
State of Montana
U.S. Fish and Wildlife Service
Private Land
0 0.5 1 2
Miles
Project Area
MONTANA
N

Project Map

5

Cultivated Areas (highlighted orange) within the buffered Seismic Survey Area. Total cultivated area is approximately 55 sq miles (or 73% of the buffered seismic area).



Cultivated Land Within the Seismic Survey Area

Responses:

United States Department of the Interior
Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way
Helena, Montana 59601-6287
Phone: (406) 449-5225 Fax: (406) 449-5339

November 9, 2011

Bill Gwilliam
U.S. Department of Energy
National Energy Technical Laboratory
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507

Dear Mr. Gwilliam:

The U.S. Fish and Wildlife Service (Service) reviewed your October 17, 2011 letter, October 25, 2011 Interim Action Request, and September 7, 2011 Big Sky Project Description (attached to a September 29, 2011 email) regarding completion of a seismic survey (seismic shoot) in association with the proposed Kevin Dome Storage Project in Toole County, Montana. In addition, project representatives further described the proposed project during an October 3, 2011 meeting with me, Brent Esmoil, and Jeff Berglund of my staff at our Montana Field Office in Helena, and an interagency meeting / field review in Shelby on October 26, 2011. During the October 26 meeting, you requested that the Service provide written comments pertaining to the seismic shoot, which is an "interim action" proposed in advance of the Environmental Assessment (EA) under preparation for the greater Kevin Dome Storage Project.

Our response comments are authorized under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et. seq.), Migratory Bird Treaty Act (MBTA)(16 U.S.C. 703 et seq.), Executive Order 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds*, Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*). Please note that these comments pertain to the proposed interim action only; we will provide additional comments regarding the overall project at a later time in association with the EA.

It is our understanding that the proposed seismic shoot would be conducted in advance of a proposed large scale carbon storage project at Kevin Dome in Toole County, Montana. The overall goal of the Kevin Dome Storage Project is to demonstrate that CO_2 can be stored safely and viably in regional geologic formations. The Kevin Dome Storage Project would involve

permitting and injecting one million tons of carbon dioxide (CO_2) into deep porous rock formations, as well as monitoring. The project infrastructure would include several production wells, one injection well, four monitoring wells, a compressor station and a six to 10 mile-long pipeline. An EA for the Kevin Dome Storage Project is currently under preparation. Data from the initial, currently proposed seismic survey would be used to determine Kevin Dome Storage Project well locations and also for geologic analysis and modeling.

It is our understanding that the seismic survey would cover an area not to exceed 75 square miles in townships 36N 2W, 36N 1W, 35N 2W, and 35N 1W. The proposed survey area includes private, state and some federally owned lands, approximately 73 percent of which are in dry land cultivation. To create sound waves, trucks that are equipped with large pads would send vibrations through the earth. The primary activity would therefore consist of driving vehicles (quads, pickups, and vibrators with sand tires) in a grid pattern across the survey area.

Receivers or sensors, called geophones, would be temporarily installed at the surface to record echoes from geological layers. The proposed sensors are cylindrical and about 3 inches in diameter and 8 inches long. One sensor would be deployed at each receiver location and planted in the ground, typically using a drill to create a hole slightly smaller than the sensor itself. Once the geophones were placed, trucks would move in tandem in a grid pattern, lowering the vibration pad onto the ground surface at regular intervals. The receiver lines would receive several passes by line trucks to deploy and retrieve equipment. The source lines would be driven by three fleets of vibrators providing three independent types of vibration energy at each source location. The proposed receiver lines are tentatively spaced 660 feet apart and the source lines are 880 feet apart, but would be adjusted based on field conditions.

Other activities and features associated with the proposed interim action include placement of a tower (to be left in place for the project duration) to measure CO_2, meteorological variables, and soil properties; CO_2 soil surface monitoring using a backpack instrument; and sampling of existing water wells in the area.

Pending receipt of permits, it is our understanding that the seismic survey is planned to commence in November or December 2011 and proceed until approximately mid-March 2012. The survey would resume post-August 2012 and be completed by mid-March 2013. The survey work would be weather dependent. The trucks and survey crew would generally operate for 12 hour shifts per day. All water resources including wetlands, lakes, rivers and/or streams would be avoided during the seismic survey.

In accordance with section 7(c) of the Endangered Species Act, the Service has determined that the following listed and candidate species may occur in Toole County:

Scientific Name	Common Name	Status
Mustela nigripes	Black-footed Ferret	LE
Anthus spragueii	Sprague's Pipit	C

*LE = Listed Endangered; C = Candidate Species

We are not aware of any black-footed ferret occurrences or habitat (black-tailed prairie dog towns) in the proposed project area. Similarly, no proposed or designated critical habitat for proposed or listed species occurs in the project area. The Sprague's pipit, a candidate species for listing as threatened or endangered, has been documented in the general project area and may occur within the proposed project boundaries in suitable grassland habitat.

Candidate species are those placed on the candidate list for future action, meaning those species do not receive statutory protection under the ESA. Candidates are reviewed annually by the Service to determine if they continue to warrant listing or to reassess their listing priority. Ideally, sufficient threats can be removed to eliminate the need for listing. If threats are not addressed or the status of the species declines, a candidate species can move up in priority for a listing proposal.

Given the proposed project location and information / analysis provided in the September 2011 *Biological Resources Reconnaissance and Impact Analysis, Seismic Survey Area, Kevin Dome Project* attached to the October 25, 2011 *Interim Action Request*, as summarized above in our project understanding discussion, no adverse effects to listed or proposed threatened or endangered species or critical habitat are anticipated in connection with the seismic survey. Similarly, given the proposed fall/winter survey period in 2011 and 2012, no adverse impacts to nesting Sprague's pipits or other migratory bird species are anticipated during seismic survey implementation.

As the proposed eddy covariance tower would be left in place year-round for the project duration, we recommend that guywires securing the tower be marked with bird deterrent devices per techniques outlined by the Avian Powerline Interaction Committee (APLIC) in *Mitigating Bird Collisions with Power Lines: The State of the Art in 1994*. This would minimize the chance for bird mortality in association with guywire collision. This publication can be obtained by writing or calling the Edison Electric Institute, P.O. Box 266, Waldorf Maryland 20604-0266, (1-800-334-5453) or visiting their website at www.eei.org. An updated version of the 1994 document may be available in early 2012.

We support the proposed avoidance of all water resources in association with the seismic survey, as this will serve to avoid and minimize impacts to active and dormant amphibians and reptiles, seasonally congregating waterfowl and shorebirds, and the wetlands and other water resources themselves. We also recommend the enactment of best management practices to avoid and minimize the spread of noxious weeds and other undesirable exotic plant species within the proposed project area. Such measures may include delineation and avoidance of weed populations and periodic vehicle and equipment washing.

There may be additional state species of concern in the vicinity of the project and we strongly recommend coordination with Montana Fish, Wildlife & Parks at 1420 East Sixth Ave., P.O. Box 200701, Helena, MT 59620-0701, 406-444-2535 and the Montana Natural Heritage Program, 1515 East 6th Avenue, Box 201800, Helena, MT 59620-1800, 406-444-5354. Both of these agencies may be able to provide updated, site-specific information regarding fish and wildlife resources occurring in the proposed project area.

Questions regarding permitting, management, or access pertaining to Service's Benton Lake Wetland Management District lands in the project area should be directed to Jim Lange, Wetland District Manager at Benton Lake National Wildlife Refuge, 922 Bootlegger Trail, Great Falls, MT 59404 (406-727-7400, ext. 228).

Thank you for the opportunity to review and comment on this project. Please telephone Jeff Berglund at 406/449-5225, ext. 206, if you have any questions regarding this matter.

Sincerely,

Brent J. Esmoil
Acting Field Supervisor

United States Department of the Interior
Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way
Helena, Montana 59601-6287
Phone: (406) 449-5225 Fax: (406) 449-5339

November 30, 2011

Bill Gwilliam
U.S. Department of Energy
National Energy Technical Laboratory
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507

Dear Mr. Gwilliam:

The U.S. Fish and Wildlife Service (Service) reviewed your November 7, 2011 letter (received on November 14, 2011) regarding a planned Environmental Assessment (EA) for a large-scale carbon dioxide storage demonstration project in Toole County referred to as the Phase III Kevin Dome Project. In addition, project representatives described elements of the proposed project during an October 3, 2011 meeting with me, Brent Esmoil, and Jeff Berglund of my staff at our Montana Field Office in Helena, and an interagency meeting / field review in Shelby on October 26, 2011. Your November 7 letter requested preliminary Service comments and information to assist with your preparation of the EA.

Our response comments are authorized under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et. seq.), Migratory Bird Treaty Act (MBTA)(16 U.S.C. 703 et seq.), as amended, Executive Order 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds*, Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), as amended, and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*.). Please note that these comments pertain to the proposed action minus the seismic survey. We previously provided comments in a November 9, 2011 letter regarding the seismic survey, an "interim action" proposed in advance of the EA. Those comments still apply to the project components to which they were addressed.

It is our understanding that Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). The BSCSP proposes to conduct the demonstration project with the support of the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL). The production, injection, and monitoring activities would occur on

Montana state trust land or private land. The proposed injection site occurs eight miles east of Sunburst, and the proposed production well site occurs approximately 12 miles northeast of Kevin. The BSCSP proposes to inject up to 1 million metric tons of CO_2 over the four-year project injection period. Proposed infrastructure would include up to five CO_2 production wells, one injection well, four monitoring wells, a compressor station, and six to 10 miles of 2-inch diameter stainless steel pipeline. The total disturbed area for the well pads, pipeline construction, and compressor station would not exceed 50 acres. Up to five miles of new aggregate roads may be constructed.

Wells would be drilled to a maximum depth of 5,200 feet, and each of the ten well pads would comprise 200 feet by 200 feet, including reserve pits. The 40 by 60-foot concrete based processing facility would be located near the production well(s). The pipeline would be buried six feet underground and would transport the CO_2 from the processing facility to the injection well. Roads and ephemeral waterways would be bored rather than trenched. All power would be provided by propane, natural gas, and diesel generators. The BSCSP may drill a shallow natural gas well within the production area to supply power to the compressor station.

Threatened and Endangered Species

In accordance with section 7(c) of the Endangered Species Act, the Service has determined that the following listed and candidate species may occur in Toole County:

Scientific Name	Common Name	Status
Mustela nigripes	Black-footed Ferret	LE
Anthus spragueii	Sprague's Pipit	C

*LE = Listed Endangered; C = Candidate Species

We are not aware of any black-footed ferret occurrences or habitat (black-tailed prairie dog towns) in the proposed project area. Similarly, no proposed or designated critical habitat for proposed or listed species occurs in the project area. The Sprague's pipit, a candidate species for listing as threatened or endangered, has been documented in the general project area and may occur within the proposed project boundaries in suitable grassland habitat.

The proposed project occurs over 40 miles east of the grizzly bear Northern Continental Divide Ecosystem Recovery Zone, and is not currently included on our species list for Toole County. However, please be aware that we have observed incremental eastward movement / occurrences of this species on the plains in recent years, including use of cultivated areas. As the proposed project life may extend for four years or more, we recommend commensurate attention to sanitation issues and use of "bear resistant" containers for garbage disposal during construction and operational project phases to reduce the potential for human-bear conflicts, should grizzly bears expand their range into the project area over the project life.

If a Federal agency authorizes, funds, or carries out a proposed action, the responsible Federal agency, or its delegated agent, is required to evaluate whether the action "may affect" listed species or critical habitat. If the Federal agency or its designated agent determines the action "may affect, is likely to adversely affect" listed species or critical habitat, the responsible Federal agency shall request formal section 7 consultation with this office. If the evaluation shows a "may affect, not likely to adversely affect" determination, concurrence from this office is required. If the evaluation shows a "no effect" determination for listed species or critical habitat, further consultation is not necessary. If a private entity receives Federal funding for a construction project, or if any Federal permit or license is required, the Federal agency may designate the fund recipient or permittee as its agent for purposes of informal section 7 consultation. The funding, permitting, or licensing federal agency is responsible to ensure that its actions comply with the ESA, including obtaining concurrence from the Service for any action that may affect a threatened or endangered species or designated critical habitat.

We recommend that biological assessments and other such evaluations include the following:

1. A description of the project.
2. A description of the specific area that may be affected by the action.
3. The current status, habitat use, and behavior of listed/proposed T/E species and status of listed/proposed critical habitat in the project area.
4. Discussion of the methods used to determine the information in Item 3.
5. An effects analysis of the action for listed/proposed species and critical habitat, including an analysis of any cumulative effects.
6. Coordination/mitigation measures that will reduce/eliminate adverse impacts to listed/proposed T/E species and critical habitat.
7. The expected status of listed/proposed T/E species and critical habitat in the future (short and long term) during and after project completion.
8. A determination of "May affect, likely to adversely affect", "May affect, not likely to adversely affect", or "No effect" for listed species and critical habitat.
9. A determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species and critical habitat.
10. Citation of literature and personal contacts used in developing the assessment.

Candidate species are those placed on the candidate list for future action, meaning those species do not receive statutory protection under the ESA. Candidates are reviewed annually by the Service to determine if they continue to warrant listing or to reassess their listing priority. Ideally, sufficient threats can be removed to eliminate the need for listing. If threats are not addressed or the status of the species declines, a candidate species can move up in priority for a listing proposal.

Migratory Birds

The MBTA prohibits the taking, killing, possession, and transportation (among other actions), of migratory birds, their eggs, parts, and nests, except when specifically permitted. While the MBTA has no provision for allowing unintentional take, the Service realizes that some birds may be killed during project construction and operation even if all known reasonable and effective measures to protect birds are used. The Service's Law Enforcement Division carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take of migratory birds. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, the Law Enforcement Division focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent and effective measures to avoid take. Companies are encouraged to work closely with Service biologists to identify available protective measures when developing project plans and/or avian protection plans (APPs), and to implement those measures prior to and during project construction and operation.

Executive Order 13186 expressly requires that Federal agencies evaluate the effects of proposed actions on migratory birds (including eagles) pursuant to NEPA "or other established environmental review process;" restore and enhance the habitat of migratory birds, as practicable; identify where unintentional take reasonably attributable to agency actions has, or is likely to have, a measurable negative effect on migratory bird populations; and, with respect to those actions so identified, the agency shall develop and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the Service. In this EA, DOE should include all practicable avoidance and minimization measures, as well as any necessary monitoring or additional mitigation, in the project plan or as Conditions of Approval in the decision document.

Reserve pits containing oil or oil-based products (i.e., oil-based drilling fluids) can attract, entrap, and kill migratory birds and other wildlife, particularly once the drilling rig and other equipment are removed and human activity diminishes. We recommend enactment of closed loop (pitless) drilling systems in lieu of open reserve pits. If this is not feasible, and reserve pits are used, we first advise you that immediate removal of the drilling fluids after well completion is the key to preventing wildlife mortality in reserve pits. Secondly, where pits remain open following completion of drilling activities, they should be netted immediately. The effectiveness of netting oil pits to exclude birds and other wildlife depends on its installation. Effective installation requires a design allowing for snow-loading and preventing ground entry by small mammals and birds.

A maximum mesh size of 1 1/2 inches will allow for snow-loading and exclude most birds; however, a mesh size of 3/4 inch may most effectively preclude bird access and entrapment. Netting should be suspended a minimum of 4 to 5 feet from the water surface to prevent the net from sagging into the oil-covered pond during heavy snow-loads, and should be wide enough to drape down the sides of the frame to prevent ground entry by wildlife. A bottom perimeter cable strung along the bottom of the posts at ground level should be used to attach the bottom of the net, and cables can be strung over the net at intervals to prevent wind effects. Proper maintenance should be performed to repair holes in the netting and to re-stretch sagging nets as necessary.

To the maximum extent practicable, well drilling, surveying, and construction activities (well pads, access roads, pipe laying, etc.) should be scheduled so as not to disrupt nesting birds or other wildlife during the breeding season (approximately April-August). If work is proposed to take place during the breeding season or at any other time which may result in take of migratory birds, their eggs, or active nests, the Service recommends that the project proponent take all practicable measures to avoid and minimize take, such as maintaining adequate buffers, to protect the birds until the young have fledged. The Service further recommends that if field surveys for nesting birds are conducted with the intent of avoiding take during construction, any documentation of the presence of migratory birds, eggs, and active nests, along with information regarding the qualifications of the biologist(s) performing the surveys, and any avoidance measures implemented at the project site be maintained.

Certain activities may require a permit from the Service's Migratory Bird Management Division. Please contact the Region 6 Migratory Bird Permits Office if you are uncertain if activities may result in take of migratory birds. Additional information about permits can be found at http://www.fws.gov/migratorybirds/mbpermits.html.

Additional recommendations include the following:

1. No trash should be disposed of in reserve pits. After drilling is complete, the reserve pit fluids and sludges should be removed immediately and the liner and remaining contents removed and legally disposed of off-site.
2. Sites subject to contamination with crude oil or similar fluids (temporary reserve pits, flare pits, emergency pits, etc.) should be netted on the tops and sides (see netting discussion above). Wire mesh or grate covers should be placed on drip buckets/barrels under valves and spigots to exclude migratory birds and other wildlife.
3. Gas should not be permanently vented or flared. Temporary flaring should not be conducted for more than 30 days following drilling completion and not occur within 300' of wetlands. Flare pipes and exhaust stacks of heater-treaters should be fitted with anti-perching devices to prevent bird use.
4. Spills (oil or brine) should be reported to the appropriate State of Montana agency. Leaks should be immediately repaired, and spills should be immediately contained and cleaned up.

Damaged habitats should be restored to pre-spill conditions. Spill Prevention Plans should be developed. A Spill Control Emergency Preparedness Plan should describe all actions, equipment, procedures, training, etc. to control and effectively respond to releases of contaminating substances (oil, brine, drilling fluids, blow-out, or any other toxic or hazardous substance) to ensure protection of fish and wildlife trust resources and human health and safety.
5. Use of interlocking oak (or similar) mats on drill pads over existing vegetation should be considered to minimize surface disturbance while allowing for quicker recovery response after drill rigs are removed.
6. Efforts should be made to decrease compressor facility sound by placement, well-insulated buildings and/or noise deflectors. Electric motors are preferred to minimize disturbance to nesting birds.

Bald and Golden Eagles

The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from taking Bald or Golden Eagles, including their parts, nests, or eggs. The BGEPA provides criminal and civil penalties for persons who take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any Bald Eagle ... [or any Golden Eagle], alive or dead, or any part, nest, or egg thereof. The BGEPA defines take as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. "Disturb" means to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

We are not aware of any bald or golden eagle nests within the proposed project area. Golden eagle nesting has been documented approximately eight miles to the west in the Kevin Rim area. However, to demonstrate appropriate analysis relative to the BGEPA, the Service recommends that DOE evaluate:

1) whether take is likely to occur from activities associated with the proposed activity; and,
2) the direct/ indirect, and cumulative impacts the proposal may have on the ability to meet the preservation standard of the BGEPA, which the Service has interpreted to mean "compatible with the goal of stable or increasing breeding populations."

Other Comments

We support the proposed avoidance of waterways in association with pipeline construction, and encourage the same approach with wetlands were possible. We also recommend the avoidance and minimization of impacts to wetlands and waterways in conjunction with road layout and construction, and enactment of best management practices to avoid and minimize the spread of noxious weeds and other undesirable exotic plant species within the proposed project area. Such measures may include delineation and avoidance of weed populations and periodic vehicle and equipment washing.

There may be additional state species of concern in the vicinity of the project and we strongly recommend coordination with Montana Fish, Wildlife & Parks at 1420 East Sixth Ave., P.O. Box 200701, Helena, MT 59620-0701, 406-444-2535 and the Montana Natural Heritage Program, 1515 East 6th Avenue, Box 201800, Helena, MT 59620-1800, 406-444-5354. Both of these agencies may be able to provide updated, site-specific information regarding fish and wildlife resources occurring in the proposed project area.

As communicated in our November 9 letter, questions regarding permitting, management, or access pertaining to USFWS Benton Lake Wetland Management District lands in the project area should be directed to Jim Lange, Wetland District Manager at Benton Lake National Wildlife Refuge, 922 Bootlegger Trail, Great Falls, MT 59404 (406-727-7400, ext. 228).

Thank you for the opportunity to review and comment on this project. Please telephone Jeff Berglund at 406/449-5225, ext. 206, if you have any questions regarding this matter.

Sincerely,

R. Mark Wilson

R. Mark Wilson
Field Supervisor

United States Department of the Interior
Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way
Helena, Montana 59601-6287
Phone: (406) 449-5225 Fax: (406) 449-5339

July 10, 2012

Bill Gwilliam
U.S. Department of Energy
National Energy Technical Laboratory
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507

Lindsey Tollefson
Big Sky Carbon Sequestration Partnership
PO Box 173905 Bozeman, MT 59717-3905

Dear Mr. Gwilliam and Ms. Tollefson:

This letter responds to a July 6, 2012 letter from the Big Sky Carbon Sequestration Partnership (BSCSP) requesting additional U.S. Fish and Wildlife Service (Service) Migratory Bird Treaty Act (MBTA) guidance pertaining to an updated well drilling proposal. The July 6, 2012 letter also proposed an arrangement for ongoing project coordination with the Service. As you are aware, we previously provided comments on the overall proposed project in letters dated November 9 and November 30, 2011.

Our response comments are authorized under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et. seq.), MBTA (16 U.S.C. 703 et seq.), as amended, Executive Order 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds*, Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), as amended, and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

We understand that the BSCSP well drilling proposal has been updated. BSCSP plans to drill up to 10 wells during late 2012 and 2013 (pending permits and project schedule). This includes up to five wells to produce CO2, one CO2 injection well and four monitoring wells near the injection well. All wells would be permitted by the Montana Board of Oil and Gas, with the exception of the CO2 injection well which would be permitted under the U. S. Environmental Protection Agency's Underground Injection Control Program. No construction would be

initiated on these wells until the National Environmental Policy Act (NEPA) process is complete. A 30-day public comment period for the project Environmental Assessment (EA) is anticipated to be initiated in August 2012.

BSCSP is tentatively planning to drill two wells in late fall of 2012 and the remainder during spring 2013. The exact locations of wells have not been determined. For all wells, drilling operations are expected to take two to three weeks per well. The drilling operations would use a freshwater-based drilling mud. Drilling mud and fluids would be contained in tanks and reserve pits. Since the mud would be fresh-water based and no hydrocarbons would be extracted, the tanks and pits would not contain oil. The tanks would hold approximately 400 barrels and be fully contained units with open tops. During drilling operations, the tanks would be used to hold and recycle drilling fluids. After the wells are completed, the tanks would be pumped and removed from the site. The reserve pits would contain the solid wastes (solids from the shaker and cuttings from the pump pits) during drilling operations. These pits would be unlined unless requested by a state or federal agency. Each pit would measure approximately 12 feet by 20 feet by 8 feet deep, and occur within a 1-acre well pad site. Once the wells are completed, all sites would be reclaimed and re-vegetated.

The MBTA prohibits the taking, killing, possession, and transportation, (among other actions) of migratory birds, their eggs, parts, and nests, except when specifically permitted. In our November 2011 project correspondence, we discussed the MBTA, potential impacts, issues to be addressed in the EA, and recommended impact minimization measures. These included measures pertaining to reserve pits that contain oil or oil-based products (i.e. oil-based drilling fluids) and can attract, entrap, and kill migratory birds and other wildlife; particularly once the drilling rig and other equipment are removed and human activity diminishes. We recommended enactment of closed loop (pitless) drilling systems in lieu of open reserve pits at such sites. If this was not feasible, and reserve pits were proposed, we advised immediate removal of the drilling fluids after well completion and, where pits were to remain open following drilling completion, that they should be netted immediately.

Based on the absence of oil from pits and tanks as discussed in your updated project description, the two- to three-week drilling operation period per well, and subsequent immediate reclamation and revegetation at each well site, netting should not be necessary. Similarly, we do not anticipate impacts to nesting birds in association with proposed fall 2012 drilling, as the nesting season would be avoided. The remaining project recommendations / issues to be addressed in the EA as described in our previous correspondence still apply.

The proposed arrangement for ongoing project consultation described in your July 6, 2012 letter is acceptable to the Service, to the extent that it is compatible with applicable ESA Section 7 consultation timeframes.

As communicated in our November 2011 letters, questions regarding permitting, management, or access pertaining to USFWS Benton Lake Wetland Management District lands in the project area should be directed to Jim Lange, Wetland District Manager at Benton Lake National Wildlife Refuge, 922 Bootlegger Trail, Great Falls, MT 59404 (406-727-7400, ext. 228).

Thank you for the opportunity to review and comment on this project. Please telephone Jeff Berglund at 406/449-5225, ext. 206, if you have any questions regarding this matter.

Sincerely,

R. Mark Wilson
Field Supervisor

Appendix C: Noise Calculations

Table C-1. Drilling Noise

	Feet	Meters											
NSA 1	**12,000**	**3,658**											
	Octave Band Center Frequency, Hz												
Source				**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB**
Drill Rig (at 25 Feet)				93	97	94	91	92	91	88	81	76	
PWL				121	125	123	120	121	120	116	109	105	
TL Enclosure (1/2 inch wood)				0.5	-5.5	-11.5	-17.5	-23.5	-29.5	-35.6	-41.6	-47.6	
PWL with enclosure				122	23	17	11	5	-1	-7	-13	-19	
Mud Handling (Shaker and Pump) (at 25 Feet)				89	90	88	81	79	78	75	74	68	
PWL				118	119	117	110	108	107	104	103	97	
Generators (Light Plant)	**325**	**435.5**	CF	**5**	**9**	**3**	**7**	**15**	**19**	**25**	**35**	**43**	
Exhaust Noise	Lw	145.1		140.1	136.1	142.1	138.1	130.1	126.1	120.1	110.1	102.1	134
Muffler Correction				25	25	29	29	27	25	24	23	23	
			PWL	115.1	111.1	113.1	109.1	103.1	101.1	96.1	87.1	79.1	107
			CF	**4**	**11**	**13**	**13**	**12**	**9**	**8**	**9**	**17**	
Inlet Noise	Lw	107.6	PWL	103.6	96.6	94.6	94.6	95.6	98.6	99.6	98.6	90.6	105
			CF	**22**	**14**	**7**	**7**	**8**	**6**	**7**	**13**	**20**	
Casing Noise	Lw	118.1	**PWL**	96	104	111	111	110	112	111	105	98	117
Excavator (at 25 Feet)					84	85	81	81	81	78	73		
PWL				29	113	114	110	110	110	107	102	29	
Total Sound Intensity				2.4907	1.0575	1.0167	0.3944	0.2741	0.3185	0.2104	0.0725	0.0122	
Total PWL				**124**	**120**	**120**	**116**	**114**	**115**	**113**	**109**	**101**	**128**
Hemispherical Spreading				-85	-85	-85	-85	-85	-85	-85	-85	-85	
Atmospheric Absorption				0	0	-1	-4	-10	-18	-33	-84	-154	
Flat Sound Level				39	35	34	27	19	12	-5	-61	-138	
Octave Band A-Weighted Correction				-39	-26	-16	-9	-3	0	1	1	-1	
A-Weighted Sound Level				0	9	18	18	16	12	-4	-60	-139	**23**
												DNL	**29**

Notes: Calculations based on available data from typical equipment set-ups; actual equipment would vary dependent on results of geotechnical evaluation and site specific design. Calculations do not account for effect of topographic features, reflection, and natural barriers. CF is correction factor, PWL is power level, TL is transmission loss, and Lw is sound power levels.

Table C-2. Compressor Noise													
	Feet	**Meters**											
NSA 1	**12,000**	**3,658**											
	Octave Band Center Frequency, Hz												
Source				**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB**
Reciprocating Compressor		**1000.0**	CF	**11**	**15**	**10**	**11**	**13**	**10**	**5**	**8**	**15**	
	Lw	118.7	**PWL**	108	104	109	108	106	109	114	111	104	118
Total Sound Intensity				0.0592	0.0236	0.0746	0.0592	0.0374	0.0746	0.2358	0.1182	0.0236	
Total PWL				**108**	**104**	**109**	**108**	**106**	**109**	**114**	**111**	**104**	**118**
Hemispherical Spreading				-85	-85	-85	-85	-85	-85	-85	-85	-85	
Atmospheric Absorption				0	0	-1	-4	-10	-18	-33	-84	-154	
Octave Band A-Weighted Correction				-39	-26	-16	-9	-3	0	1	1	-1	
A-Weighted Sound Level (w/o barrier)				-16	-7	6	10	7	5	-3	-58	-136	**14**
												Ldn	**20**
	Feet	**Meters**											
Critical Distance Calculation	**1000**	**305**											
	Octave Band Center Frequency, Hz												
Source				**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB**
Reciprocating Compressor		**1000.0**	CF	**11**	**15**	**10**	**11**	**13**	**10**	**5**	**8**	**15**	
	Lw	118.7	**PWL**	108	104	109	108	106	109	114	111	104	118
Total Sound Intensity				0.0592	0.0236	0.0746	0.0592	0.0374	0.0746	0.2358	0.1182	0.0236	
Total PWL				**108**	**104**	**109**	**108**	**106**	**109**	**114**	**111**	**104**	**118**
Hemispherical Spreading				-65	-65	-65	-65	-65	-65	-65	-65	-65	
Atmospheric Absorption				0	0	0	0	-1	-2	-3	-8	-15	
Octave Band A-Weighted Correction				-39	-26	-16	-9	-3	0	1	1	-1	
A-Weighted Sound Level (w/o barrier)				4	13	27	33	37	42	46	38	22	**48**
												Ldn	**55**
Note: w/o means without.													

Appendix D: BIA and Tribal Consultations

Note: All the Tribal contacts below received the same pre-consultation letter.

- Melissa Passes, Branch Chief, Environmental Services, Rocky Mountain Regional Office Bureau of Indian Affairs
- John Murray, Blackfeet THPO office
- Morris "Davey" Belgard, Fort Belknap THPO office
- Alvin Windy Boy Sr., Rocky Boy THPO
- Francis Auld, Acting THPO for Confederated Salish and Kootenai Tribes of the Flathead Reservation

Pre-consultation Letter Example:

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

October 17, 2011

Mr. John Murray
Blackfeet Tribal Historic Preservation Officer
620 All Chief Road
Box 850
Browning, MT 59417

SUBJECT: Environmental Assessment for a Large Volume Injection of Carbon Dioxide to Assess Commercial Scale Geologic Sequestration in Saline Formations of the Big Sky Carbon Sequestration Partnership – Phase III, Kevin Dome Project, Toole Co., Montana

Dear Mr. Murray,

Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). With the support of the U.S. Department of Energy's (DOE's) National Energy Technology Laboratory (NETL), BSCSP proposes to conduct a large-scale demonstration of the sequestration of carbon dioxide from a natural source, referred to as the "Phase III Kevin Dome Project" or BSCSP's proposed project in Toole County, Montana. Federal funding would be committed by NETL for the fieldwork contemplated, and the federal action (i.e. DOE's proposed action) is to provide approximately $63.8 million of federal funding (out of a total estimated $81.4 million project cost) to implement BSCSP's proposed project. The project infrastructure would include several production wells, one injection well, four monitoring wells, a compressor station, and a 6 to 10 mile pipeline.

Due to the need to determine the specific site locations of the project components, BSCSP has requested permission to conduct a preliminary three-dimensional and nine-component seismic survey during the winter of 2011-2012, as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the environmental assessment's (EA's) planned completion next year.

Based on the scope of the proposed project, NETL plans to prepare an EA in accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA) to analyze, document, and disseminate information on the potential environmental consequences of the proposed project. A consultation letter for the above EA would be sent requesting your input for the larger EA effort.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
william.gwilliam@netl.doe.gov • Voice (304) 285-4401 • Fax (304) 285-4216 • www.netl.doe.gov

these regulations and DOE's procedures, the EA will examine the potential environmental impacts of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating informal consultation and requesting any additional information you may have on properties of cultural significance within the vicinity of the Phase III Kevin Dome Project and any comments or concerns you have on the potential for this project to affect these properties. This information is being requested to aid in the preparation of the EA and NETL's review of the interim action as well as to meet DOE's obligations under various regulations. If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Sincerely,

W. J. Gwilliam

William J. Gwilliam
Physical Scientist/NEPA Document Manager

P.S. I look forward to seeing you at the project permitting kick-off meeting in Shelby, Montana (invitations sent separately by Lindsey Tollefson of BSCSP) on October 26, 2011.

Attachments

E-mail cc:

M. Morse
L. Spangler
L. Tollefson
W. Aljoe

Note: Same pre-consultation letter maps were sent as in the USFWS letter in Appendix B.

Consultation Letter for the EA:

In addition to the contacts that received the pre-consultation letter, the below contacts were sent a consultation letter.

- "Curley" Youpee Darrell, Fort Peck Assiniboine and Sioux Tribes THPO
- Conrad Fisher, Northern Cheyenne Tribe THPO
- Dale Old Horn, The Crow Tribe of Indians THPO

Consultation Letter Example:

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

November 7, 2011

Ms. Melissa Passes
Rocky Mountain Regional Office Bureau of Indian Affairs
316 N. 26th Street
Billings, MT 59101

SUBJECT: Environmental Assessment for a Large Volume Injection of Carbon Dioxide to Assess Commercial Scale Geologic Storage in Saline Formations of the Big Sky Carbon Sequestration Partnership – Phase III, Kevin Dome Project, Toole Co., Montana

Dear Ms. Passes,

Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). With the support of the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), BSCSP proposes to conduct a large-scale demonstration carbon dioxide (CO_2) storage from a natural source, referred to as the "Phase III Kevin Dome Project" or BSCSP's proposed project in Toole County, Montana. Federal funding would be committed by NETL for the fieldwork contemplated, and the Federal action (i.e. DOE's proposed action) is to provide approximately $63.8 million of Federal funding (out of a total estimated $81.4 million project cost) to implement BSCSP's proposed project. Based on the scope of the proposed project, NETL plans to prepare an environmental assessment (EA) in accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA) to analyze, document, and disseminate information on the potential environmental consequences of the proposed project.

At a rate of approximately 250,000 metric tons (275,000 short tons) per year, BSCSP proposes to inject up to 1 million metric tons (1,100,000 short tons) of supercritical CO_2 over the 4-year project injection period into the Duperow formation in Kevin Dome. BSCSP's proposed project's infrastructure would include up to five CO_2 production wells, one injection well, four monitoring wells, a compressor station, and 6 to 10-miles of 2-inch stainless steel pipeline (See enclosed map). The total disturbed area for the well pads, pipeline construction, and compressor station would not be expected to exceed 50-acres. There could be up to 5-miles of new aggregate roads. As part of this project, many monitoring and sampling activities would be implemented including crosswell seismic, walkaway vertical seismic profiling, surface seismic, fluid sampling from the reservoir using u-tubes in the monitoring wells, and surface techniques such as eddy covariance and soil flux chamber measurements.

All wells would be drilled to a maximum of 5,200-feet (ft). The ten well pads would be 200-ft by 200-ft including reserve pits. The processing facility would be about 40 by 60-ft with a concrete base and be located near the production well(s). The pipeline would be buried 6-ft underground and would transport the CO_2 from the processing facility to the injection well. Any

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
william.gwilliam@netl.doe.gov • Voice (304) 285-4401 • Fax (304) 285-4216 • www.netl.doe.gov

road or ephemeral waterways would be bored rather than trenched. All power would be provided by propane, natural gas, and diesel generators. Within the production area (see enclosed map), BSCSP may drill a shallow natural gas well to supply power to the compressor station.

The production, injection, and monitoring activities would occur on Montana's state trust land or privately owned land. The proposed injection site is about 8-miles east of Sunburst, and the proposed production well site is approximately 12-miles northeast of the town of Kevin. Many of the activities related to pipeline construction would occur on lands held in fee title by private landowners, but BSCSP would work with these owners for access. The seismic work would be performed on private, state, and U.S. government owned lands pending landowner permission or acquisition of required state and Federal permits.

The exact locations of all the project components are pending the permitting process and the results of the seismic survey, which is being reviewed as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the EA's planned completion next year. The interim action is currently planned to be granted by middle of November. A three-dimensional, nine-component seismic survey of no more than 75 square miles is proposed for winter 2011/spring 2012 with any remaining surveying occurring during fall and winter 2012, depending on weather. The seismic survey will be suspended between March 15 and August 15 to protect migratory birds, minimize surface impacts, and allow access to plowed land which comprises approximately 70 percent of the survey area. Some minimal environmental surface monitoring is also being proposed as an interim action. The seismic activity would utilize Vibroseis trucks with sand tires. The receiver lines would be spaced 660-ft apart, and the sources lines would be placed 880-ft apart. The vibrators would be placed in a hole 2-inches in diameter and 5-inches deep. The area would be surveyed for threatened and endangered species, wetlands, and cultural resources before the activities would occur. The seismic survey lines are dependent on obtaining landowner permission and the results of the cultural and biological surveys planned for this winter. After the 4-years of injection, BSCSP will monitor for another 2-years. Afterwards, commercial viable wells would be transferred to Vecta with all other wells being properly plugged and compressor facility idled.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with these regulations and DOE's procedures, the EA will examine the potential environmental impacts of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating consultation and requesting any additional information you may have on properties of cultural significance within the vicinity of the Phase III Kevin Dome Project and any comments or concerns you have on the potential for this project to affect these properties. This information is being requested to aid in the preparation of the EA as well as to meet DOE's obligations under various regulations. NETL intends for the NEPA process to satisfy the Section 106 requirements. We would appreciate comments by December 9, 2011. If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Please copy Meghan Morse to communications:

Meghan Morse
7927 Jones Branch Drive, Suite 150
McLean, VA 22102
Email: mmorse@mangi.com

For more information on the project and carbon storage, please visit the following websites: http://www.netl.doe.gov/technologies/carbon_seq/, www.bigskyco2.org, and http://www.netl.doe.gov/technologies/carbon_seq/faqs.html#storage.

Sincerely,

William J. Gwilliam
Physical Scientist/NEPA Document Manager

Attachments

Note: The same consultation letter maps were sent as in the USFWS letter in Appendix B.

Responses:

>>> "Cultural Resources Department" <cultres@nemontel.net> 11/7/2011 6:09 PM >>>
Thank you for the information letter.
Who will be the lead agency? and when can we expect
face to face consultation?
Curley

>>> "Francious Auld" <francisa@cskt.org> 10/27/2011 3:06 PM >>>
Mr. Gwilliams,
As per my phone message I left you.
Will there be a "All Tribes of Montana" initial Consultation meeting? And if there is one can it be centralized at a location so that all Montana Tribes can attend. I understand sometimes a request can be impossible. I would though support an effort because of the magnitude of this propose project. It just South of the Sweetgrass Hills a place that is highly significant to many Tribes. Please take this into consideration in your planning.
Thank you,

Francis Auld & Mike Durglo Sr.
Tribal Preservation Department
P.O. Box 278
Pablo, MT. 59855
(406) 675-2700 ext. 1076
francisa@cskt.org
mikeds@cskt.org

Salish, Pend d'Oreille and Kootenai

From: Francis Auld [mailto:francisa@cskt.org]
Sent: Thursday, December 29, 2011 12:03 PM
Subject: Kevin Dome Project

William,

I have received a letter dated November 7, 2011. Subject RE: ENVIRONMENTAL ASSESMENT FOR A LARGE VOLUME INJECTION OF CARBON DIOXIDE TO ASSESS COMMERCIAL SCALE GEOLOGIC STORAGE IN SALINE FORMATIONOF THE BIG SKY CARBON SEQUESTRATION PARDNERSHIP – PHASE 111, KEVIN DOME PROJECT, TOOLE CO., MONTANA.
I believe in our past phone discussions a suggestion was made to have a Montana Indian Wide Consultation meeting. This would educate all Montana Tribes of this project in case there is more proposed project as such, possibly on or near their Tribal lands.

Thank you,

Francis Auld and Mike Durlgo Sr. Acting Managers
Tribal Preservation Office
Box 278
Pablo, Montana 59855
(406) 675-2700 EXT. 1075
francisa@cskt.org
mikeds@cskt.org

Appendix E: State Historic Preservation Office

Pre-consultation Letter:

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

October 17, 2011

Mr. Mark Baumler
State Historic Preservation Officer
225 N. Roberts
P.O. Box 201201
Helena, MT 59620-1201

SUBJECT: Environmental Assessment for a Large Volume Injection of Carbon Dioxide to Assess Commercial Scale Geologic Sequestration in Saline Formations of the Big Sky Carbon Sequestration Partnership – Phase III, Kevin Dome Project, Toole Co., Montana

Dear Mr. Baumler,

Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). With the support of the U.S. Department of Energy's (DOE's) National Energy Technology Laboratory (NETL), BSCSP proposes to conduct a large-scale demonstration of the sequestration of carbon dioxide from a natural source, referred to as the "Phase III Kevin Dome Project" or BSCSP's proposed project in Toole County, Montana. Federal funding would be committed by NETL for the fieldwork contemplated, and the federal action (i.e. DOE's proposed action) is to provide approximately $63.8 million of federal funding (out of a total estimated $81.4 million project cost) to implement BSCSP's proposed project. The project infrastructure would include several production wells, one injection well, four monitoring wells, a compressor station, and a 6 to 10 mile pipeline.

Due to the need to determine the specific site locations of the project components, BSCSP has requested permission to conduct a preliminary three-dimensional and nine-component seismic survey during the winter of 2011-2012, as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the environmental assessment's (EA's) planned completion next year.

Based on the scope of the proposed project, NETL plans to prepare an EA in accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA) to analyze, document, and disseminate information on the potential environmental consequences of the proposed project. A consultation letter for the above EA would be sent requesting your input for the larger EA effort.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
william.gwilliam@netl.doe.gov • Voice (304) 285-4401 • Fax (304) 285-4216 • www.netl.doe.gov

these regulations and DOE's procedures, the EA will examine the potential environmental impacts of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating informal consultation and requesting any additional information you may have on properties of historic or archaeological significance within the vicinity of the Phase III Kevin Dome Project and any comments or concerns you have on the potential for this project to affect these properties. This information is being requested to aid in the preparation of the EA and NETL's review of the interim action as well as to meet DOE's obligations under Section 106 of the *National Historic Preservation Act of 1966 as amended.* If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Sincerely,

W. J. Gwilliam

William J. Gwilliam
Physical Scientist/NEPA Document Manager

P.S. I look forward to seeing you at the project permitting kick-off meeting in Shelby, Montana (invitations sent separately by Lindsey Tollefson of BSCSP) on October 26, 2011.

Attachments

E-mail cc:

M. Morse
L. Spangler
L. Tollefson
W. Aljoe
S. Wilmoth

Note: Same pre-consultation letter maps were sent as in the USFWS letter in Appendix B.

Note: A copy of below consultation letter was also sent to Mark Baumler, State Historic Preservation Officer

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

November 7, 2011

Mr. Stan Wilmoth
Montana State Historic Preservation Office
225 N. Roberts
P.O. Box 201201
Helena, MT 59620-1201

SUBJECT: Environmental Assessment for a Large Volume Injection of Carbon Dioxide to Assess Commercial Scale Geologic Storage in Saline Formations of the Big Sky Carbon Sequestration Partnership – Phase III, Kevin Dome Project, Toole Co., Montana

Dear Mr. Wilmoth,

Montana State University manages the Big Sky Regional Carbon Sequestration Partnership (BSCSP). With the support of the U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL), BSCSP proposes to conduct a large-scale demonstration carbon dioxide (CO_2) storage from a natural source, referred to as the "Phase III Kevin Dome Project" or BSCSP's proposed project in Toole County, Montana. Federal funding would be committed by NETL for the fieldwork contemplated, and the Federal action (i.e. DOE's proposed action) is to provide approximately $63.8 million of Federal funding (out of a total estimated $81.4 million project cost) to implement BSCSP's proposed project. Based on the scope of the proposed project, NETL plans to prepare an environmental assessment (EA) in accordance with the requirements of the *National Environmental Policy Act of 1969* (NEPA) to analyze, document, and disseminate information on the potential environmental consequences of the proposed project.

At a rate of approximately 250,000 metric tons (275,000 short tons) per year, BSCSP proposes to inject up to 1 million metric tons (1,100,000 short tons) of supercritical CO_2 over the 4-year project injection period into the Duperow formation in Kevin Dome. BSCSP's proposed project's infrastructure would include up to five CO_2 production wells, one injection well, four monitoring wells, a compressor station, and 6 to 10-miles of 2-inch stainless steel pipeline (See enclosed map). The total disturbed area for the well pads, pipeline construction, and compressor station would not be expected to exceed 50-acres. There could be up to 5-miles of new aggregate roads. As part of this project, many monitoring and sampling activities would be implemented including crosswell seismic, walkaway vertical seismic profiling, surface seismic, fluid sampling from the reservoir using u-tubes in the monitoring wells, and surface techniques such as eddy covariance and soil flux chamber measurements.

All wells would be drilled to a maximum of 5,200-feet (ft). The ten well pads would be 200-ft by 200-ft including reserve pits. The processing facility would be about 40 by 60-ft with a concrete base and be located near the production well(s). The pipeline would be buried 6-ft

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
william.gwilliam@netl.doe.gov • Voice (304) 285-4401 • Fax (304) 285-4216 • www.netl.doe.gov

underground and would transport the CO_2 from the processing facility to the injection well. Any road or ephemeral waterways would be bored rather than trenched. All power would be provided by propane, natural gas, and diesel generators. Within the production area (see enclosed map), BSCSP may drill a shallow natural gas well to supply power to the compressor station.

The production, injection, and monitoring activities would occur on Montana's state trust land or privately owned land. The proposed injection site is about 8-miles east of Sunburst, and the proposed production well site is approximately 12-miles northeast of the town of Kevin. Many of the activities related to pipeline construction would occur on lands held in fee title by private landowners, but BSCSP would work with these owners for access. The seismic work would be performed on private, state, and U.S. government owned lands pending landowner permission or acquisition of required state and Federal permits.

The exact locations of all the project components are pending the permitting process and the results of the seismic survey, which is being reviewed as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the EA's planned completion next year. The interim action is currently planned to be granted by middle of November. A three-dimensional, nine-component seismic survey of no more than 75 square miles is proposed for winter 2011/spring 2012 with any remaining surveying occurring during fall and winter 2012, depending on weather. The seismic survey will be suspended between March 15 and August 15 to protect migratory birds, minimize surface impacts, and allow access to plowed land which comprises approximately 70 percent of the survey area. Some minimal environmental surface monitoring is also being proposed as an interim action. The seismic activity would utilize Vibroseis trucks with sand tires. The receiver lines would be spaced 660-ft apart, and the sources lines would be placed 880-ft apart. The vibrators would be placed in a hole 2-inches in diameter and 5-inches deep. The area would be surveyed for threatened and endangered species, wetlands, and cultural resources before the activities would occur. The seismic survey lines are dependent on obtaining landowner permission and the results of the cultural and biological surveys planned for this winter. After the 4-years of injection, BSCSP will monitor for another 2-years. Afterwards, commercial viable wells would be transferred to Vecta with all other wells being properly plugged and compressor facility idled.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with these regulations and DOE's procedures, the EA will examine the potential environmental impacts of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard

copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating consultation and requesting any additional information you may have on properties of historic or archaeological significance within the vicinity of the Phase III Kevin Dome Project and any comments or concerns you have on the potential for this project to affect these properties. This information is being requested to aid in the preparation of the EA as well as to meet DOE's obligations under Section 106 of the *National Historic Preservation Act of 1966 as amended* and various other regulations. NETL intends for the NEPA process to satisfy the Section 106 requirements. We would appreciate comments by December 9, 2011. If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Please copy Meghan Morse to communications:

Meghan Morse
7927 Jones Branch Drive, Suite 150
McLean, VA 22102
Email: mmorse@mangi.com

For more information on the project and carbon storage, please visit the following websites: http://www.netl.doe.gov/technologies/carbon_seq/, www.bigskyco2.org, and http://www.netl.doe.gov/technologies/carbon_seq/faqs.html#storage.

Sincerely,

W. J. Gwilliam

William J. Gwilliam
Physical Scientist/NEPA Document Manager

Attachments

Note: The same consultation letter maps were sent as in the USFWS letter in Appendix B.

Appendix F: Other Agencies

Below is the list of other agencies that received pre-consultation and/or consultation letters. Beyond the inside address and salutation, these letters both pre-consultation and consultation only differed from the corresponding ones in the above appendices on the second page, which an example of each is below.

- George Hudak, UIC Coordinator, Montana Board of Oil and Gas
- Bonnie Lovelace, Special Projects, Montana Department of Environmental Quality
- Monte Mason, Minerals Management Bureau Chief, Montana Department of Natural Resources and Conservation
- Gary Olson, Wildlife Biologist, MT Department of Fish, Wildlife, and Parks
- Kirstin Boyle, BLM
- Wendy Cheung, UIC Program, USEPA Region 8
- Deborah Blank, Montana Regulatory Program Manager, US Army Corps of Engineers
- Montana Natural Heritage Program

Pre-consultation:

of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating an informal consultation and requesting any additional information you may have on environmental and other concerns near the Phase III Kevin Dome Project. This information is being requested to aid in the preparation of the EA and NETL's review of the interim action. If you have any such information, require additional information, or have any questions or comments about the above project, please contact DOE's NETL using the contact information provided below:

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
Office phone: 304-285-4401
Email: william.gwilliam@netl.doe.gov

Sincerely,

W. J. Gwilliam

William J. Gwilliam
Physical Scientist/NEPA Document Manager

P.S. I look forward to seeing you at the project permitting kick-off meeting in Shelby, Montana (invitations sent separately by Lindsey Tollefson of BSCSP) on October 26, 2011.

Attachments

E-mail cc:

M. Morse
L. Spangler
L. Tollefson
W. Aljoe

Consultation:

ephemeral waterways would be bored rather than trenched. All power would be provided by propane, natural gas, and diesel generators. Within the production area (see enclosed map), BSCSP may drill a shallow natural gas well to supply power to the compressor station.

The production, injection, and monitoring activities would occur on Montana's state trust land or privately owned land. The proposed injection site is about 8-miles east of Sunburst, and the proposed production well site is approximately 12-miles northeast of the town of Kevin. Many of the activities related to pipeline construction would occur on lands held in fee title by private landowners, but BSCSP would work with these owners for access. The seismic work would be performed on private, state, and U.S. government owned lands pending landowner permission or acquisition of required state and Federal permits.

The exact locations of all the project components are pending the permitting process and the results of the seismic survey, which is being reviewed as an interim action. DOE/NETL is currently evaluating this request to allow the seismic survey before the EA's planned completion next year. The interim action is currently planned to be granted by middle of November. A three-dimensional, nine-component seismic survey of no more than 75 square miles is proposed for winter 2011/spring 2012 with any remaining surveying occurring during fall and winter 2012, depending on weather. The seismic survey will be suspended between March 15 and August 15 to protect migratory birds, minimize surface impacts, and allow access to plowed land which comprises approximately 70 percent of the survey area. Some minimal environmental surface monitoring is also being proposed as an interim action. The seismic activity would utilize Vibroseis trucks with sand tires. The receiver lines would be spaced 660-ft apart, and the sources lines would be placed 880-ft apart. The vibrators would be placed in a hole 2-inches in diameter and 5-inches deep. The area would be surveyed for threatened and endangered species, wetlands, and cultural resources before the activities would occur. The seismic survey lines are dependent on obtaining landowner permission and the results of the cultural and biological surveys planned for this winter. After the 4-years of injection, BSCSP will monitor for another 2-years. Afterwards, commercial viable wells would be transferred to Vecta with all other wells being properly plugged and compressor facility idled.

In accordance with DOE NEPA implementing procedures, DOE must evaluate the potential environmental impacts of its proposed action that could have a significant impact on human health and the environment, including any decision to provide financial assistance. In compliance with these regulations and DOE's procedures, the EA will examine the potential environmental impacts of BSCSP's proposed project and the no-action alternative and will identify any unavoidable adverse environmental impacts of BSCSP's proposed project. This EA (*when final*) would fulfill DOE's obligations under NEPA and provide DOE with the information needed to make an informed decision to provide financial assistance for the Phase III Kevin Dome Project.

When DOE's NETL completes preparation of the draft EA for this project (currently estimated to be in spring 2012), it would be made available for a 30-day public comment period. A hard copy of the draft EA would be sent to your office, and you may again respond to any specific comments or concerns you may have with this project.

DOE is initiating consultation and requesting any additional information you may have on environmental and other concerns in the vicinity of the Phase III Kevin Dome Project. This information is being requested to aid in the preparation of the EA. We would appreciate comments by December 9, 2011. If you have any such information, require additional information, or have

Responses:

-----Original Message-----
From: Blank, Deborah L NWO [mailto:Deborah.L.Blank@usace.army.mil]
Sent: Friday, November 04, 2011 4:24 PM
To: Tollefson, Lindsey
Subject: RE: Interim Action Request for Kevin Dome Carbon Storage Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Hi, we sent you a preapplication letter that explains our program. We do not really have the time to review projects in their entirety and make comments, especially if there are no impacts to waters of the US. If at any time you think the project will place dredged or fill material into a water of the US, or affect the Missouri River, then please contact us. At this point I have not been apprised of any impact to waters of the US. I have closed out the preapplication file. Thank you for including us in the updates, but my email is getting locked up with the large files sent to me.

We do have a Nationwide 6 for survey activities.
http://www.nwo.usace.army.mil/html/od-rmt/factsheets/nwfs6.pdf

Please note, you do not notify us (ie send in an application) for this Nationwide Permit.

Classification: UNCLASSIFIED
Caveats: NONE

Montana Department of
ENVIRONMENTAL QUALITY

Brian Schweitzer, Governor
Richard H. Opper, Director

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

November 3, 2011

William J. Gwilliam
Physical Scientist/NEPA Document Manager
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507

Dear Mr. Gwilliam:

Thank you for your pre-consultation correspondence with the Montana Department of Environmental Quality (DEQ) regarding the Environmental Assessment for the Big Sky Carbon Sequestration Partnership, Kevin Dome project. It was a pleasure to meet with you in Shelby, MT for the field trip and agency staff meeting, October 26.

As we discussed at the meeting, the DEQ will likely process permits related to air and water quality, but the EPA will process the major Underground Injection Control permit. It is understandable that the initial seismic work be separated from the main permit applications in order to gather information that will better define the later permitting requirements, especially exact locations and likely impact areas.

At this time, the DEQ has no state actions requiring a response, but we would certainly wish to have the opportunity to comment on any NEPA documents as they are available. Also, at this time, we are not requesting particular analyses or evaluation methods.

You or your contractor may feel free to contact us for additional information as needed. Also, Montana's Natural Resource Information System, housed at our state library may prove useful in looking for site-specific information. I have provided the link to that site to your contractor. The Montana DEQ website would also be helpful if you need to look up either environmental information managed by our programs or contact individuals within DEQ. The site is: http://deq.mt.gov/default.mcpx.

Please contact me if I may be of further assistance at 406-444-1760 or blovelace2@mt.gov

Sincerely,

Bonnie Lovelace

Bonnie Lovelace
Special Projects Manager
Director's Office
Montana Department of Environmental Quality

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Havre Field Office
3990 Highway 2 West
Havre, Montana 59501
www.blm.gov/mt

TAKE PRIDE IN AMERICA

December 8, 2011

ATTN: Bill Gwilliam
U.S. Department of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507

Dear Mr. Gwilliam:

We have reviewed the Big Sky Carbon Sequestration Partnership (BSCSP) project information from your November 7, 2011, letter, including the additional website sources you provided. The Bureau of Land Management's (BLM) interdisciplinary team identified cultural resources, groundwater, fluid minerals, raptor nesting areas, migratory bird habitat, and noxious and invasive species as having potential issues and concerns. Proposed mitigations and more detailed scoping information are provided in the enclosed "BLM Scoping Comments". The original scoping responses are being kept as part of the communication records for this project at the Havre Field Office. We would appreciate a copy of the final analysis and decision record when it is completed.

We are aware of one connected action; Delfan, a private company, has proposed producing CO2 in this general area to export to Canada for enhanced oil recovery.

For your records, I have also enclosed a list of resources which either are not present in the public lands in the project area or they would not be affected to an extent that warrants analysis.

If you have any questions or concerns, please contact Kirsten Boyle at (406) 262-2829 or kirsten_boyle@blm.gov.

Sincerely,

/s/

Stanley Jaynes
Field Manager

cc: Meghan Morse
7927 Jones Branch Drive, Suite 150
McLean, VA 22102

BLM Scoping Comments

Cultural Resources: Certain areas require a Class III Cultural Inventory. Josh Chase, BLM Archeologist, has been in contact with BSCSP and the Department of Energy's cultural contractor, SWCA. Until we receive and review the results of the cultural inventory, we cannot assess the potential impacts to cultural resources.

Groundwater: There are dozens of groundwater wells for primarily domestic, stock, and monitoring purposes in the project area. Several water wells extend into the Madison Formation between 1,700 and 2,100 feet below surface (FBS) though the majority are 20 to 150 FBS. There are also many active and abandoned subsurface oil and gas wells, and there is a wide variety in the subsurface condition of these wells. This means there are at least three scenarios where CO2 might leak into groundwater formations: 1) An improperly sealed well, 2) A fault or fracture not identified or inaccurately characterized during site selection, or 3) A combination of scenarios 1 and 2.

Reaction of CO2 with groundwater and minerals could result in reactive products that affect the water-rock system by weakening or strengthening reservoir-sealing rocks or by increasing their porosity and permeability. These reactive products could also affect borehole cements and steel, such as well pipe. Reaction of dissolved CO2 with minerals can be rapid (days) for some carbonate minerals, or slow (hundreds to thousands of years) for silicate minerals. Both minerals are present in the subsurface of the project area.

The risks associated with CO2 leakage have been successfully mitigated in other projects through proper site selection techniques, effective engineering and design, and integration of operational procedures, gas detection, and gas monitoring systems. These mitigations appear to have been included as design features in the proposed project, so no mitigations will be proposed by the BLM.

Fluid Minerals: There is potential for drainage of Federal minerals depending on well proximity to Federal subsurface estate. The Great Falls Field Office, BLM, will monitor wells associated with this project as part of their drainage program. If Federal resources are lost or migrate from the Federal mineral estate, compensation could be required.

Currently no wells are proposed into Federal minerals. If that changes, the proponent would be required to secure a Federal Oil and Gas Lease and the appropriate authorizations (Approved Permit to Drill, etc.) before starting any well activities.

Comment: In general, it seems this project would be more beneficial to the public if it had established a pilot project of using CO2 for enhanced oil recovery in the nearby Cut Bank Oil Field. Montana Tech's Petroleum Department has conducted several studies identifying this field as a great candidate for CO2 flooding. By using Cut Bank, the project would not only provide carbon sequestration, but would also prolong the life of a mature oil field that already has most of the needed infrastructure. Thus, the project could reduce greenhouse gases while contributing to domestic energy needs.

2of 4

Raptor Nests and Migratory Bird Habitat: Two raptor nests have been identified. They are both on private lands, one within and one adjacent to the project area. They should not be directly affected by production, pipeline, or injection construction and development since they are not in the project's production, pipeline, or injection areas. However, they might be indirectly affected by other associated disruptive activities, in particular seismic survey(s).

Migratory bird habitat does exist on BLM surface lands and might be affected by project activities, in particular seismic survey(s).

Proposed mitigation (for both):

No surface disturbing or disrupting activities will be permitted between March 15 and August 15.

Invasive Species: Though there are no known infestations of state listed noxious plants on public lands in the project area, disturbance and vehicle traffic still pose some risk for the introduction and spread of invasive and/or undesired non-native species.

Proposed mitigation:

The operator will pressure wash or otherwise thoroughly clean all equipment and vehicles prior to entering public lands.

Should any surface disturbance occur on public lands, the following mitigation would also be required:

The authorization holder will be responsible for eliminating any noxious weeds on the well pad(s), access road(s), and pipeline(s) through the life of the well(s) plus five (5) years after abandonment. The holder must consult with the BLM Authorized Officer on the type of pesticide, rate, and timing of application by December 31 of the year prior to the year of application(s) to ensure compliance with BLM regulations, Federal law, and state law.

Resources on BLM Surface Lands Which are Not Issues
(Either not present or not affected to an extent that warrants analysis)

Not Present
Lands with Special Designations
Lands with Wilderness Characteristics
Big Game winter range
Greater Sage-Grouse habitat
Black-Tailed Prairie Dog habitat
Paleontological Resources
Solid Minerals (no areas of concern present)

Minimal Effects Anticipated
Visual Resource Management: Area is Class IV designation
Recreation: Sweet Grass Hills Special Recreation Management Area (SRMA)
Surface water, Wetlands, Riparian Zones
Soils

4of 4