FINDING OF NO SIGNIFICANT IMPACT
And
DECISION RECORD

FOR

ENVIRONMENTAL ASSESSMENT
FOR SPRING CREEK COAL LEASE MODIFICATION
MTM-069782
And
Amendment to Land Use Lease MTM-74913
EA# MT-DOI-BLM-MT-020-2010-29

Finding of No Significant Impact / Decision Record
Miles City Field Office

INTRODUCTION:
The Bureau of Land Management (BLM) completed an Environmental Assessment MT-DOI-BLM-MT-020-2010-29 for the Spring Coal Lease Modification Application MTM-069782 and the application to amend Land Use Lease (LUL) MTM-74913. The Environmental Assessment (EA) analyzed the environmental impacts of modifying an existing lease, MTM-069782, to include a tract of Federal coal reserves adjacent to the Spring Creek Mine, an operating surface coal mine in the northwest Powder River Basin (PRB). The modification, if approved, would add approximately 498.1 acres that contain about 50.8 million tons of insitu coal.

The EA also analyzed the environmental impacts of assigning Spring Creek Coal Company's (SCCC) LUL MTM-74913 from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company, renewing the land use lease for an additional 20 years and amending the lease to authorize the use of approximately 197.12 additional acres of public land for coal mine layback, construction of a flood control structure, placement of topsoil and overburden stockpiles, and establishment of transportation and utility line corridors in order to fully recover coal reserves from existing Federal Coal Lease MTM-94378 and Montana State Coal Lease C-1088-05, and from the above referenced pending lease by modification (LBM). If the amendment is approved, the LUL would total 222.12 acres. The land use lease tracts are referred to as the LUL tracts.

The legal description of the proposed coal lease modification as applied for by SCCC under the Proposed Action is as follows:

Township 8 South, Range 40 East, Big Horn County, Montana

Section 31:	Lot 2	36.91 acres
	Lot 3	36.97 acres
	NW¼NE¼SW¼	10.00 acres
	S½NE¼SW¼	20.00 acres
	Lot 4	37.03 acres
	SE¼SW¼	40.00 acres
	NW¼SW¼SE¼	10.00 acres
	S½SW¼SE¼	20.00 acres
	SW¼SE¼SE¼	10.00 acres

Township 9 South, Range 40 East, Big Horn County, Montana

Section 6:	Lot 2	40.04 acres
	Lot 1	40.05 acres
	SW¼NE¼	40.00 acres
	NW¼SE¼NE¼	10.00 acres
	S½SE¼NE¼	20.00 acres

Lot 4	37.09 acres
Lot 3	40.02 acres
N½SE¼NW¼	20.00 acres
N½NE¼SE¼	20.00 acres
NE¼NW¼SE¼	10.00 acres

Total: 498.11 acres

The legal description of the proposed LUL assignment, renewal, and amendment as applied for by SCCC under the Proposed Action is as follows:

Existing LUL:

Township 8 South, Range 39 East, Big Horn County, Montana

Section 22: N½NE¼SW¼, N½SE¼NE¼SW¼	25.00 acres

Additional LUL amendment area:

Township 8 South, Range 39 East, Big Horn County, Montana

Section 35: NE¼NE¼	40.00 acres
SE¼NE¼	40.00 acres
E½NW¼NE¼	20.00 acres
E½W½NW¼NE¼	10.00 acres
NW¼NW¼NW¼NE¼	2.50 acres
NE¼SW¼NE¼	10.00 acres
NE¼SE¼SW¼NE¼	2.50 acres
E½NE¼SE¼	20.00 acres
E½NW¼NE¼SE¼	5.00 acres
NE¼SE¼SE¼	10.00 acres

Township 9 South, Range 40 East, Big Horn County, Montana

Section 6: Lot 5	37.12 acres

Total: 222.12 acres

The EA also analyzes the No Action Alternative and the Proposed Action with BLM imposed mitigation measures. The EA is attached to and incorporated by reference in this Finding of No Significant Impact (FONSI) determination.

PLAN CONFORMANCE AND CONSISTENCY:
The proposed project has been reviewed and found to be in conformance with the following BLM plans and associated Record of Decision(s):

1. Powder River Resource Management Plan and Record of Decision, March 1985

FINDING OF NO SIGNIFICANT IMPACT DETERMINATION:
Based upon a review of the EA and the supporting documents, I have determined that the project is not a major federal action significantly affecting the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity, as defined in 40 CFR 1508.27, and do not exceed those effects described in the Powder River RMP. Therefore, an environmental impact statement is not needed. This finding is based on the context and intensity of the project as described below:

Context: The proposed actions would occur adjacent to the Spring Creek Mine, an operating surface coal mine in Big Horn County, Montana, which produces coal from Federal and State coal leases. The project, if approved, would add approximately 498.1 acres that contains about 50.8 million tons of insitu coal to existing Federal Coal Lease MTM-069782. The project would also amend (LUL) MTM-74913 and add approximately 197.12 additional acres of public land to the existing LUL (totaling about 222.12) for coal mine layback, construction of a flood control structure, placement of topsoil and overburden stockpiles, and establishment of transportation and utility line corridors.

The proposed project is near the Decker Coal Mine and the CX Field, a coal bed natural gas (CBNG) field that is also located in Big Horn County of southeastern Montana. The CX Field is an active gas field that produces coal bed natural gas from federal, state and private wells. There are also other producing CBNG fields in the general area. The Spring Creek Coal Mine is also within about 3 miles of the Tongue River Reservoir which includes the Tongue River Reservoir State Park.

Intensity: The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27.

1. **Impacts may be both beneficial and adverse.**
The proposed actions would impact resources as described in the EA. In addition to mitigation measures included in the project design, BLM developed additional mitigation measures to further minimize or eliminate adverse impacts to other resources and land uses. These additional mitigation measures are included in the Proposed Action Alternative. The EA also disclosed beneficial impacts from the proposed project to the local economy and to local, state and federal governments from increased revenues. The mitigation measures in the Proposed Action Alternative have been developed in close cooperation with the Montana Department of Fish, Wildlife and Parks and the Montana Department of Environmental Quality, Coal and Uranium Bureau, and are designed to minimize or eliminate adverse impacts. None of the environmental effects discussed in detail in the EA are considered significant.

2. **The degree to which the selected alternative will affect public health or safety.**
The Proposed Action Alternative is designed to minimize impacts to other resources as well as to public health and safety. The public generally cannot access the project area because access is restricted by the Spring Creek Mine. Security gates and a guard are located on the primary mine access road leading into the project area. Spring Creek Mine currently possesses all necessary

permits from numerous State and Federal agencies for protection of the environment and human health and safety from permitted mining activities. These permits include very stringent requirements that are closely monitored to insure compliance with the various terms and conditions. Surface disturbing impacts would not occur to the subject lands until such time as the modifications and amendments to the State and Federal mine permits allowing such activity are approved.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas.**
The historic and cultural resources of the area have been reviewed by a BLM archeologist, the State Historic and Preservation Office, and affected Tribes. The potential impacts have been mitigated in the design of the Proposed Action Alternative. There would not be any effects on park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas, because none of these are located within or adjacent to the project area.

4. **The degree to which the effects on the quality of the human environment are likely to be highly controversial.**
Members of the public have not expressed concerns regarding potential impacts to groundwater, surface water, existing water rights, wildlife and quality of life in a predominately rural area. The Proposed Action Alternative includes mitigation measures that are designed to minimize or eliminate adverse impacts to resources and the quality of the human environment. SCCC is required to have all approved permits required by local, state and federal agencies with jurisdiction over components of the proposed project.

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.**
The proposed actions are not unique or unusual. The Spring Creek Coal Mine has been in operation since 1980. BLM has analyzed potential environmental impacts from other lease applications previously submitted for the Spring Creek Mine. The potential impacts associated with surface coal mines in general and this coal mine in particular have been described and analyzed in detail in other NEPA documents. The analyses showed that the proposed action does not involve highly uncertain, unique or unknown risks.

6. **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.**
The actions considered in the Proposed Action Alternative were considered by the interdisciplinary team within the context of past, present, and reasonably foreseeable future actions. Approval of the proposed actions would not set a precedent because the proposed action would authorize leasing of additional coal as well as amending the existing LUL at a coal mine with existing Federal coal leases which have undergone similar impacts. The proposal therefore, represents a continuation of reasonable and responsible surface coal mining operations, and does not establish a precedent for future actions. The decision does not constitute a decision in principle concerning a future action or consideration.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.**
The interdisciplinary team evaluated the proposed actions in context of past, present and reasonably foreseeable actions. The environmental analysis did not show significant effects from the proposed actions by themselves or in addition to past, present and reasonably foreseeable future actions in the general area.

8. **The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.**

We applied the criteria for adverse effect and found the proposed Lease by Modification (LBM) will have an adverse effect to archaeological site 24BH3392. This site is a prehistoric cribbed log structure and occupation site that is recommended as eligible for listing on the National Register of Historic Places under Criterion D of 36 CFR 60.4. The site is recommended as eligible for NRHP listing for its ability to contribute to the understanding of the prehistory of southeastern Montana. Avoidance of the site was analyzed and found not to be economically feasible (see Section 2.3 of the EA). Prior to mining, the information contained in the site would be recovered through implementation of the Data Recovery Plan outlined in Appendix D of the EA. No other districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places will be adversely affected by the Federal action, nor will the action cause loss or destruction of significant scientific information. Loss of Site 24BH3392 will be mitigated through data recovery prior to mining.

9. **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.**
No endangered or threatened species or their habitat are known to exist within or adjacent to the project area.

10. **Whether the action threatens a violation of a Federal, State, Local, or Tribal law, regulation or policy imposed for the protection of the environment, where non-Federal requirements are consistent with Federal requirements.**
The proposed actions do not violate any Federal, State, Local or Tribal law or requirement imposed for the protection of the environment. State, local, and tribal interests were given the opportunity to participate in the environmental analysis process. Furthermore, the actions are consistent with applicable land management plans, policies, and programs.

Summary of the Proposal

SCCC has made an application to modify existing coal lease, MTM-069782, to include a tract of federal coal reserves adjacent to the Spring Creek Mine, an operating surface coal mine in the northwest PRB. The modification, if approved, would add approximately 498.1 acres that contains about 50.8 million tons of insitu coal.

They have also requested to assign Spring Creek Coal Company's LUL MTM-74913 from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company and to renew the

land use lease for an additional 20 years. Spring Creek Coal Company also requested to amend the land use lease to authorize the use of 197.12 additional acres of public land for coal mine layback, construction of a flood control structure, placement of topsoil and overburden stockpiles, and establishment of transportation and utility line corridors in order to fully recover coal reserves from existing Federal Coal Lease MTM-94378 and Montana State Coal Lease C-1088-05, and from the above referenced pending LBM. The land use lease tracts are referred to as the LUL tracts.

Other than a narrow permitted pipeline corridor, the LBM tract and the LUL tracts are outside of the approved permit boundary for the Spring Creek Coal Mine. The mine is operated by Spring Creek Coal Limited Liability Company, a subsidiary of Cloud Peak Energy (CPE) and is located in T. 8 & 9 S., R. 39 & 40 E., Big Horn County, Montana, approximately 32 miles north of Sheridan, Wyoming. The approved Spring Creek Mine permit area includes 6,926 acres. On February 8, 2006, the Montana Department of Environmental Quality (MDEQ) approved Spring Creek Mine's current air quality permit to allow up to 24 million tons of coal per year to be mined. The mine produced 15.8 million tons in 2007 and 18.0 million tons of coal in 2008.

If Federal Coal Lease MTM-069782 is modified to include the proposed LBM and if LUL MTM-74913 is amended, SCCC would be required to revise its coal mining permit prior to mining the coal. As a part of that process, a revised mining and reclamation plan would be developed showing how the lands in the tracts that are leased would be mined and reclaimed. Specific impacts that would occur during the mining and reclamation of the tracts would be addressed in the mining and reclamation plans, and specific mitigation measures for anticipated impacts would be described in detail at that time. Specific mitigation measures have been developed via the environmental analysis process to eliminate or lessen potential impacts arising from leasing the coal and amending the LUL. Those mitigation measures will be attached as stipulations to the modified coal lease and LUL.

Decision

Based upon the analysis of potential environmental impacts described in the February 2010, *Environmental Assessment for Spring Creek Coal Lease Modification MTM-069782 and Amendment to Land Use Lease MTM-74913* (Attached), it is my decision to select the Proposed Action Alternative from the EA and approve the modification to Coal Lease MTM-069782 and the amendment to Land Use Lease MTM-74913 inclusive of the attached stipulations.

Approved project components include:

- Modify Federal Coal Lease MTM-069782 by adding approximately 498.1 acres to it that contain about 50.8 million tons of insitu coal.

- Based on new studies, the lands included in the lease modification area and the land use lease amendment area are within an area recently identified as containing sage-grouse habitat. Since the habitat data are new, the coal unsuitability screen for wildlife, specifically Criterion 15 (43 CFR 3461.5(o)(1)), will be applied to lands impacted by the Proposed Action. These lands will be designated as *Unsuitable for Leasing With Exceptions Applied,* and a stipulation will be placed on the coal lease and LUL

amendment making the Habitat Recovery and Replacement Plan (HRRP) as described in the EA, a mitigation requirement of the leases.

- Amend LUL MTM-74913 to authorize the use of 197.12 additional acres of public land for coal mine layback, construction of a flood control structure, placement of topsoil and overburden stockpiles, and establishment of transportation and utility line corridors in order to fully recover coal reserves from existing Federal Coal Lease MTM-94378 and Montana State Coal Lease C-1088-05, and from the above referenced pending LBM.

- The existing LUL which expires on April 22, 2012, will be amended and renewed for an additional 20 years with an expiration date of April 22, 2032, and would be renewable.

- SCCC has two BLM issued *2920 Minimum Impact Land Use Permits* for environmental monitoring: 1) MTM-96659 in the E½, Section 35, T8S, R39E, and 2) MTM-96660 in Lots 3, 4, and 5, Section 6, T9S, R40E. SCCC proposes to retain the permit in Section 35 (MTM-96659), but would no longer need the permit in Section 6 (MTM-96660) if the coal lease modification and land use lease amendment are approved. Permit MTM-96660 will be relinquished by SCCC or allowed to expire.

- Spring Creek Coal Company's LUL MTM-74913 will be assigned from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company.

A decision to modify Federal Coal Lease MTM-069782 and to Amend LUL MTM-74913 is a prerequisite for mining, but it is not the enabling action that would allow mining to begin. The BLM does not authorize mining operations within the tract by modifying and/or amending the leases. SCCC would be required to revise its State and Federal coal mining permit prior to conducting surface disturbing operations and mining the coal.

This Decision is effective immediately. Actions authorized by this Decision may begin immediately in accordance with any restrictions or constraints imposed by lease stipulations, permit conditions of approval, or surface owner agreements.

Approved By: _____

Deborah K. Johnson Date

Field Manager, Miles City Field Office

Authorities:

- Mineral Leasing Act of 1920 (MLA), as amended;
- Multiple-Use Sustained Yield Act of 1960;
- National Environmental Policy Act of 1969 (NEPA);
- Federal Coal Leasing Act Amendment of 1976;
- Federal Land Policy Management Act of 1976;
- Surface Mining Control and Reclamation Act of 1977 (SMCRA); and
- Energy Policy and Conservation Act of 2005.
    - Section 302 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2762, 2763; 43 U.S.C., 1732).

Compliance and Monitoring: All Surface coal mines are regulated by various State and Federal agencies which require monitoring for a multitude of resources. The solid mineral staff at the Montana State Office of the BLM is charged with conducting production verification inspections on active Federal coal leases on a quarterly basis. Inspections for compliance with other surface disturbance related stipulations not covered by the mine permit are conducted on an as-needed basis by the BLM's Miles City Field Office.

In accordance with State and Federal regulations, the Montana Department of Environmental Quality, Coal and Uranium Bureau inspect the Spring Creek Coal Mine for compliance with the terms and conditions of mine permits on a monthly basis. Federal inspectors with the Office of Surface Mining Reclamation and Enforcement also inspect the mine on a yearly basis.

The mine is required via various permit conditions and regulations to monitor and report on impacts to a variety of resources some of which include groundwater, air quality, wildlife, mine related disturbances, reclamation, revegetation, and blasting.

Realty Specialists from the BLM are also required to inspect the area for compliance with lease terms and conditions of the LUL at least once every 5 years, and possibly more frequently depending on the level of activity.

Terms / Conditions / Stipulations: The following mitigation measures were analyzed in the EA and are included as Special Stipulations to the Coal and Land Use Leases;

APPENDIX A

STANDARD AND SPECIAL LEASE STIPULATIONS DEVELOPED FOR THE LEASE BY MODIFICATION TRACT

SPECIAL STIPULATIONS - In addition to observing the general obligations and standards of performance set out in the current regulations, the lessee shall comply with and be bound by the following stipulations. These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall

be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require his agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

(a) CULTURAL RESOURCES -

(1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the Authorized Officer of the Bureau of Land Management (BLM) (hereinafter referred to as the Authorized Officer) on portions of the mine plan area, or exploration plan area, that may be adversely affected by lease-related activities and which were not previously inventoried at such a level of intensity. Cultural resources are defined as a broad, general term meaning any cultural property or any traditional lifeway value, as defined below:

> Cultural property: a definite location of past human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structure, or places with important public and scientific uses, and may include traditional cultural or religious importance to specified social and/or cultural groups. Cultural properties are concrete, material places, and things that are classified, ranked, and managed through the system of inventory, evaluation, planning, protection, and utilization.
>
> Traditional lifeway value: the quality of being useful in or important to the maintenance of a specified social and/or cultural group's traditional systems of (a) religious belief, (b) cultural practice, or (c) social interaction, not closely identified with definite locations. Another group's shared values are abstract, nonmaterial, ascribed ideas that one cannot know about without being told. Traditional lifeway values are taken into account through public participation during planning and environmental analysis.

The cultural resources inventory shall be conducted by a qualified professional cultural resource specialist; i.e., archaeologist, anthropologist, historian, or historical architect, as appropriate and necessary, and approved by the Authorized Officer (BLM if the surface is privately owned). A report of the inventory and recommendations for protection of any cultural resources identified shall be submitted to the Western Regional Director of the Office of Surface Mining (hereinafter referred to as the Assistant Director) by the Authorized Officer. Prior to any on-the-ground cultural resource inventory, the selected professional cultural resource specialist shall consult with the BLM, the Northern Cheyenne Cultural Protection Board, and the Crow Historic and Cultural Committee. The purpose of this consultation will be to guide the work to be performed and to identify cultural properties or traditional lifeway values within the immediate and surrounding mine plan area. The lessee shall undertake measures, in accordance with instructions from the Assistant Director to protect cultural resources on the leased lands. The lessee shall not commence the surface-disturbing activities until permission to proceed is given by the Assistant Director in consultation with the Authorized Officer.

(2) The lessee shall protect all cultural resource properties within the lease area from lease related activities until the cultural resource mitigation measures can be implemented as part of an approved mining and reclamation plan or exploration plan.

(3) The cost of carrying out the approved site mitigation measures shall be borne by the lessee.

(4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Assistant Director, or the Authorized Officer if the Assistant Director is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Assistant Director. Within two (2) working days of notification, the Assistant Director will evaluate or have evaluated any cultural resources discovered and will determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations shall be borne by the surface managing agency unless otherwise specified by the Authorized Officer.

(5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

(6) The mitigation plan found in Appendix D of the EA DOI-BLM-MT-020-2010-29 for Spring Creek Coal Lease Modification MTM-069782 for mitigating impacts to NRHP Cultural site (24BH3392) must be initiated and completed prior to surface disturbing activities occurring on the tracts.

(7) Prior to surface disturbance, the information for archaeological sites 24BH2530, 24BH2531, 24BH3388, 24BH3396, and 24BH3401 in Section 35, T8S, R39E will be updated. The purpose of the updating is to better refine the spatial extent and relationships between the sites, man-made disturbances, and Archaeological Site 24BH1589 on adjacent state lands.

(b) PALEONTOLOGICAL RESOURCES -

If a paleontological resource, either large and conspicuous, and/or of significant scientific value is discovered during construction, the find will be reported to the Authorized Officer immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 feet of such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant interest discovered during the operation.

(c) PUBLIC LAND SURVEY PROTECTION -

The lessee will protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the lease areas. If any monuments, corners or accessories are destroyed, obliterated or damaged by this operation, the lessee will hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories at the same locations, using surveying procedures in accordance with the "Manual of Surveying Instructions for the Survey of Public Lands of the United States." The survey will be recorded in the appropriate county records, with a copy sent to the Authorized Officer.

(d) RESOURCE RECOVERY AND PROTECTION PLAN (R2P2) -

Notwithstanding the approval of a resource recovery and protection plan (R2P2) by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (i) the operator/lessee fails to achieve maximum economic recovery (MER) [as defined at 43 CFR 3480.0-5.2(21)] of the recoverable coal reserves or (ii) the operator/lessee is determined to have caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecovered coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unmineable by the operation, the operator shall submit appropriate justification to obtain approval by the Authorized Officer to leave such reserves unmined. Upon approval by the Authorized Officer, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or a portion of the lease as authorized by statute and regulation.

In the event the Authorized Officer determines that the R2P2 as approved will not attain MER as the result of changed conditions, the Authorized Officer will give proper notice to the operator/lessee as required under applicable regulations. The Authorized Officer will order a modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the authorized officer that the coal reserves have been rendered unmineable or at such time that the lessee has demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the Minerals Management Service (MMS) demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

(e) MULTIPLE MINERAL DEVELOPMENT

Operations will not be approved which, in the opinion of the Authorized Officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

The BLM realizes that coal mining operations conducted on Federal coal leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as Federal oil and gas leases issued in a Federal coal lease area may inhibit coal recovery. BLM retains the authority to alter and/or modify the R2P2 for coal operations on those lands covered by Federal mineral leases so as to obtain maximum resource recovery.

(f) RECLAMATION/WILDLIFE -

SCCC will be required to reclaim disturbed habitats within the areas designated as *Unsuitable for Leasing with Exceptions Applied* back to wildlife habitat as outlined in the Habitat Recovery and Replacement Plan (HRRP), which is included in part in Appendix B. This reclamation stipulation suffices for the needs of other wildlife species within the tract disturbance area.

To mitigate the loss of and replace habitats within the tract disturbance area delineated as valuable sage-grouse habitat (BLM 2006), SCCC will be required to adhere to terms of the HRRP, which is included in part in Appendix B.

MTM-74913 SCCC Land Use Lease Assignment/Renewal/Amendment Stipulations

a. Land Use Lease MTM-74913 is being renewed for an additional 20 years, along with the amendment, and will expire April 22, 2032.

b. This amendment is subject to the terms and conditions in 43 CFR 2920, the mitigations set forth in the application/plan of development, the stipulations and special conditions of the original lease, except Item (i) of "Section 3 – Restrictions on Use" of the original lease regarding reclamation is no longer in effect. Reclamation of the Federal land affected by the LUL will be in accordance with the Habitat Recovery and Replacement Plan (HRRP) and the reclamation plan, contained in the approved State and Federal Mine Permits.

c. The Flood Control Structures will be constructed in accordance with the Mine Safety and Health Administration (MSHA) design and operation requirements.

d. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the Authorized Officer concurrent with the filing of the reports to the involved Federal agency or State government.

e. The holder shall conduct all activities associated with the construction, operation, and termination of the land use lease within the authorized limits of the lease.

f. The holder shall be responsible for weed control on disturbed areas within the limits of the lease. The holder is responsible for consultation with the authorized officer and/or local authorities for acceptable weed control methods.

g. The holder shall coordinate with the parties holding authorized rights on the adjacent and affected lands [such as working out other grazing options with the grazing permittees/lessees].

h. This land use authorization renewal and amendment are issued subject to a subsequent appraisal by a qualified appraiser of the Bureau of Land Management. The authorized user agrees to pay the Bureau of Land Management, upon demand, those fees determined in the appraisal to represent the fair market rental for the use of the public lands involved in this land use authorization amendment.

APPENDIX B
LEASE BY MODIFICATION MTM-069782
HABITAT RECOVERY AND REPLACEMENT PLAN

(Please Refer to the attached EA)

APPENDIX D
CULTURAL RESOURCE DATA RECOVERY PLAN
for
PISTOL PETE SITE 24BH3392

(Please Refer to the attached EA)

ENVIRONMENTAL ASSESSMENT FOR SPRING CREEK COAL LEASE MODIFICATION MTM-069782 and Amendment to Land Use Lease MTM-74913 EA# MT-DOI-BLM-MT-020-2010-29

Prepared by:

The United States Department of the Interior
Bureau of Land Management
Miles City Field Office

In Cooperation with

Montana Department of Environmental Quality
and
DOI OSM, Western Regional Coordinating Center

February 2010

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT v
1.0 INTRODUCTION 1-1
1.1 Background 1-1
1.2 Purpose and Need 1-5
1.3 Regulatory Authority and Responsibility 1-5
1.4 Relationship to BLM Policies, Plans, and Programs 1-6
1.5 Conformance with Land Use Plan 1-8
1.6 Consultation and Coordination 1-11
2.0 PROPOSED ACTION AND ALTERNATIVES 2-1
2.1 Proposed Action 2-1
2.2 Alternative 1 - No Action Alternative 2-6
2.3 Alternative Considered but Eliminated from Detailed Analysis 2-9
2.4 Mitigation and Management 2-9
2.5 Relevant Regional Activity 2-10
2.5.1 Relevant Past and Present Actions 2-10
2.5.2 Reasonably Foreseeable Future Actions 2-11
2.5.3 Potential Future Actions 2-12
2.6 Comparison of Alternatives 2-12
3.0 AFFECTED ENVIRONMENT 3-1
3.1 General Setting 3-1
3.2 Topography and Physiography 3-2
3.3 Geology, Mineral Resources, and Paleontology 3-2
3.3.1 General Geology 3-2
3.3.2 Mineral Resources 3-4
3.4 Air Quality 3-7
3.4.1 Background 3-7
3.4.2 Particulate Emissions 3-11
3.4.3 Blasting Emissions 3-11
3.4.4 Emission Control Techniques 3-13
3.4.5 Visibility 3-14
3.4.6 Acidification of Lakes 3-14
3.5 Water Resources 3-14
3.5.1 Groundwater 3-14
3.5.2 Surface Water 3-17
3.6 Alluvial Valley Floors 3-18
3.7 Wetlands 3-20
3.8 Soils 3-20
3.9 Vegetation 3-20
3.10 Wildlife 3-26
3.10.1 Big Game 3-26
3.10.2 Other Mammals 3-28
3.10.3 Raptors 3-28
3.10.4 Upland Game Birds 3-30
3.10.5 Other Birds 3-34
3.10.6 Amphibians and Reptiles, and Aquatic Species 3-34
3.10.7 Threatened or Endangered Species and Other Species of High Federal or State Interest 3-35
3.11 Ownership and Use of Land 3-35
3.12 Cultural Resources 3-35
3.12.1 Native American Consultation 3-43
3.13 Visual Resources 3-43

3.14 Noise 3-44
3.15 Transportation Facilities 3-46
3.16 Hazardous and Solid Waste 3-46
3.17 Socioeconomics 3-46
3.17.1 Local Economy 3-46
3.17.2 Population 3-48
3.17.3 Employment 3-48
3.17.4 Housing 3-49
3.17.5 Local Government Facilities and Services 3-49
3.17.6 Environmental Justice 3-50
3.18 Greenhouse Gas Emissions 3-51
4.0 ENVIRONMENTAL CONSEQUENCES 4-1
4.0.1 Mitigation 4-2
4.0.2 Cumulative Effects Common to Both Alternatives 4-2
4.1 Effects From Proposed Action 4-2
4.1.1 Topography and Physiography 4-4
4.1.2 Geology, Mineral Resources, and Paleontology 4-5
4.1.3 Air Quality 4-7
4.1.4 Water Resources 4-9
4.1.5 Alluvial Valley Floors 4-13
4.1.6 Wetlands 4-13
4.1.7 Soils 4-14
4.1.8 Vegetation 4-15
4.1.9 Wildlife 4-18
4.1.10 Land Use 4-24
4.1.11 Cultural Resources 4-25
4.1.12 Visual Resources 4-27
4.1.13 Noise 4-28
4.1.14 Transportation Facilities 4-29
4.1.15 Hazardous and Solid Waste 4-29
4.1.16 Socioeconomics 4-30
4.1.17 Global Climate Change 4-31
4.2 Effects From Alternative 1 – No Action 4-34
5.0 CONSULTATION AND COORDINATION 5-1
6.0 REFERENCES 6-1

LIST OF TABLES

Table 1-1. Federal and State Permitting Requirements and Agencies. 1-7
Table 2-1. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for Spring Creek Mine and LBM Tract. 2-4
Table 2-2. Comparison of Potential Impact by Alternatives by Resource. 2-13
Table 3-1. Critical Elements Requiring Mandatory Evaluation. 3-1
Table 3-2. Average Physical Characteristics of Anderson-Dietz Seam in the Area. 3-6
Table 3-3. Federal and Montana Ambient Air Quality Standards. 3-9
Table 3-4. Maximum Allowable Increases for Federal Prevention of Significant Deterioration of Air Quality. 3-10
Table 3-5. Approximate Distances and Directions from the Tract to PSD Class I and Class II Sensitive Receptor Areas. 3-10
Table 3-6. Estimated Particulate Matter (PM) and NOx Emissions Permitted – tons/year (tpy). 3-12
Table 3-7. Existing Acid Neutralizing Capacity in Sensitive Lakes. 3-16
Table 3-8. Surface Water Flow Summary. 3-17

Table 3-9. Maximum Density of Mule Deer and Pronghorn Recorded During Winter Aerial Surveys From 1997 Through 2008 at the Spring Creek Mine. 3-26
Table 3-10. Habitat Associations of Mule Deer and Pronghorn [# (percent)] Observed During the Five Aerial Surveys at the Spring Creek Mine From January Through March 2008. 3-27
Table 3-11. Peak Counts of Sage-Grouse from 1979 Through 2008 at Leks in the Vicinity of the Spring Creek Mine. 3-31
Table 3-12. Peak Counts of Sharp-Tailed Grouse from 1980 through 2008 at Leks in the Vicinity of the Spring Creek Mine. 3-33
Table 3-13. Oil and Gas Leases within the Spring Creek South RFD Area and the LBM and LUL Tracts. 3-38
Table 3-14. Summary of Archaeological Investigations Completed at Spring Creek Coal Mine. 3-40
Table 3-15. Cultural Resource Sites Associated with the LBM Tract and Spring Creek South RFD. 3-42
Table 3-16. Historic Coal Production [1] for Montana and Big Horn and Rosebud Counties. 3-47
Table 3-17. Historic Values of Coal Sold for Montana. 3-47
Table 3-18. Cumulative Royalty Payments[1] from Coal Production at the Spring Creek Mine. 3-47
Table 3-19. Estimated Annual Equivalent CO_2 Emissions[1] at the Spring Creek Mine. 3-52
Table 4-1. Summary Comparison of Impacts of Action Alternatives Compared to the Currently Approved Mine Plan. 4-1
Table 4-2. Estimated Annual Equivalent CO_2 Emissions[1] at the Spring Creek Mine (2013-2023). 4-31

LIST OF FIGURES

Figure 1-1. General Location of the Proposed LBM and LUL Tracts. 1-2
Figure 1-2. Configuration of the Proposed LBM and LUL Tracts, RFD Area, and Coal Leases within and Adjacent to the Spring Creek Coal Mine Permit Boundary. 1-3
Figure 1-3. Existing Unsuitability Designations Within and Adjacent to the Spring Creek Coal Mine Permit Boundary 1-10
Figure 2-1. Configuration of the Proposed LBM and LUL Tracts, RFD Area, and Coal Leases Within and Adjacent to the Spring Creek Mine Permit Boundary. 2-2
Figure 2-2. Coal Removal Areas Within and Adjacent to the Proposed LBM and LUL Tracts. 2-7
Figure 2-3. Initial Surface Disturbance Associated With the LUL Tracts. 2-8
Figure 3-1. Wind Rose, Air Quality, and Meteorological Stations at the Spring Creek Coal Mine. 3-3
Figure 3-2. Generalized Stratigraphic Cross Section Through the Spring Creek Coal Mine Area. 3-5
Figure 3-3. Visibility in the Badlands and Bridger Wilderness Area. 3-15
Figure 3-4. Delineated Wetlands and Designated AVFs Associated with the Proposed LBM and LUL Tracts. 3-19
Figure 3-5. Soil Mapping Units Within The Proposed Action Disturbance Limit 3-21
Figure 3-6. Soil Mapping Units Within The Proposed Action Disturbance Limit 3-22
Figure 3-7. Vegetation Communities Within The Proposed Action Disturbance Limit. 3-24
Figure 3-8. Vegetation Communities Within The Proposed Action Disturbance Limit. 3-25
Figure 3-9. Wildlife Use Associated with the Proposed LBM and LUL Tracts and the Spring Creek Coal Mine Area. 3-29
Figure 3-10. Surface Ownership Associated with the Proposed LBM and LUL Tracts. 3-36
Figure 3-11. Oil and Gas Ownership Associated with the Proposed LBM and LUL Tracts. 3-37
Figure 3-12. Cultural Resources Within and Adjacent to the Proposed LBM and LUL Tracts. 3-41
Figure 3-13. Relationship Between A-Scale Decibel Readings and Sound of the Daily Life. 3-45
Figure 4-1. Pearson Creek Amendment Area Disturbance Limit and Proposed Action Disturbance Limit. 4-3

LIST OF APPENDICES

Appendix A. Standard and Special Lease Stipulations Developed for the Lease by Modification MTM-069782 and Land Use Lease MTM-74913

Appendix B. Habitat Recovery and Replacement Plan Requirement for Unsuitability Criterion 15 and Lease by Modification MTM-069782 Habitat Recovery and Replacement Plan

Appendix C. Special Status Species Affects Determinations Summary Tables for Lease by Modification MTM-069782 and Land Use Lease MTM-74913

Appendix D. Cultural Resource Data Recovery Plan for Pistol Pete Site 24BH3392

ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT

AAQS	Ambient Air Quality Standards
ACEC	Area of Critical Environmental Concern
A/D	Anderson-Dietz
ADS	Agglomeration Dust Suppression
ANC	acidification neutralization capacity
ANFO	ammonium nitrate fuel oil
APE	Area of Potential Effect
AU	Animal unit
AUM	animal unit month
AVF	alluvial valley floor
BACT	Best Available Control Technology
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best Management Practice
Btu	British thermal units
CBNG	coal bed natural gas
CH_4	Methane
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
CO_2	carbon dioxide
COE	U.S. Army Corps of Engineers
CPE	Cloud Peak Energy
D1	Dietz 1
D2	Dietz 2
D3	Dietz 3/Monarch
D4	Dietz 4/Carney
D6	Dietz 6/Wall
dBA	A-weighted decibels
DCC	Decker Coal Company
DOI	Department of the Interior
dv	deciview
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
F	Fahrenheit
FAS	Federal-Aid Secondary Route
FEIS	Final Environmental Impact Statement
FR	Federal Register
FSEIS	Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement
ft	feet, foot
GHG	greenhouse gas
HRRP	habitat recovery and replacement plan
IMPROVE	Interagency Monitoring of Protected Environments
LBM	lease by modification
LUL	Land use lease
MAAQS	Montana Ambient Air Quality Standards
MBOGC	Montana Board of Oil and Gas Conservation
MBTA	Migratory Bird Treaty Act
mi^2	square mile
$\mu g/m^3$	micrograms per cubic meter
µeq/L	microequivalents per liter
mg/L	milligrams per liter
MEPA	Montana Environmental Policy Act
MDEQ	Montana Department of Environmental Quality

ABBREVIATIONS AND ACRONYMS USED IN THIS REPORT

MDEQ/ARM	Montana Department of Environmental Quality/Air Resources Management Bureau
MDFWP	Montana Department of Fish, Wildlife & Parks
MNHP	Montana Natural Heritage Program
MLA	Mineral Leasing Act of 1920
mmt	million tons
mmtpy	million tons per year
MPDES	Montana Pollution Discharge Elimination System
MSA	Management Situation Analysis
MSHA	Mine Safety and Health Administration
MSL	mean sea level
MT FEIS	Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NORA	Notice of Realty Action
NRHP	National Register of Historic Places
O_3	ozone
OWUS	other Waters of the U.S.
OSMRE	Office of Surface Mining Reclamation and Enforcement
Pb	chemical symbol for lead
PEC	Passive Emission Control
PM	particulate matter
$PM_{2.5}$	particulates finer than 2.5 microns in effective diameter
PM_{10}	particulates finer than 10 microns in effective diameter
POD	Plan of Development
PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
R2P2	Resource Recovery and Protection Plan
RFD	Reasonably Foreseeable Development
RMEF	Rocky Mountain Elk Foundation
RMP	Resource Management Plan
SCCC	Spring Creek Coal Limited Liability Company
SHPO	State Historic Preservation Office
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO_2	Sulfur dioxide
T&E	threatened and endangered
TCP	Traditional cultural property
TEEA	Technical Examination & Environmental Assessment
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
tpy	tons per year
TRRC	Tongue River Rail Company
TSP	total suspended particulates
U.S.	United States
USDC	U.S. Department of Commerce
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
VRM	visual resource management
WICHE	Western Interstate Commission for Higher Education
WSGS	Wyoming State Geological Survey

Chapter 1
PURPOSE OF AND NEED FOR ACTION

1.0 INTRODUCTION

This Environmental Assessment (EA)[1] analyzes the environmental impacts of modifying an existing lease to include a tract of federal coal reserves adjacent to the Spring Creek Mine, an operating surface coal mine in the northwest Powder River Basin (PRB). In 2007, Spring Creek Coal Company, the then operator of the Spring Creek Mine, filed an application to modify federal coal lease MTM-069782 by adding approximately 498.1 acres that contain about 50.8 million tons of insitu coal. The application was filed under the lease by modification (LBM) regulations at 43 Code of Federal Regulations (CFR) 3432 and the provisions of the Energy Policy and Conservation Act of 2005. In late 2008, the name of the operator of the mine changed from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company. In this document, the operator of the Spring Creek Mine will be referred to as SCCC. The coal lease tract is referred to as the LBM tract.

This EA also analyzes the environmental impacts of assigning Spring Creek Coal Company's Land Use Lease (LUL) MTM-74913 from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company and renewing the land use lease for an additional 20 years and amending the lease to authorize the use of 197.12 additional acres of public land for coal mine layback, construction of a flood control structure, placement of topsoil and overburden stockpiles, and establishment of transportation and utility line corridors in order to fully recover coal reserves from existing Federal Coal Lease MTM-94378 and Montana State Coal Lease C-1088-05, and from the above referenced pending LBM. The land use lease tracts are referred to as the LUL tracts.

The LBM modification and LUL amendment applications have been reviewed by Bureau of Land Management (BLM), Montana State Office, Branch of Solid Minerals. An environmental document analyzing the effects of leasing and mining the coal in the LBM tract and leasing and disturbing the surface within the LUL tracts is necessary for the LBM modification and LUL amendment processes. The LBM and the LUL tracts considered in this EA and the adjacent mines are shown on Figure 1-1. The federal coal reserves were applied for as a maintenance tract for the Spring Creek Mine. The relationship of the LBM tract as applied for and the LUL tracts in relation to the existing Spring Creek Mine coal leases is shown on Figure 1-2.

1.1 Background

Other than a narrow permitted pipeline corridor, the LBM tract and the LUL tracts are outside of the approved permit boundary for the Spring Creek Coal Mine. The mine is operated by Spring Creek Coal Limited Liability Company, a subsidiary of Cloud Peak Energy (CPE) and is located in Big Horn County, Montana, approximately 32 miles north of Sheridan, Wyoming (Figure 1-1). The approved Spring Creek Mine permit area includes 6,926 acres. On February 8, 2006 the Montana Department of Environmental Quality (MDEQ) approved Spring Creek Mine's current air quality permit to allow up to 24 million tons of coal per year to be mined. The mine produced 15.8 million tons in 2007 and 17.9 million tons of coal in 2008.

An environmental document analyzing the effects of leasing and mining the coal within the LBM tract and disturbing surface lands associated with a LUL is necessary for the lease modification process.

The proposed coal lease modification area and land use lease amendment areas are described in Chapter 2. The modification and amendment areas are within a region that has been evaluated by several federal and state environmental analyses, which describe the existing and affected environment. These documents contain detailed analyses of the impacts to be expected as a result of surface coal mining and other development activities in this area. This EA is tiered to these existing Environmental Impact Statement (EIS)

[1] Refer to page v for a list of abbreviations and acronyms used in this document.

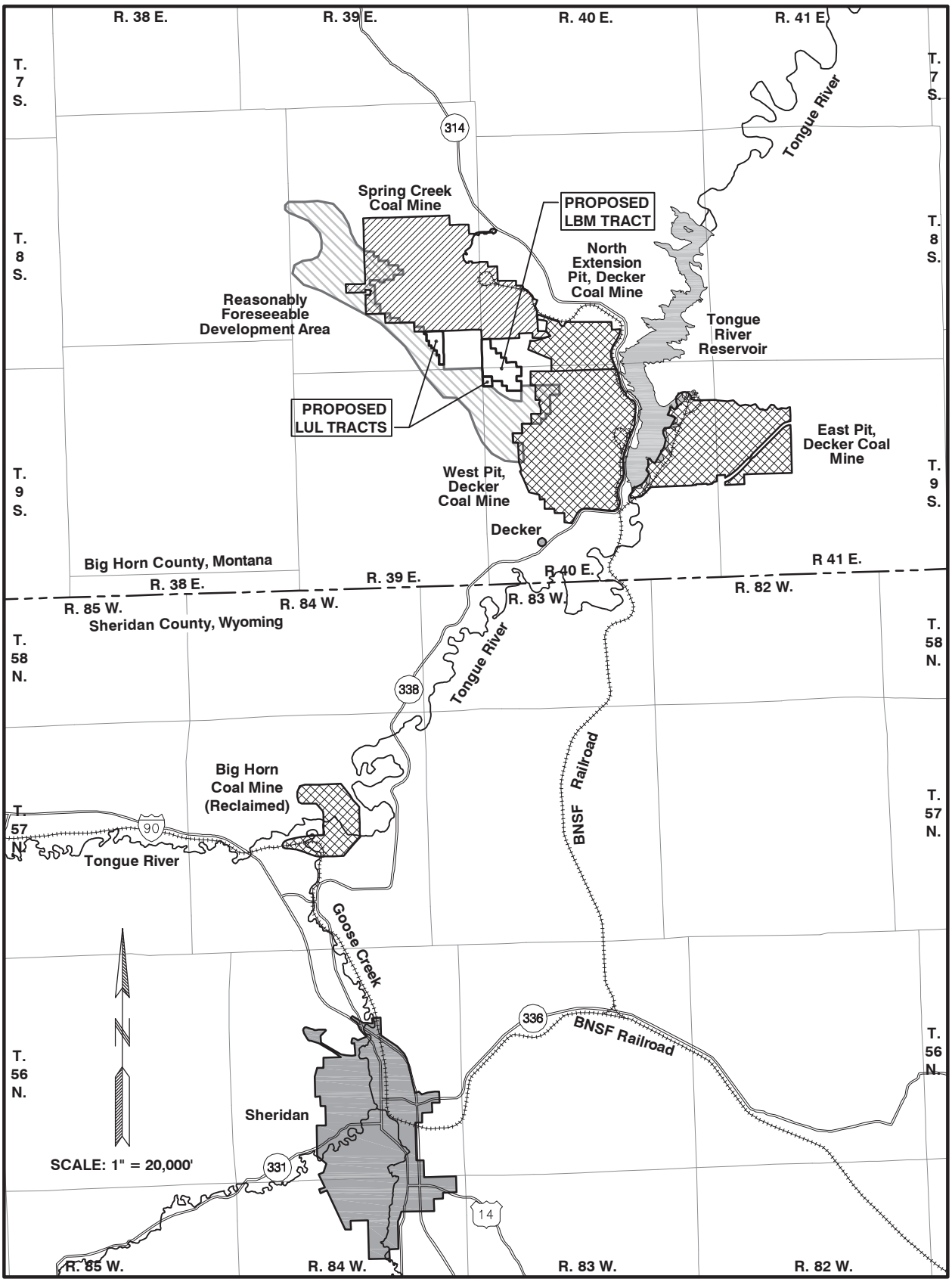


Figure 1-1. General Location of the Proposed LBM and LUL Tracts.

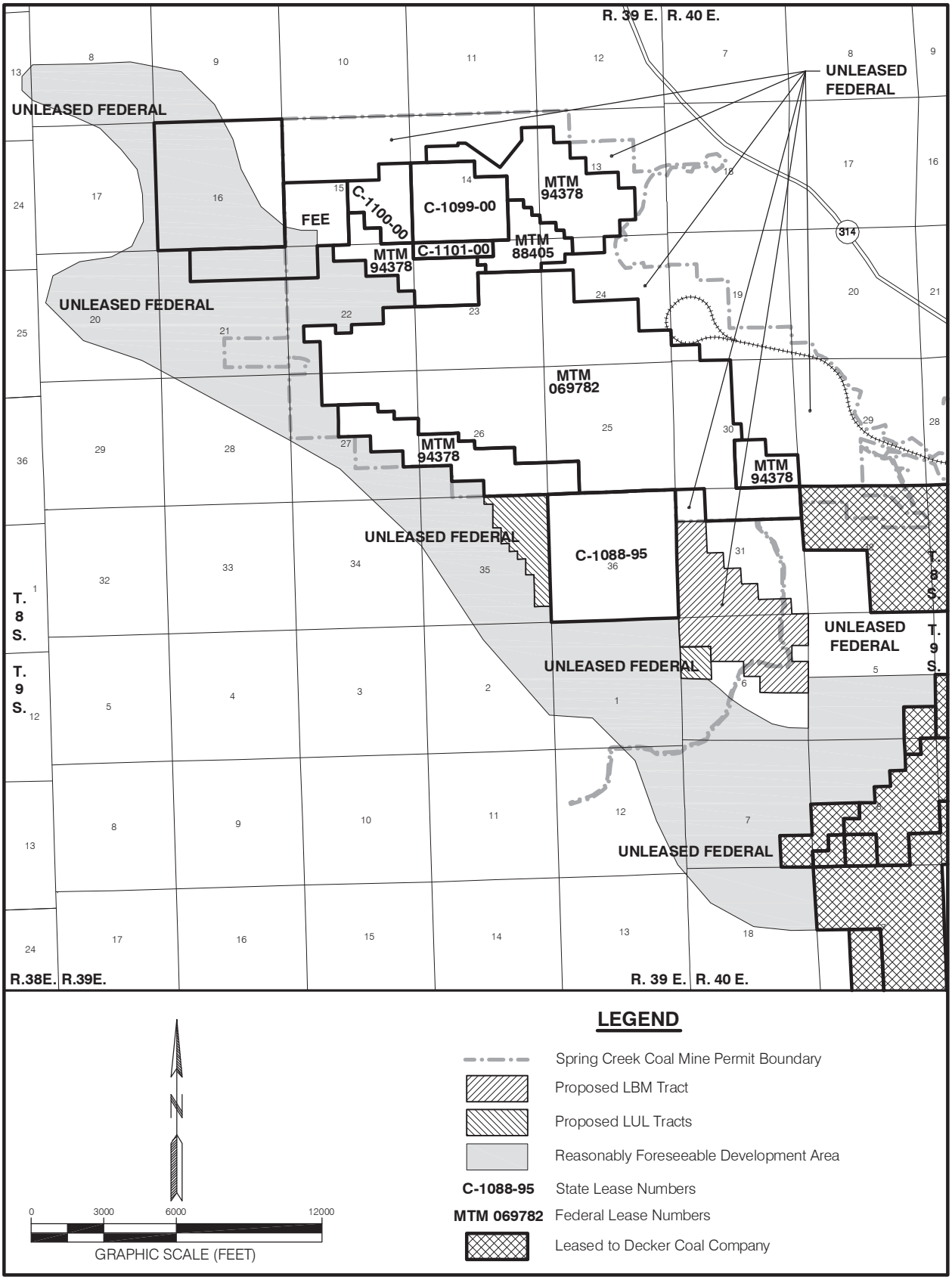


Figure 1-2. Configuration of the Proposed LBM and LUL Tracts, RFD Area, and Coal Leases Within and Adjacent to the Spring Creek Coal Mine Permit Boundary.

and EA documents, as is outlined in the BLM National Environmental Policy Act of 1969 (NEPA) Handbook (H-1790-1, Section 5.2). Tiering is appropriate when the analysis for the proposed action will be a more site-specific or project-specific refinement or extension of the existing NEPA documents. The documents are available for viewing at the Miles City District Office of BLM and are as follows:

- Final Environmental Statement - Proposed Mining and Reclamation Plan, Spring Creek Mine, Big Horn County, Montana, On Federal Lease M-069782, (USGS and MT DSL, 1979).
- Draft Environmental Statement Regional Analysis – Northern Powder River Basin, Coal, Montana (BLM/MDSL 1979).
- Draft Powder River Regional Coal Environmental Impact Statement, (BLM 1981a).
- Final Powder River Regional Coal Environmental Impact Statement, (BLM 1981b).
- Draft Environmental Impact Statement for Round II Coal Lease Sale in the Powder River Region (BLM 1984a).
- Final Resource Management Plan/Environmental Impact Statement, Powder River Resource Area, December 1984 (BLM 1984b).
- Final Economic, Social and Cultural Supplement to the Powder River I Regional EIS (BLM 1990).
- Tongue River Basin Project, Final Environmental Impact Statement, Montana Department of Natural Resources and Conservation, the Northern Cheyenne Tribe, and the U.S. Bureau of Reclamation, (MDNRC, Northern Cheyenne Tribe, U.S. Bureau of Reclamation 1996).
- Environmental Assessment for Modifying Decker Coal Leases, MTM 057934A and MTM 061685, EA# MT-020-78-7-44, (BLM 1998).
- Environmental Assessment and Powder River Resource Area, Resource Management Plan Amendment for Spring Creek Coal Company's Lease by application MTM 88405 and State of Montana Coal Lease Applications C-1099-XX, C-1100-XX, and C-1101-XX, (BLM 2000).
- Montana Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plan, (BLM 2003c).
- Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project, (BLM 2003a).
- Final Environmental Impact Statement for the Pittsburg and Midway Coal Mining Company Coal Exchange Proposal, (BLM 2003b).
- Environmental Assessment for Spring Creek Coal Company's Lease by Application MTM 94378 – EA# MT-020-2007-34, (BLM 2006a).
- Environmental Assessment for Decker Coal Lease Modifications MTM37604 and MTM57934 EA# MT-020-2006-097, (BLM 2006b).
- Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment for the Powder River and Billings Resource Management Plan (BLM 2008a).
- Draft Environmental Impact Statement for the Absaloka Mine Crow Reservation South Extension Coal Lease Approval, Proposed Mine Development Plan, and Related Federal and State Permitting Actions (Bureau of Indian Affairs/MDEQ 2008a).
- Final Environmental Impact Statement for the Absaloka Mine Crow Reservation South Extension Coal Lease Approval, Proposed Mine Development Plan, and Related Federal and State Permitting Actions (Bureau of Indian Affairs/MDEQ 2008b).

BLM will use the analysis in this EA to decide whether to modify existing coal lease MTM-069782 as applied for to include additional coal or reject the current lease modification application. BLM will also use the analysis in this EA to decide whether to assign, renew, and amend existing Land Use Lease MTM-74913 to allow additional surface disturbance on land adjacent to existing and proposed coal leases. A Decision Record will be issued regarding the request to modify the current coal lease and to assign, renew, and amend the land use lease.

This EA builds upon the above documents and addresses issues that may have changed since the documents were published or that arose from the current scoping process. These issues are identified in Section 1.5.

1.2 Purpose and Need

SCCC has applied for the coal reserves in the LBM tract in order to extend the life of the Spring Creek Mine. The tract contains an estimated 50.8 million tons of in situ coal. SCCC is proposing to mine approximately 41.0 million tons of this insitu coal (39.0 million tons of recoverable coal). Based upon the current projected annual coal production over the life of the mine, the applicant currently estimates that the existing recoverable reserves at the Spring Creek Mine will be depleted within approximately 17.6 years at an average production rate of approximately 18 million tons per year (mmtpy). According to the most recent information from SCCC, beginning in year 2008, the Spring Creek Mine plans to produce an average of approximately 18 mmtpy for 19.7 years if they acquire the lease modification. Thus, acquiring the new lease modification would extend the life of the mine by approximately 2.1 years.

This EA analyzes the potential environmental impacts of modifying an existing federal coal lease and mining the federal coal proposed in the SCCC maintenance coal lease modification application, as required by National Environmental Policy Act (NEPA) and associated rules and guidelines. A decision to modify federal coal lease MTM-069782 to include the lands in this application is a prerequisite for mining but it is not the enabling action that would allow mining to begin. The BLM does not authorize mining operations within the tract by modifying the lease.

This EA also analyzes the environmental impacts of renewing SCCC's Land Use Lease (LUL) MTM-74913 for an additional 20 years and assigning it from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company and amending the lease to authorize the use of an additional 197.12 acres of public land (222.12 total acres) for surface disturbance in order to fully recover coal reserves from existing Federal Coal Lease MTM-94378 and Montana State Coal Lease C-1088-05, and from the above referenced pending LBM.

Potential cumulative environmental impacts resulting from leasing the coal tract and the potential long-term development of coal included in a revised Reasonably Foreseeable Development (RFD) area (5,668.8 acres) are evaluated using an RFD scenario formulated by BLM and SCCC. Reasonably and Foreseeable Development was initially discussed in a 2000 EA associated with federal and state coal lease applications (BLM/MDSL 2000). The revised RFD area (referred to as the Spring Creek South RFD) represents an adjustment in the estimated future leasing needs required to mine coal at a rate of approximately 18 million tons per year over the next 20 years (Figure 1-2). The Spring Creek South RFD does not include the proposed LBM. BLM has not received an application to lease federal coal within the Spring Creek South RFD.

1.3 Regulatory Authority and Responsibility

The coal lease modification application was submitted and will be processed and evaluated under the following federal authorities:

- Mineral Leasing Act of 1920 (MLA), as amended;
- Multiple-Use Sustained Yield Act of 1960;
- National Environmental Policy Act of 1969 (NEPA);
- Federal Coal Leasing Act Amendment of 1976;
- Federal Land Policy Management Act of 1976;
- Surface Mining Control and Reclamation Act of 1977 (SMCRA); and
- Energy Policy and Conservation Act of 2005.

The LUL assignment, renewal, and amendment application was submitted and will be processed and evaluated under the following federal authority:

- Section 302 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2762, 2763; 43 U.S.C., 1732).

The BLM is the lead agency responsible for leasing federal coal lands under the MLA as amended by Federal Coal Leasing Act Amendment and is also responsible for preparation of this EA to evaluate the potential environmental impacts of modifying a coal lease.

The area is within an area that has been included in the Final Resource Management Plan/Environmental Impact Statement, Powder River Resource Area (BLM 1984b).

MDEQ and Office of Surface Mining Reclamation and Enforcement (OSMRE) are cooperating agencies on this EA. SMCRA gives the OSMRE primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations in the United States (U.S.). Pursuant to Section 503 of SMCRA, the MDEQ developed, and the Secretary of the Interior approved, Montana's permanent regulatory program authorizing MDEQ to regulate surface coal mining operations and the surface effects of underground coal mining on private and state lands within the state of Montana. In April 1981, pursuant to Section 523(c) of SMCRA, MDEQ entered into a cooperative agreement with the Secretary of the Interior authorizing MDEQ to regulate surface coal mining operations and the surface effects of underground coal mining on federal lands within the State.

In conformance to the cooperative agreement, a federal coal leaseholder in Montana must submit a permit application/revision to OSMRE and MDEQ for any proposed coal mining and reclamation operations on federal lands in the state. MDEQ reviews the permit application/revision to insure it complies with the permitting requirements and the coal mining operation will meet the performance standards of the approved Montana program. OSMRE, BLM, and other federal agencies review the permit application/revision to insure it complies with the terms of the coal lease, the MLA, NEPA, and other federal laws and their attendant regulations. If the permit application/revision does comply, MDEQ issues the applicant a permit to conduct coal mining operations. OSMRE recommends approval, approval with conditions, or disapproval of the MLA mining plan to the Assistant Secretary of the Interior, Land and Minerals Management. Before the MLA mining plan can be approved, the BLM must concur with this recommendation.

If federal coal lease MTM-069782 is modified to include the proposed LBM and if LUL MTM-74913 is amended, SCCC would be required to revise its coal mining permit prior to mining the coal, following the processes outlined above. As a part of that process, a revised mining and reclamation plan would be developed showing how the lands in the tracts that are leased would be mined and reclaimed. Specific impacts that would occur during the mining and reclamation of the tracts would be addressed in the mining and reclamation plans, and specific mitigation measures for anticipated impacts would be described in detail at that time.

MDEQ enforces the performance standards and permit requirements for reclamation during a mine's operation and has primary authority in environmental emergencies. OSMRE retains oversight responsibility for this enforcement. BLM has authority in those emergency situations where MDEQ or OSMRE cannot act before environmental harm and damage occurs. BLM also has a responsibility to consult with and obtain the comments and assistance of other state and federal agencies that have jurisdiction by law or special expertise with respect to potential environmental impacts. Table 1-1 presents federal and state permitting requirements that may be required to mine the coal lease tract.

1.4 Relationship to BLM Policies, Plans, and Programs

In addition to the federal acts listed under Section 1.3, guidance and regulations for managing and administering public lands, including the federal coal lands in the SCCC application, are set forth in 40 CFR 1500 (Protection of Environment), 43 CFR 1601 (Planning, Programming, Budgeting), 43 CFR 3400 (Coal Management) and 43 CFR 2920 (Leases, Permits and Easements).

Table 1-1. Federal and State Permitting Requirements and Agencies.

AGENCY	LEASE/PERMIT/ACTION
FEDERAL	
Bureau of Land Management	Coal Lease
	Resource Recovery and Protection Plan
	Exploration Drilling Permit
	Contract for Sale of Mineral Materials
	Land Use Lease Amendment
Office of Surface Mining Reclamation and Enforcement	MLA Mining Plan Approval Document Preparation
	SMCRA Oversight
Department of the Interior	MLA Mining Plan Approval
Mine Safety and Health Administration	Safety Permit and Legal I.D.
	Ground Control Plan
	Major Impoundments
	Explosives Use and Storage Permit
Bureau of Alcohol, Tobacco and Firearms	Explosives Manufacturer's License
	Explosives Use and Storage Permit
Federal Communication Commission	Radio Permit: Ambulance
	Mobile Relay System Radio License
Nuclear Regulatory Commission	Radioactive By-products Material License
U.S. Army Corps of Engineers	Authorization of Impacts to Wetlands & Other Waters of the US
Environmental Protection Agency	Hazardous Waste I.D. Number
Department of Transportation	Hazardous Waste Shipment Notification
Federal Aviation Administration	Radio Tower Facilities Construction Permit
STATE	
Montana Department of Natural Resources and Conservation	Water Rights
Montana Department of Environmental Quality-Permitting and Compliance Division*	Permit and License to Mine
	Air Quality Permit to Operate; and Air Quality Permit to Construct
	Montana Pollutant Discharge Elimination System Water Discharge Permit
	Permit to Construct Sedimentation Pond
	Authorization to Construct Septic Tank & Leach Field; Authorization to Construct and Install a Public Water Supply & Sewage Treatment System
	Solid Waste Disposal Permit-Permanent and Construction

* There are separate bureaus for land, air, water, etc.

1.5 Conformance with Land Use Plan

The BLM's principal authority to manage public lands is established by Federal Land Policy Management Act, as amended. Through this authority, the BLM is responsible for managing resources on public lands in a manner that maintains or improves them. The BLM planning regulations are set forth in 43 CFR 1600.

The Powder River Resource Area, Resource Management Plan, Final Environmental Impact Statement (FEIS) of December 1984 is the plan that governs the management of BLM-administered lands and minerals in this portion of Big Horn County, Montana. The Record of Decision for this plan was approved on March 15, 1985.

The Federal Coal Leasing Act Amendment requires that lands considered for leasing be included in a comprehensive land use plan and that leases be compatible with that plan. The BLM applied four screens to determine coal areas acceptable for further consideration for leasing. The screens were designed to identify coal deposits and to limit the coal found acceptable for further consideration to those areas with the best coal potential and where no overriding resource or environmental conflicts exist. The four screens include the following components:

- identification of coal-bearing areas with development potential;
- application of surface owner consultation;
- analysis of multiple use conflicts; and
- application of unsuitability criteria.

A coal tract that is acceptable for further consideration for leasing must be located within an area that has been determined to have coal development potential. The land in this coal lease modification application is within the area identified as having coal development potential by the BLM in the coal screening analyses published in the 1984 BLM planning document.

Surface owner consultation was completed during the preparation of coal screening analysis published in the 1984 Powder River Resource Area RMP. Qualified private surface owners in the Spring Creek potential coal development area were provided the opportunity to express their preference for or against surface mining of federal coal under their private surface estate during the screening. The current surface ownership of the LBM area is federal and private (Section 3.11).

As part of the coal planning for the 1984 BLM Powder River Resource Area RMP, a multiple land use conflict analysis was completed to identify and "eliminate additional coal deposits from further consideration for leasing to protect resource values of a locally important or unique nature not included in the unsuitability criteria", in accordance with 43 CFR 3420.1-4e(3). The 1984 multiple use conflict evaluation in the BLM Powder River Resource Area RMP identified areas within Big Horn and Rosebud Counties that were potentially affected by multiple use conflicts in four categories (producing oil and gas fields, communities, recreation and public purpose facilities, and cultural resources). None of the multiple use conflict areas identified in the 1984 Powder River Resource Area RMP are included in the coal lease modification tract.

The coal mining unsuitability criteria listed in the federal coal management regulations (43 CFR 3461.5) have been applied to high to moderate coal development potential lands in the Montana PRB. The Powder River Resource Management Plan originally classified various parcels of federal coal lands within the Powder River Basin with the potential for development using the unsuitability criteria listed in 43 CFR 3461.5. The designations have been changed several times at the Spring Creek Coal Mine since the original designation in 1984 due to additional information regarding the unsuitability issue. The most recent redesignation occurred in 2007 when approximately 45.5 acres were removed from the *Unsuitable For Leasing Without Exception* designation.

Because additional data have been collected in the area since completion of the Powder River Resource Area RMP, BLM is reviewing existing unsuitability criteria designations over a larger area than the parcel within the federal coal lease and land use lease amendment tracts. The review will be completed using a RFD scenario, as described above. BLM will not change unsuitability designations within the Spring Creek South RFD at this time, unless the changes are related to the Proposed Action. BLM's authority to apply unsuitability designations for coal leasing does not extend to state and privately owned coal.

Criterion 15 (sage-grouse wintering area, sharp-tailed grouse and sage-grouse dancing and strutting grounds) leasing restrictions are currently in place near the proposed LBM and LUL tracts (Figure 1-3). No areas within the tracts are currently designated as unsuitable, although approximately 99 percent (810.8 acres – does not include 37.1 overlapping acres within the LUL disturbance area) of the disturbance area associated with the LBM tract, approximately 19 percent (37.1 acres) of the LUL amendment tracts, and approximately 51 percent (2,873.2 acres) of the Spring Creek South RFD area are within polygons identified by BLM as crucial sage-grouse habitat (BLM 2008a). Adaptive management could be applied to this sage-grouse habitat that would allow BLM to alter surface disturbance thresholds, adopt new Best Management Practices (BMPs), and work with the State to universally apply BMPs to protect sage-grouse habitat. Adaptive management would likely come in the form of a habitat recovery and replacement plan (HRRP) that is designed to mitigate the loss of sage-grouse habitat. The sage-grouse habitat inside the Spring Creek South RFD would be subject to further evaluation in the event development of federal minerals is proposed within the area, with the goal of avoiding the displacement of sage-grouse from important habitat areas.

Approximately 675.2 acres of within the LBM disturbance area (does not include 37.1 overlapping acres within the LUL disturbance area) and approximate 197.1 acres within the LUL amendment area have been designated as *Suitable for Leasing With Stipulations* under Criterion 15 (Figure 1-3). These acreages received this designation based on mule deer and antelope winter range. A special stipulation would normally be added to the coal lease requiring that these lands be reclaimed back to suitable wildlife habitat. Since there is overlap between the big game winter range lands and the sage-grouse habitat areas described above, the reclamation of any sage-grouse habitat outlined in a specific HRRP would fulfill the reclamation requirements for mule deer and pronghorn antelope. The HRRP would provide quality habitat for both big game and grouse.

Approximately 532 acres within the Spring Creek South RFD have been designated as *Unsuitable For Leasing Without Exception* due to Criterion 15 - wildlife habitat of high interest (sage-grouse wintering area and sharp-tailed and sage-grouse dancing and strutting grounds). Approximately 276 acres have been designated *Unsuitable For Leasing Without Exception* due to Criterion 15 – crucial mule deer winter range and 248 acres have been designated as *Unsuitable For Leasing Without Exception* due to Criterion 11 - buffer zone for golden eagle nest. These areas are unsuitable for lease consideration and would be excluded from future lease consideration unless, after consultation with the state, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

Cultural resource sites are evaluated by criteria set forth by the National Register of Historic Places (NRHP). Sites determined to be eligible for listing on the National Register are treated essentially as if they were listed on the National Register. That is, before a federal undertaking can jeopardize their eligibility, the loss of the resource must be mitigated through implementation of an approved mitigation plan. Any sites recommended for NRHP listing within the proposed LBM and LUL tracts disturbance areas are subject to stipulations (Appendices A and D). One NRHP recommended site would be disturbed under the Proposed Action. The entire Spring Creek South RFD has not been surveyed for cultural resources at a Class III level. Eight known NRHP sites are within the Spring Creek South RFD area. The potential exists for disturbance of the sites within the RFD area and sites located in areas not yet surveyed for cultural resources if mineral development occurs in the future.

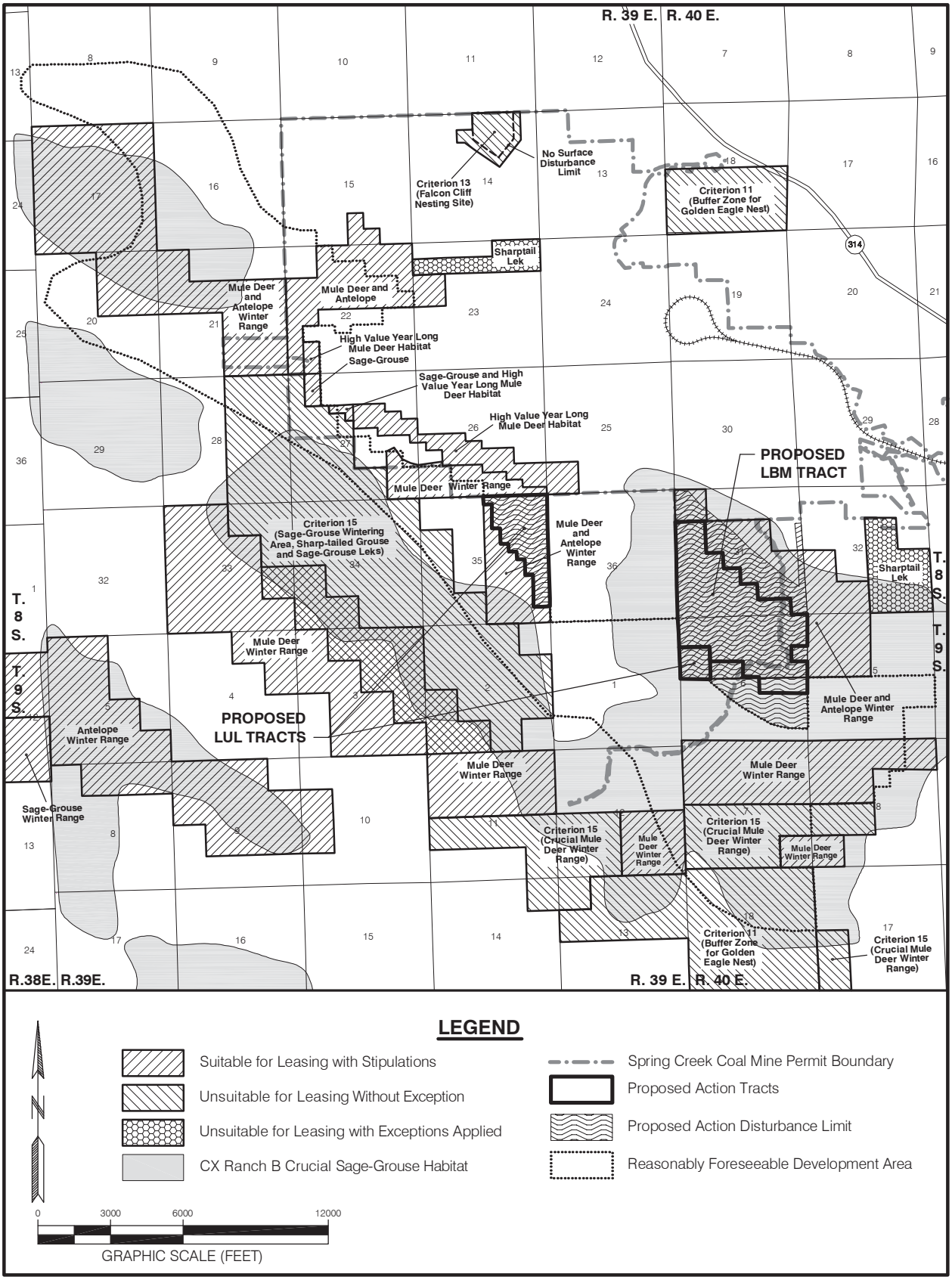


Figure 1-3. Existing Unsuitability Designations Within and Adjacent to the Spring Creek Coal Mine Permit Boundary.

Text on Page 4 of the Record of Decision for the Power River Resource Area RMP under Leases, Permits, and Easements states that "Legitimate uses of public land may be authorized on a case-by-case basis by permits, leases, and easements if they cannot be authorized by other laws and regulations." and "Leases may be granted to authorize use of public lands for long-term developments."

With the above described stipulations and exclusions in place all portions of the LBM and LUL amendment tracts included in the Proposed Action would be in conformance with the land use plan.

1.6 Consultation and Coordination

Initial Involvement

BLM received the Spring Creek coal lease modification application on May 17, 2007. On July 12, 2007, SCCC submitted a revision to the land description for the lease modification. The BLM ruled that the application and lands involved met the requirements of regulations governing coal lease modifications (43 CFR 3432). BLM received the LUL amendment proposal on March 6, 2009. The BLM, Montana State Office, Branch of Solid Minerals initially reviewed the application. On August 13, 2009, the BLM, MCFO, issued a Notice of Realty Action and request for public comment on the proposed LUL amendment with the comment period ending on September 28, 2009.

Public scoping meetings were conducted August 19, 20, and 21, 2008. Scoping meetings were held in Billings and Miles City, Montana and in Sheridan, Wyoming.

Chapter 5 provides a list of persons, firms, and agencies contributing data analysis, review, or guidance to this environmental assessment.

Chapter 2
PROPOSED ACTION AND ALTERNATIVES

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and alternatives to this action. The Proposed Action is to modify existing coal lease MTM-069782 to include a tract of federal coal reserves and to assign, renew, and amend land use lease MTM-74913. All modification areas are adjacent to the Spring Creek Mine, an operating surface coal mine in the northwest PRB. The Proposed Action is BLM's preferred alternative.

This chapter also summarizes the relevant regional activity for cumulative impact analysis purposes and provides a summary comparison of the consequences of each alternative.

The Spring Creek Mine currently leases approximately 3,773 acres of federal coal; 200 acres of private coal, and 480 acres of state coal within the existing SCCC Mine permit boundaries. A total of approximately 4,708 acres will eventually be affected by mining the current leases.

2.1 Proposed Action

The boundaries of the LBM modification and the LUL amendment tracts are shown on Figure 2-1. The legal description of the proposed coal lease modification as applied for by SCCC under the Proposed Action is as follows:

Township 8 South, Range 40 East, Big Horn County, Montana

Section 31:	Lot 2	36.91 acres
	Lot 3	36.97 acres
	NW¼NE¼SW¼	10.00 acres
	S½NE¼SW¼	20.00 acres
	Lot 4	37.03 acres
	SE¼SW¼	40.00 acres
	NW¼SW¼SE¼	10.00 acres
	S½SW¼SE¼	20.00 acres
	SW¼SE¼SE¼	10.00 acres

Township 9 South, Range 40 East, Big Horn County, Montana

Section 6:	Lot 2	40.04 acres
	Lot 1	40.05 acres
	SW¼NE¼	40.00 acres
	NW¼SE¼NE¼	10.00 acres
	S½SE¼NE¼	20.00 acres
	Lot 4	37.09 acres
	Lot 3	40.02 acres
	N½SE¼NW¼	20.00 acres
	N½NE¼SE¼	20.00 acres
	NE¼NW¼SE¼	10.00 acres
	Total:	**498.11 acres**

The legal description of the proposed LUL assignment, renewal, and amendment as applied for by SCCC under the Proposed Action is as follows:

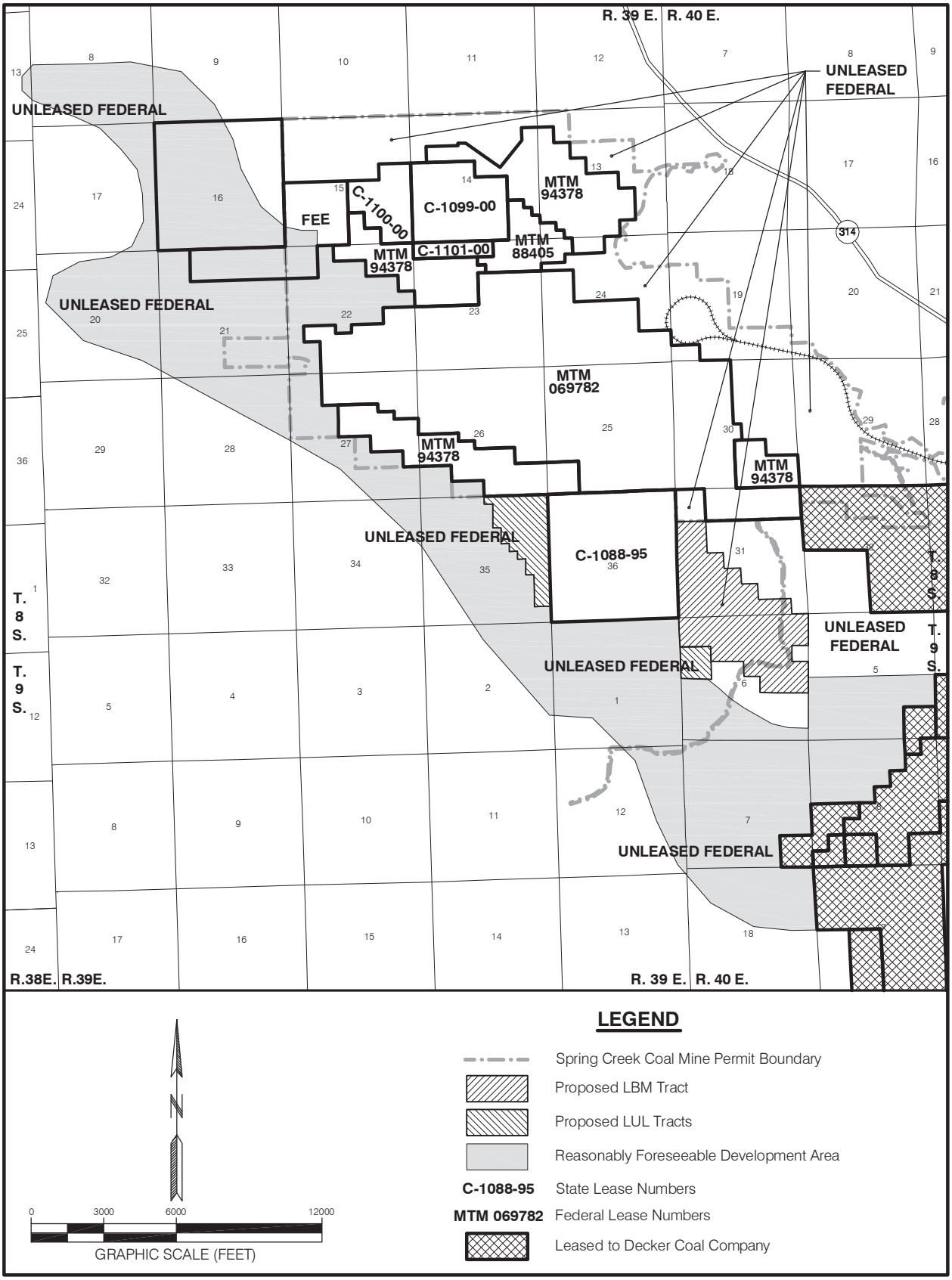


Figure 2-1. Configuration of the Proposed LBM and LUL Tracts, RFD Area, and Coal Leases Within and Adjacent to the Spring Creek Coal Mine Permit Boundary.

Existing LUL:

Township 8 South, Range 39 East, Big Horn County, Montana

Section 22:	N½NE¼SW¼, N½SE¼NE¼SW¼	25.00 acres

Additional LUL amendment area:

Township 8 South, Range 39 East, Big Horn County, Montana

Section 35:	NE¼NE¼	40.00 acres
	SE¼NE¼	40.00 acres
	E½NW¼NE¼	20.00 acres
	E½W½NW¼NE¼	10.00 acres
	NW¼NW¼NW¼NE¼	2.50 acres
	NE¼SW¼NE¼	10.00 acres
	NE¼SE¼SW¼NE¼	2.50 acres
	E½NE¼SE¼	20.00 acres
	E½NW¼NE¼SE¼	5.00 acres
	NE¼SE¼SE¼	10.00 acres

Township 9 South, Range 40 East, Big Horn County, Montana

Section 6:	Lot 5	37.12 acres
	Total:	**222.12 acres**

Land descriptions and acreage are based on the BLM Status of Public Domain Land and Mineral Titles approved Master Title Plats as of January 18, 2006. Under the Proposed Action, the lease modification area, as applied for by SCCC, would be subject to standard and special lease stipulations developed for the mine (Appendix A).

The amendment to SCCC's LUL would authorize the surface use of 197.12 additional acres (222.12 total acres) of public land for coal mine layback, a flood control structure, topsoil and overburden stockpiles, and transportation and utility line corridors in order to facilitate the full recovery of coal reserves from SCCC's adjoining Federal Coal Lease MTM-94378, Montana State Coal Lease C-1088-05, and for Spring Creek's pending Coal Lease Modification MTM-069782. The layback is a critical component in the coal strip mine recovery that consists of a series of benches cut into the mine highwall to stabilize the wall as mining progresses into an area. The land adjacent to the coal leases needs to be disturbed during normal mining operations to completely and safely remove the coal within the lease boundary. The flood control structure consists of a reservoir sized at approximately 159 acre feet, to contain a 100-year, 24-hour flood event associated with the Pearson Creek drainage. This reservoir is needed to prevent saturation and potential failure of the highwall and/or flooding into the pit which would not only slow or stop coal production but expose mine personnel to a health and safety hazard. The topsoil stripped from the coal leases would be stockpiled on the subject lands to be used in reclamation after mining. The overburden removed from the pit would also be stockpiled on the subject lands to be used in post-mining topography construction. An electric line and distribution station would be located within the use area to keep it safely away from the pit and grading activity and buffered by the access/haul roads which will be used in the mining process and to service the stockpiles. The amendment would consist of 160 acres in the E½ of Section 35, T 8S, R39E, and 37.12 acres in lot 5 of Section 6, T9S, R40E. The area of 100 percent usage in Section 35 is estimated to be 108.90 acres with the remaining 51.10 acres receiving a 10 percent usage. The area of 100 percent usage in Section 6 is estimated to be 21.20 acres with the remaining 15.92 acres receiving a 10 percent usage. Disturbance within

the 197.12 acre LUL may change as mining progresses. SCCC has two BLM issued *2920 Minimum Impact Land Use Permits* for environmental monitoring: 1) MTM-96659 in the E½, Section 35, T8S, R39E, and 2) MTM-96660 in Lots 3, 4, and 5, Section 6, T9S, R40E. SCCC proposes to retain the permit in Section 35 (MTM-96659), but would no longer need the permit in Section 6 (MTM-96660) if the coal lease modification and land use lease amendment are approved. Permit MTM-96660 could be relinquished or allowed to expire if the Proposed Action is approved.

The subject land would be offered noncompetitively to SCCC as an amendment to their existing land use lease MTM-74913 which was originally issued for 40 acres for stockpiling of topsoil and overburden, construction of a haul road, and for drainage control in the NE¼SW¼, Section 22, T8S, R39E, for their current coal mining operation. SCCC recently relinquished 15 acres of the existing LUL and previous amendment, with these acres now included in coal leases. Of the remaining 25 acres of the current LUL, which is located in the N½NE¼SW¼, N½SE¼NE¼SW¼, Section 22, T8S, R39E, it is estimated that approximately 2.5 acres of surface will be disturbed for stockpiling, drainage control, and a haul road and the remaining 22.5 acres would received a 10% usage. This disturbance area may change as mining progresses. All tracts are adjacent to the Spring Creek coal mine operation. The existing lease, which expires on April 22, 2012, would be amended and renewed for an additional 20 years, and would expire on April 22, 2032, and would be renewable. The proposed lease assignment, renewal, and amendment would be approved pursuant to Section 302 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2743, 2762; 43 U.S.C., 1732), would be for surface use only of the public land and would be subject to the terms and conditions in 43 CFR 2920, the mitigations set forth in the application/plan of development, the stipulations and special conditions of the original lease and additional stipulations identified for this amendment and listed in Appendix A. The lease assignment, renewal, and amendment would be subject to cost recovery and rental as provided for at 43 CFR 2920.6 and 2920.8. The lease would be monitored for use and before renewal or closure.

SCCC estimates that the LBM tract contains an estimated 50.8 million tons of insitu coal. Of this insitu coal, SCCC estimates approximately 40.9 million tons are mineable and that around 37.3 million tons of coal would be recovered during mining (Table 2-1).

Table 2-1. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for Spring Creek Mine and LBM Tract.

Item	No Action Alternative (Existing Mine)	Added by the LBM Tract as Proposed	Added by LUL Renewal/Amendment
In-place Coal (as of 1/1/2009)	402 mmt[1]	50.8 mmt	0 mmt
Mineable Coal (as of 1/1/2009)	334 mmt	40.9 mmt	0 mmt
Recoverable Coal (as of 1/1/2009)[2]	317 mmt	37.3 mmt	0 mmt
Coal Lease Area - federal leases only (acres)	3,773	498.1	0
Total Area to be Disturbed (acres)	4,707.9	819.9	197.1[3]
Permit Area (acres)	6,926	0[4]	0[4]
Average Annual Post-2008 Coal Production	18 mmt	18 mmt	18 mmt
Remaining Life of Mine (post-2008)	17.6 yrs	2.1 yrs	0
Average Number of Employees	215	0	0

[1] Million tons
[2] Assumes 95% recovery factor
[3] Acreage includes 37.1 acres overlapping with (not included in) LBM disturbance
[4] Pending Pearson Creek Amendment would add 2,042 acres to SCCC's currently approved permit area, including these areas (see Figure 2-1)

No areas within the disturbance area associated with the Proposed Action are currently designated as unsuitable; however, based on new studies, the subject lands are within an area recently identified as containing sage-grouse habitat (Figure 1-3). Since the habitat data are new, the coal unsuitability screen for wildlife, specifically Criterion 15 (43 CFR 3461.5(o)(1)), will be applied to lands impacted by the Proposed Action during this environmental review process.

The federal regulations at 43 CFR 3461.5(o)(1) for Criterion 15 states "Federal lands which the surface management agency and the state jointly agree are habitat for resident species of fish, wildlife and plants of high interest to the state and which are essential for maintaining these priority wildlife shall be considered unsuitable.

A lease may be issued, if after consultation with the State, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long term impact on the species being protected. Also, the Powder River Resource Area RMP provides additional guidance on Criterion 15 as follows; "These mitigable acreages consist of sharp-tailed and sage grouse leks with buffer zones and sage grouse wintering areas. Habitat recovery and replacement plan requirements are detailed in the coal MSA" (management situation analysis).

Therefore, in accordance with the federal regulations and the Powder River Resource Area RMP, BLM can lease the sage-grouse habitat but must require a HRRP. The HRRP requirement states in part "The lessee shall be required to mitigate for grouse habitat loss where applicable and the resultant loss or displacement of these species due to surface coal mining operation." The HRRP requirement further states that the "habitat recovery and replacement plan shall indicate the methods to be employed by the lessee which will ensure that the recovered or replaced land has the capacity to support the species, as determined by the BLM in consultation with the state of Montana."

BLM has required SCCC to develop a HRRP for inclusion in this analysis, which has been reviewed and approved by BLM, MDEQ, and the Montana Department of Fish Wildlife and Parks (MDFWP). The BLM's HRRP Requirement Guidelines for Unsuitability Criterion 15 as well as a portion of SCCC's HRRP are attached to this document as Appendix B. The entire HRRP document, including supporting baseline habitat data, is available electronically at the BLM Miles City Field Office and MDEQ offices in Billings and Helena.

The HRRP was based on a holistic approach that considers proper conservation practices for all species of concern, including the sage-grouse. SCCC followed proactive practices, such as monitoring and treating for mosquito larvae in ponds and stored tires around the mine site to prevent potential West Nile Virus with potential impacts to sage-grouse and other species of concern. SCCC included several conservation practices as determined through collaboration with MFWP, BLM, and MDEQ. Specifically, the Plan included habitat analyses, enhancements to the current approved reclamation plan, and off-site mitigation options.

A decision approving the Proposed Action would result in the important habitat lands within the disturbance area associated with the Proposed Action being designated as *Unsuitable for Leasing With Exceptions Applied* and a stipulation would be placed on the coal lease and LUL amendment making the HRRP a mitigation requirement of the lease.

Approximately 872 acres of federal coal within disturbance area associated with the Proposed Action (LBM and LUL actions) have been designated as *Suitable for Leasing With Stipulations* applied under Criterion 15 - mule deer and antelope winter range (Figure 1-3). A special stipulation would normally be added to the coal lease requiring that these lands be reclaimed back to suitable wildlife habitat. Since there is overlap between the big game winter range lands and the sage-grouse habitat areas, the reclamation of any sage-grouse habitat outlined in the HRRP would fulfill the reclamation requirements in place for mule deer and pronghorn antelope. The HRRP would provide quality habitat for both big game and grouse.

In addition, cultural site 24BH3392 is considered eligible for nomination to the NRHP and this site would be destroyed by mining under the Proposed Action. However, an excavation and data recovery plan has been developed to mitigate the impacts to this site. The plan is attached to this document as Appendix D and would be attached to the coal lease as a special stipulation requiring implementation of the plan prior to site disturbance.

The approved Spring Creek Mine Permit (No. SMP #79012) includes monitoring and mitigation measures for the Spring Creek Mine that are required by SMCRA and Montana State Law. In addition, vegetative reclamation capable of supporting sage-grouse, as described in the HRRP and within certain prescribed areas of the mine, will be made a requirement of the state mine permit. If the coal within the LBM tract was acquired by SCCC and the LUL assignment, renewal, and amendment were approved, these monitoring and mitigation measures would be extended to cover operations associated with the tracts when the Spring Creek Mine's mining permit is amended to include the tracts. This amended permit would have to be approved before mining operations could take place on the tracts. These monitoring and mitigation measures are considered to be part of the Proposed Action during the leasing process because they are regulatory requirements.

Under the Proposed Action the LBM tract would be mined and the LUL tracts would be disturbed as an integral part of a proposed revision to the Spring Creek Mine (Figures 2-2 and 2-3). This revision has not yet been approved so discussions regarding currently approved disturbance, permit acres, and coal tons available do not include the revision values.

The Spring Creek Mine is currently operating under one approved state mining permit. The approved Spring Creek state mining permit and MLA mining plan for the Spring Creek Mine would require a Major Revision to include mining of the coal lease tract and disturbance of the LUL tracts. Since the tracts would be an extension of mining within a currently proposed amendment to the Spring Creek Mine, the facilities and infrastructure would be the same as those identified in the MDEQ Mine Permit SMP #79012 renewed April 9, 2004, and the BLM Resource Recovery and Protection Plan (R2P2), which was revised December 6, 2004.

The Spring Creek Mine produced 15.8 million tons in 2007 and 17.9 million tons in 2008. Under the Proposed Action, SCCC estimates that average annual coal production would be approximately 18 mmtpy for approximately 21 years.

Coal within the coal lease tract would be produced from one coal seam that SCCC refers to as the Anderson-Dietz (A/D), which averages 80 feet thick inside the SCCC mine permit area. If the lease modification is approved, coal removal within the LBM tract would begin in early 2013. Current full-time employment at the Spring Creek Mine is approximately 215.

2.2 Alternative 1 - No Action Alternative

Under Alternative 1, the No Action Alternative, SCCC's application to lease the coal included in the lease modification would be rejected and the coal included in the LBM tract would not be mined at this time and the land use lease would not be assigned, renewed, or amended to include additional lands. Employment will likely not be affected in the short term on the existing leases at the Spring Creek Mine. Rejecting the application would not preclude an application to lease the coal included in the area in the future. Unsuitability Criterion 15 would be applied to the disturbance area associated with the Proposed Action and the subject lands would be redesignated as *Unsuitable for Leasing Without Exception* to avoid impacts to sage-grouse habitat. The current designations on lands within RFD that are outside of the above described lands would remain in place.

Under the No Action Alternative, the Spring Creek Mine would mine the remaining 317 million tons of recoverable coal reserves (estimated as of 1/09) in approximately 18 years at an average production rate of approximately 18 mmtpy. Without the LUL amendment SCCC would not be able to mine approximately 6.5 million tons of otherwise mineable federal coal and 5.2 million tons of State coal.

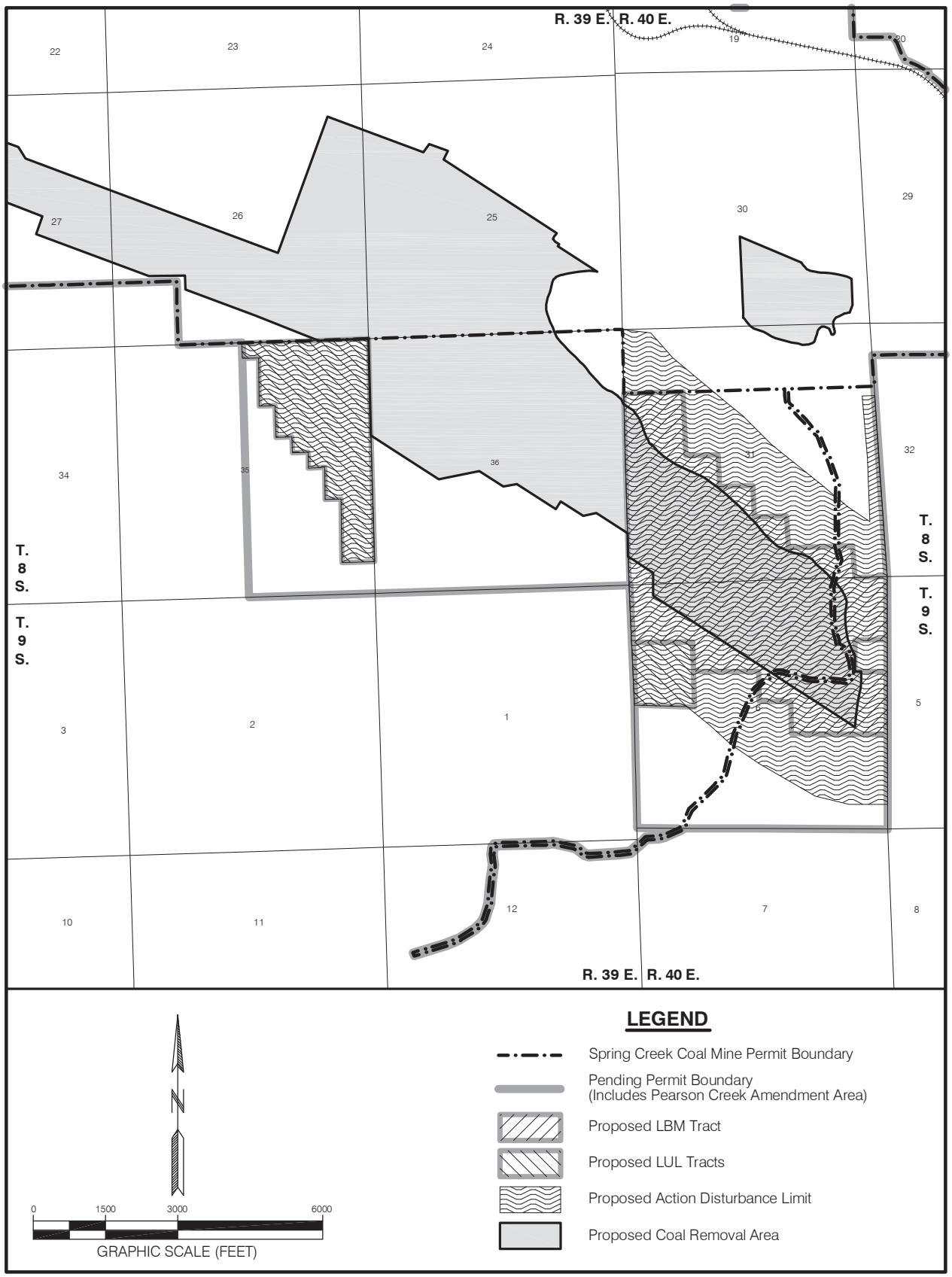


Figure 2-2. Coal Removal Areas Within and Adjacent to the Proposed LBM and LUL Tracts.

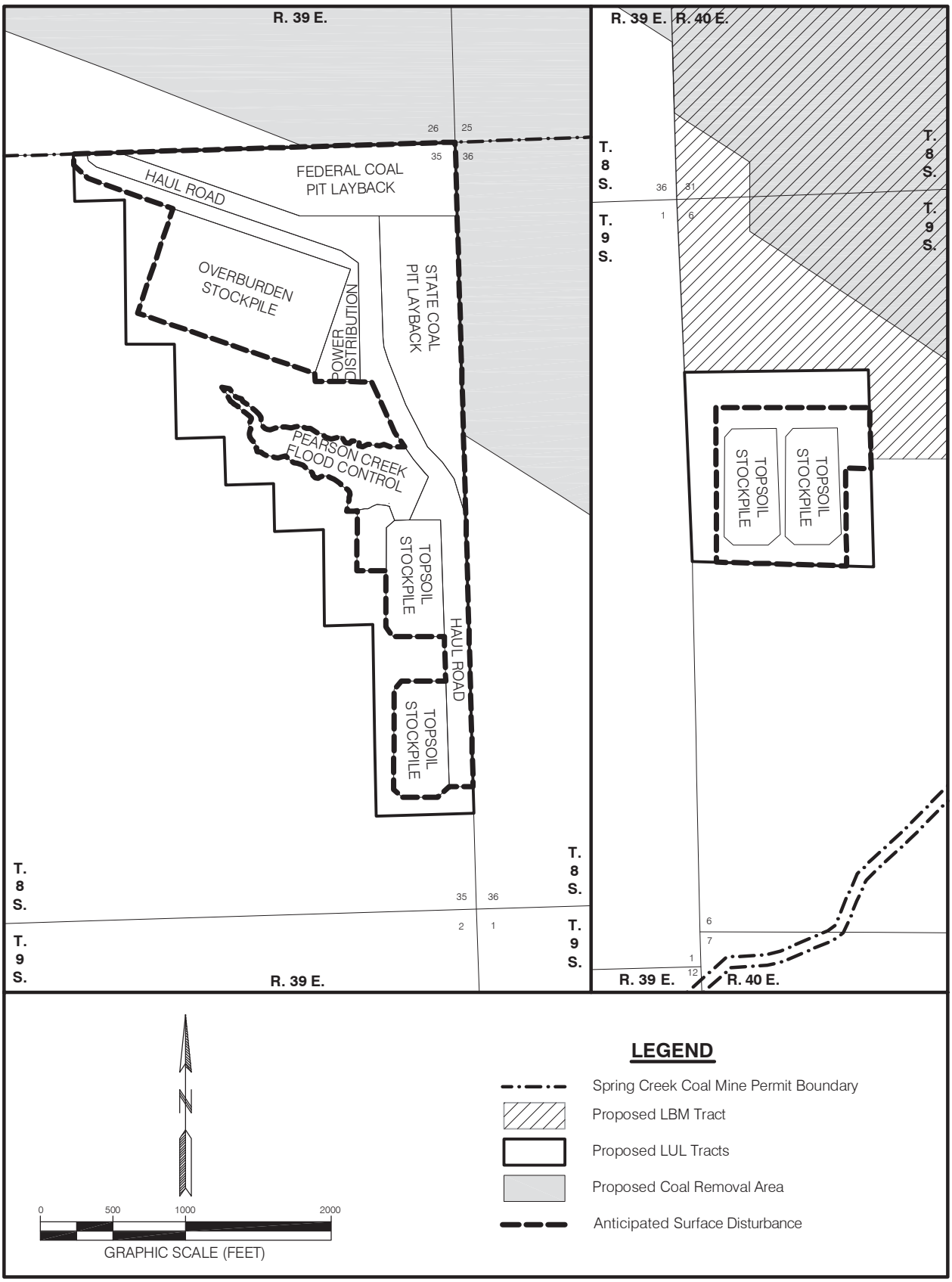


Figure 2-3. Initial Surface Disturbance Associated With the LUL Tracts.

In order to compare the economic and environmental consequences of mining and/or disturbing these lands versus not mining and/or disturbing them, this EA was prepared under the assumption that the tracts would not be disturbed in the foreseeable future if the No Action Alternative were selected.

2.3 Alternative Considered but Eliminated from Detailed Analysis

According to the Council on Environmental Quality (FedCenter 2009) and the regulations implementing NEPA found at 43 CFR 1502.14(a) BLM must; "Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss their reasons for having been eliminated."

In addition, BLM *Manual H-1790-1 - National Environmental Policy Act Handbook* (BLM 2008b) states; "You may eliminate an action alternative from detailed analysis if:

- it is ineffective (it would not respond to the purpose and need).
- it is technically or economically infeasible (consider whether implementation of the alternative is likely given past and current practice and technology; this does not require cost-benefit analysis or speculation about an applicant's costs and profits).
- it is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the LUP).
- its implementation is remote or speculative.
- it is substantially similar in design to an alternative that is analyzed.
- it would have substantially similar effects to an alternative that is analyzed."

In accordance with the above regulations and guidance, BLM has considered analyzing an alternative which would have required SCCC to mine around a cultural site in order to preserve it.

Cultural site (24BH3392) is considered eligible for the NRHP and consists of two juniper cribbed log structures, a variety of lithic artifacts, and bison bone. Preliminary evaluation of the site indicates a Late Prehistoric Period occupation.

Spring Creek Coal Company developed a preliminary mine plan for mining around the site. The preliminary plan, which was reviewed by BLM, indicated that it would not be economically feasible to pursue the avoidance alternative due to the major changes in mining methodologies that would have to be employed to successfully mine around the site.

A mitigation plan (Appendix D) has been developed which will require excavation and data recovery of the site prior to it being destroyed by mining operations.

2.4 Mitigation and Management

Implementation of the Proposed Action would result in impacts to sage-grouse habitat. The following mitigation and management measures would be required to reduce or minimize these impacts if high-value sage-grouse habitat is disturbed:

- SCCC has completed a detailed habitat analysis of the permit areas.
- SCCC has prepared a detailed description of the methods to recover, replace or mitigate habitat loss.
- SCCC will prepare a timetable needed to accomplish the habitat recovery.
- BLM has evaluated the final plan, in consultation with the State of Montana.

A complete list of Standard and Special Lease Stipulations and the condensed Habitat Recovery and Replacement Plan are included as Appendices A and B, respectively. The complete Habitat Recovery and a

condensed Replacement Plan is available electronically at the BLM Miles City Field Office in Miles City, Montana and at and MDEQ offices in Billings and Helena. The LUL amendment, assignment, and renewal would be subject to the stipulations and special conditions of the original lease and additional stipulations included in Appendix A.

In addition, SCCC has developed an excavation and data recovery plan to mitigate impacts to cultural site (24BH3392) which is included in this document as Appendix D.

2.5 Relevant Regional Activity

The Powder River Resource Area RMP and the Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans (MT FEIS) analyzed long-term cumulative effects of surface coal mining and coal bed natural gas (CBNG) activity throughout the region and disclosed the general types of effects to be considered in more detail during the review of site-specific mining and CBNG proposals. Cumulative effects are the result of impacts from other past, present, or reasonably foreseeable future actions that would overlap in time and locale with the direct effects of the Proposed Action or the No Action Alternative, thus resulting in "cumulative effects" distinctly different (greater or less) than the direct effects. The actions listed below have been considered as potential contributors (relevant) to cumulative effects with the proposed project. A specific cumulative effects analysis for each resource is presented in Chapter 4, by alternative.

2.5.1 Relevant Past and Present Actions

2.5.1.1 Coal Mines

Spring Creek Mine: The Spring Creek Mine is a surface coal mine owned and operated by Spring Creek Coal Company. The mining method consists of open pit strip mining. The permitted mine operations area is approximately 6,926 surface acres. The 2008 coal production was 17.9 million tons.

SCCC has proposed a revision to the Spring Creek mine plan to add approximately 2,042 acres to the current permit boundary. The Pearson Creek Amendment is being reviewed by MDEQ/OSMRE and has not yet been approved so discussions regarding currently approved disturbance, permit acres, and coal tons available do not include the revision values.

Decker Mine: The Decker Mine is a surface coal mine owned and operated by Decker Coal Company (DCC). The Decker Mine is comprised of three distinct pit areas. The mine is located approximately 1.5 miles southeast of the LBM area. The permitted mine operations area is approximately 11,718 surface acres. The 2008 coal production was 7.0 million tons.

Absaloka Mine: The Absaloka Mine is a surface coal mine located on and adjacent to the Crow Reservation, owned and operated by Westmoreland Resources, Inc. The mine is located approximately 45 miles northwest of the Spring Creek Coal Mine. The permitted mine operations area is approximately 10,427 surface acres. The average annual coal production is 6.5-7 million tons.

2.5.1.2 Gravel/Scoria Pits

Some gravel or scoria would be used to surface project area roads and would come from already permitted mineral material sites.

2.5.1.3 CBNG Development

Montana: According to the Montana Board of Oil and Gas Conservation (MBOGC) website, November, 2009, approximately 1,106 CBNG wells have been drilled in Big Horn County; approximately 173 wells or

around 16 percent are federal wells. Currently 738 CBNG wells in Big Horn County are considered to be in production. A majority of these wells are found in the CX Field, south and east of the Spring Creek Mine.

Fidelity Exploration: The CX Field, including the Badger Hills and Dry Creek areas, is a CBNG producing field operated by Fidelity Exploration & Production Company. The field encompasses approximately 92.5 sections between the Montana/Wyoming state line and the Decker and Spring Creek coal mines. As of November 12, 2009, MBOGC website indicates that the CX Field has 848 producing or shut-in wells. Some of the existing CBNG producing wells are located near the tracts. The CBNG wells in the CX Field are completed in the Dietz 1 (D1), Dietz 2 (D2), Dietz 3 (D3/Monarch), and Dietz 4 (D4/Carney) (SCCC nomenclature) coal seams.

BLM recently approved Plans of Development (PODs) for two projects within the CX Field. The Deer Creek North/Deer Creek North Amendment POD proposed drilling 34 federal wells and the Decker Mine East POD proposed drilling 14 federal wells.

Pinnacle Gas: Powder River Gas Company received approval on November 19, 2004, from BLM and MBOGC to drill and test 16 CBNG wells within the Coal Creek Field. This project area, now operated by Pinnacle Gas Resources Inc., is approximately 6 miles east of the LBM and LUL tracts. Pinnacle Gas received approval on April 28, 2005, from MBOGC to drill and test 48 proposed fee wells on 24 locations, with up to 2 wells per location (Flowers-Goodale and Dietz 6 (D6/Wall) coal seams) within the expanded Coal Creek Field. As proposed, the 48 wells would be drilled on 80 acre spacing per coal seam. The expansion includes private surface and mineral ownership, encompassing five surface owners. The proposed management of water produced with CBNG would include lined evaporation impoundments and treatment and discharge into the Tongue River under an approved Montana Pollution Discharge Elimination System (MPDES) permit. As of October 17, 2008, 64 wells have been completed within this field.

The Dietz Field is a CBNG producing field operated by Pinnacle Gas Resources. The Dietz project totals approximately 4,880 acres of mineral lease and is located approximately 6 miles east of the LBM and LUL tracts. The Dietz project plan decision (approved July 21, 2005) includes the drilling, completion, and production of 132 CBNG wells as well as the installation of roads, pipelines and associated infrastructure needed to produce the wells. Water produced by CBNG development will be stored in lined evaporation impoundments, used for irrigation, or treated at the existing Coal Creek treatment plant operated by Pinnacle; treated water may be discharged under an existing MPDES permit. Any well(s) would be plugged and abandoned and surface restored if commercial quantities of gas are not discovered; partial reclamation of unused disturbed areas and utility disturbed areas would be required during the project life. The project area is composed of fee minerals. Surface is owned by both private entities and the state of Montana. As of October 17, 2006, 103 wells have been completed within this field.

The Trust Land Management Division of the MBOGC issued drilling permits to Pinnacle Gas the Waddle Creek POD and Fork's Ranch POD on April 1, 2008. The MBOGC accepted the Waddle Creek POD and the Fork's Ranch POD on November 2, 2006, but reserved the issuance of permits until the environmental reviews had been complete. A total of 32 coal bed natural gas wells will be drilled on two state sections. Each section will have eight pad locations with two wells per pad site on the Waddle Creek POD and the Fork's Ranch POD. Each well would be drilled to five different coal seams within the Fort Union Formation. This area is located approximately over 20 miles east of the LBM and LUL tracts, in Big Horn County. As of November 20, 2008, no wells had been drilled within these fields.

2.5.2 Reasonably Foreseeable Future Actions

The BLM 1984 Powder River Resource Area RMP/Environmental Impact Statement as amended by the MT FEIS contains Reasonably Foreseeable Development and Reasonably Foreseeable Future Actions scenarios.

2.5.2.1 Future Coal development

According to the Powder River Basin Coal Review, production at currently operating mines is projected to continue through 2020 (BLM 2005a). In addition, two potential new developments (i.e., the Young's Creek Mine (formerly the Ash Creek Mine) in Wyoming, and the Otter Creek Mine in the Montana) have been identified in the region. Development of these mines would be dependent on markets for the coal and may be tied to development of infrastructure including the Tongue River Railroad and/or power plants. It is assumed that development of the Otter Creek Mine would require construction of Tongue River Rail Company's (TRRC's) proposed Tongue River Railroad.

The Surface Transportation Board recently approved (October 9, 2007) the final leg of the TRRC proposed rail line running from Miles City, Montana to near the Spring Creek Mine. Permits from state and federal agencies are still needed, and rights of way through private and public property must be secured before construction of the line could begin. The other two sections had been approved in 1986 and 1996. A 1998 lawsuit involving the project has yet to be resolved (Casper Star Tribune 2007).

2.5.2.2 Future CBNG development

The BLM 1984 Powder River RMP/EIS as amended by the MT FEIS contains Reasonably Foreseeable Development and Reasonable Foreseeable Future Actions scenarios. The scenarios prepared for the amendment estimated that approximately 26,000 federal CBNG wells could be drilled throughout the life of the plan (BLM/MDEQ 2003).

It is also reasonably foreseeable that some wells would be plugged and abandoned, and that associated sites would be reclaimed. Based on a predicted 10 percent rate of future well abandonment (MT FEIS page MIN-29), a total of 2,600 dry holes could be expected statewide over a 20 year period (BLM/MDEQ 2003).

Proposed Future CBNG development includes:

- Fidelity Exploration has submitted Notices of Staking to the BLM for the expansion of exploration and production operations in the CX Field. The project areas known as Deer Creek South and Corral Creek are located within the CX Field (approved by the Montana Board of Oil & Gas Conservation), Big Horn County of southeastern Montana, T. 8 and 9 S., R. 39, 40 and 41 E. One well per 160 acres would be drilled with multiple coal seam completions constructed in one wellbore negating the need for multiple wells on one site (monobores). The average production life of the project wells is expected to be 10-20 years with final reclamation to be completed 2 to 3 years after plugging of the wells. The proposed project is located on private, state and BLM administered surface.

2.5.3 Potential Future Actions

The following future actions are probable to be proposed and/or are internally being prepared by project proponents. At this time, these actions are assumed and too vague to be considered in this document's cumulative effects analysis. These actions will not escape a NEPA analysis; rather when they are proposed or known by the BLM, they will then be considered in a cumulative effects analysis. This would include the following actions:

- St. Mary's Land and Exploration Coal Bed Natural Gas PODs
- Crow Tribe Mineral Development
- Wyoming CBNG PODs

2.6 Comparison of Alternatives

Table 2-2 compares the major effects of the Proposed Action and the No Action Alternative.

Table 2-2. Comparison of Potential Impact by Alternatives by Resource

MAGNITUDE AND DURATION OF IMPACT		
Resource Name	**Alternative 1– No Action**	**Proposed Action (LBM Approval and LUL Amendment)**
TOPOGRAPHY & PHYSIOGRAPHY		
Lower surface elevation	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Permanent topographic moderation, which could result in:		
Microhabitat reduction	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Habitat diversity reduction	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Big game carrying capacity reduction	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in water runoff and peak flows	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Increased precipitation infiltration	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in erosion	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Potential enhanced vegetative productivity	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Potential acceleration of groundwater recharge	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
GEOLOGY AND MINERALS		
Removal of coal	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Removal and replacement of topsoil and overburden	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Physical characteristic alterations in replaced overburden	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Loss of unrecovered CBNG though venting and/or depletion of hydrostatic pressure	Minor to moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Loss of access for development of sub-coal oil and gas resources and other minerals	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Destruction of paleontological resources that are not exposed on the surface	Moderate, permanent on the existing mine areas	Same as No Action on expanded mine areas
AIR QUALITY		
Particulate Emissions:		
Elevated concentrations associated with projected average production of 18 mmtpy in compliance with ambient standard	Moderate, short term for existing approved mining operations	Same as No Action for 2.1 additional years
Potential for public exposure to particulate emissions along State Highway 314 and for occupied dwellings in area	Minor to moderate, short term for existing approved mining operations	Same as No Action for 2.1 additional years
Potential for human health impacts as a result of exposure to particulate emissions	Minor to moderate, short term for existing approved mining operations	Same as No Action for 2.1 additional years
NO_x Emissions from Machinery:		
Elevated concentrations associated with average production of 18 mmtpy in compliance with ambient standard	Moderate, short term for existing approved mining operations	Same as No Action for 2.1 additional years
Potential for public exposure to NO_x emissions from machinery along State Highway 314 and for occupied dwellings located in area	Moderate, short term for existing approved mining operations a	Same as No Action for 2.1 additional years
Potential for human health impacts as a result of exposure to NO_x emissions	Moderate, short term for existing approved mining operations	Same as No Action for 2.1 additional years
NO_x Emissions from Blasting in Compliance with Spring Creek Mine Permit Blasting Conditions:		
Potential for public exposure	No projected events	Same as No Action for 2.1 additional years
Potential for human health impacts as a result of exposure to NO_x emissions	No projected events	Same as No Action for 2.1 additional years

Table 2-2. Comparison of Potential Impact by Alternatives by Resource (Continued)

	MAGNITUDE AND DURATION OF IMPACT	
Resource Name	**Alternative 1– No Action**	**Proposed Action (LBM Approval and LUL Amendment)**
AIR QUALITY (Continued)		
Visibility:		
Elevated concentrations of fine particulate matter associated with average production of 18 mmtpy	Moderate, short term for existing approved mining operations	Same as No Action on expanded mine area for 2.1 additional years
Acidification of Lakes:		
SO_2 emissions derived from burning SCCC coal to produce power	Moderate, short term in vicinity of power plants	Same as No Action on expanded mine area for 2.1 additional years
WATER RESOURCES		
Groundwater		
Removal of coal and overburden aquifers	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Replacement of existing coal and overburden with unconsolidated backfill material	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Depressed water levels in overburden and coal aquifers adjacent to mine	Moderate, short to long term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area
Change in hydraulic properties in backfilled areas	Moderate, permanent on existing mine areas	Same as No Action on expanded mine areas
Increase in TDS concentrations in backfilled areas	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Use of subcoal aquifers for water supply	Negligible, short term on existing mine and surrounding area	Same as No Action for 2.1 additional years
Surface Water		
Diversion and disruption of surface drainage systems	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reconstruction of surface drainage systems	Permanent on existing mine areas	Same as No Action on expanded mine areas
Increased runoff and erosion rates on disturbed lands due to vegetation removal	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Increased infiltration on reclaimed lands due to topographic moderation	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Increased runoff on reclaimed lands due to loss of soil structure	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Potential for adverse downstream effects as a result of sediment produced by large storms	Moderate, long term for existing approved mining operations	Same as No Action on expanded mining operations
ALLUVIAL VALLEY FLOORS		
There are no AVFs significant to agriculture on the proposed lease/amendment tracts		
Removal and restoration of AVFs determined not to be significant to agriculture	Negligible, short term on existing leases	Same as No Action on expanded mine areas
Disruptions to streamflows supplying downstream AVFs	Moderate, short term on existing leases; jurisdictional wetlands would be replaced as required under Section 404 of the Clean Water Act	Same as No Action on expanded mine areas
WETLANDS		
Removal of jurisdictional wetlands and loss of wetland function until reclamation occurs	Moderate, short term to permanent on existing leases; non-jurisdictional wetlands would be replaced as required by the surface land owner or MDEQ	Same as No Action on expanded mine areas
Removal of non-jurisdictional wetlands and loss of wetland function until reclamation occurs	Moderate, short term to permanent on existing leases; non-jurisdictional wetlands would be replaced as required by the surface land owner or MDEQ	Same as No Action on expanded mine areas

Table 2-2. Comparison of Potential Impact by Alternatives by Resource (Continued)

Resource Name	MAGNITUDE AND DURATION OF IMPACT Alternative 1– No Action	Proposed Action (LBM Approval and LUL Amendment)
SOILS		
Changes in physical properties after reclamation:		
Increased near-surface bulk density and decreased soil infiltration rate resulting in increased potential for soil erosion	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
More uniformity in soil type, thickness, and texture	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Decreased runoff due to topographic modification	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
More uniform soil structure	High, permanent on existing mine areas	Same as No Action on expanded mine areas
Changes in biological properties in soils that are stockpiled before reclamation:		
Reduction in organic matter	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in microorganism population	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in seeds, bulbs, rhizomes, and live plant parts	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Changes in chemical properties:		
More uniform soil nutrient distribution	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in soil nutrient cycling	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Changes to horizonization: More uniform soil horizons	High, permanent on existing mine areas	Same as No Action on expanded mine areas
VEGETATION		
During mining:		
Progressive removal of existing vegetation	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Increased erosion	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Wildlife habitat and livestock grazing loss	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
After revegetation:		
Changes in vegetation patterns	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in vegetation diversity	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in shrub density	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Decreased big game habitat carrying capacity	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Decreased habitat for shrub dependent species	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Potential invasion of non-native plant species	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas

Table 2-2. Comparison of Potential Impact by Alternatives by Resource (Continued)

Resource Name	MAGNITUDE AND DURATION OF IMPACT	
	Alternative 1– No Action	**Proposed Action (LBM Approval and LUL Amendment)**
WILDLIFE		
Displacement of all wildlife from active mining areas	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Increased competition on adjacent undisturbed or reclaimed lands, especially big game	Moderate, short term on adjacent areas	Same as No Action on adjacent areas
Restriction of wildlife movement, especially big game	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Increased mortality of small mammals	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Surface and noise disturbance of active sage-grouse leks	Moderate, short to long term on existing mine areas	Same as No Action on expanded mine areas
Disturbance of sage-grouse nesting and wintering habitat during mining	Moderate, short to long term on existing mine areas	Same as No Action on expanded mine areas
Loss of sage-grouse nesting habitat after reclamation	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Alteration of plant and animal communities after reclamation	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Abandonment of raptor nests	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Surface and noise disturbance of active sage-grouse leks	Moderate, short to long term on existing mine areas	Same as No Action on expanded mine areas
Disturbance of sage-grouse nesting and wintering habitat during mining	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Loss of sage-grouse nesting habitat after reclamation	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Alteration of plant and animal communities after reclamation	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Abandonment of raptor nests	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Loss of foraging habitat for raptors	Moderate, short to long term on existing mine areas	Same as No Action on expanded mine areas
WILDLIFE (Continued)		
Loss of nesting and foraging habitat for Migratory Birds of Management Concern	Negligible, short to long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in waterfowl resting and feeding habitat	Negligible, short term on existing mine areas	Same as No Action on expanded mine areas
Loss of habitat for aquatic species, amphibians, and reptiles during mining	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Road kills by mine-related traffic	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in habitat carrying capacity and habitat diversity on reclaimed lands	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Potential reduction in microhabitats on reclaimed lands	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Localized avoidance of foraging areas by big game	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES		
Black-footed ferrets	No effect	No effect
Interior least tern	No effect	No effect
Ute ladies'-tresses	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Ownership and Use of Land		
Reduction of livestock grazing	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Loss of wildlife habitat	Moderate, long term on existing mine areas	Same as No Action on expanded mine areas
Loss of access for sub-coal oil and gas development	Negligible, short term on existing mine areas	Same as No Action on expanded mine areas
Removal of oil and gas production facilities	Negligible, short term on existing mine areas	Same as No Action on expanded mine areas
Loss of access to public land available for recreation and grazing	Negligible, short term on existing mine areas	Same as No Action on expanded mine areas
CULTURAL RESOURCES		
Sites that are not eligible for NRHP	Negligible to Moderate, long term on existing mine area	Same as No Action on expanded mine areas
Sites that are eligible for NRHP	Negligible to Moderate, long term on existing mine area	Same as No Action on expanded mine areas
Sites that are unevaluated for eligibility	Negligible to Moderate, long term on existing mine area	Same as No Action on expanded mine areas

Table 2-2. Comparison of Potential Impact by Alternatives by Resource (Continued)

Resource Name	MAGNITUDE AND DURATION OF IMPACT Alternative 1– No Action	Proposed Action (LBM Approval and LUL Amendment)
NATIVE AMERICAN CONSULTATION	No impact identified on existing mine areas	Same as No Action on expanded mine areas
VISUAL RESOURCES		
During mining:		
Alteration of landscape by mining facilities and operations	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Visibility of mining operations from highway?	Moderate, short term on existing mine areas	Same as No Action on expanded mine areas
Following reclamation:		
Smoother sloped terrain	Negligible, long term on existing mine areas	Same as No Action on expanded mine areas
Reduction in sagebrush density	Moderate, short to long term on existing mine areas	Same as No Action on expanded mine areas
NOISE		
Increased noise levels	Moderate to substantial, short term on existing mines, surrounding areas, and occupied dwellings within 4,800 feet of mining activities	Same as No Action on expanded mine areas
TRANSPORTATION FACILITIES		
Use of railroads and existing SCCC mine rail infrastructure to ship coal	Moderate, for duration of existing approved mining operations	Same as No Action for 2.1 additional years
Employee and service contractor use of highway to and from mine sites	Moderate, for duration of existing approved mining operations	Same as No Action for 2.1 additional years
Relocation of pipelines	Negligible, short to long term on existing mine areas	Same as No Action on expanded mine areas
Relocation of utility lines	Negligible, short to long term on existing mine areas	Same as No Action on expanded mine areas
HAZARDOUS AND SOLID WASTE		
Waste generated by mining operations	Negligible for duration of existing approved mining operations	Same as No Action for 2.1 additional years
SOCIOECONOMICS		
Employment	Moderate, beneficial short term for existing approved mining operations	Same as No Action for 2.1 additional years
Revenues from royalties and taxes to the state government	Moderate, beneficial short term for existing approved mining operations	Same as No Action for 2.1 additional years
Revenues from royalties and taxes to the federal government	Moderate, beneficial short term for existing approved mining operations	Same as No Action for 2.1 additional years
Revenues from taxes to local economy	Moderate, beneficial short term for existing approved mining operations	Same as No Action for 2.1 additional years
Additional housing and infrastructure needs	No new impact related to existing mine areas	Same as No Action for 2.1 additional years

Chapter 3
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources that could be affected by implementation of the alternatives described in Chapter 2 as they relate to the LBM and LUL tracts. Aspects of the affected environment described in this chapter focus on the relevant major issues presented in Chapter 2. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table 3-1.

Table 3-1. Critical Elements Requiring Mandatory Evaluation.

Mandatory Item	Not Present in Immediate Area	No Impact	Potentially Impacted
Threatened and Endangered Species			X
Floodplains	X		
Wilderness Values	X		
Areas of Critical Concern (ACECs)	X		
Water Resources			X
Air Quality			X
Cultural or Historical Values			X
Prime or Unique Farmlands	X		
Wild & Scenic Rivers	X		
Wetland/Riparian		X	
Native American Religious Concerns			X
Hazardous Wastes or Solids		X	
Invasive, Nonnative Species			X
Environmental Justice		X	

3.1 General Setting

The LBM and LUL tracts described in this EA are located near the western edge of the Great Plains physiographic province within sight of the Bighorn Mountains. Surface drainage is from one ephemeral stream, which flows toward the Tongue River/Tongue River Reservoir. The Tongue River flows generally northeastward about 110 miles to its confluence with the Yellowstone River.

As shown on Figure 1-1, the LBM and LUL tracts are in the southeast corner of Big Horn County, Montana, about sixteen miles north of the Montana-Wyoming State line and about 32 miles northeast of Sheridan, Wyoming. Sheridan, Ranchester, and Dayton, Wyoming and Busby and Lame Deer, Montana are the only communities of appreciable size within a radius of about 50 miles. The Spring Creek Mine, which takes its name from the Spring Creek drainage, lies west of the Tongue River Reservoir. The SCCC mine area currently spans approximately 10.8 square miles (mi^2).

The LBM and LUL tracts consist primarily of the incised valley floors of Pearson Creek and its tributaries and adjacent relatively steep slopes, interspersed with flat benches. Elevations range from about 4,070 feet (ft) to 3,847 ft above mean sea level and slopes range from flat to 109 percent. The average slope within the LBM tract is approximately 14 percent and the average slope within the LUL tract is approximately 20 percent. Within the Spring Creek South RFD, the maximum elevation is approximately 4,295 feet and the lowest elevation is approximately 3,560 feet above mean sea level (MSL).

The climate within the tracts is semi-arid and characterized by cold winters, warm summers and a large variation in annual and seasonal precipitation and temperature. Wind, precipitation, and temperature patterns in the tracts are significantly affected by the mountain ranges to the west, especially by the nearby Bighorn Mountains.

Annual precipitation for the period 1950-2004 at the Decker station ranged from a low of 7.94 inches in 2002 to a high of 22.65 inches in 1975. Average annual precipitation was 11.79 inches. Approximately 45 percent of the annual precipitation falls in the 3-month period April through June. Nearly 30 percent falls as snow in the 6-month period October through March. The remainder generally occurs as summer thunderstorms, which are commonly accompanied by high winds and hail. Most flooding in the area occurs in response to high-intensity thunderstorms of comparatively short duration (BLM 1998).

During the winter months, more than 50 percent of the maximum possible sunshine reaches the land surface. Annually, 63 percent of the maximum possible sunshine reaches the land surface. The seasonal and daily variations between maximum and minimum temperatures are often extreme. Daily variations of 30° to 50° Fahrenheit (F) are common as a result of characteristic radiation. Temperatures at Sheridan range from -30° to 103°F while temperatures at Birney in the Tongue River Valley range from -45° to 107°F. Temperatures in the tracts probably lie between these extremes. The growing season usually lasts 100 to 130 days (BLM 1998).

Figure 3-1 illustrates the wind direction and percent of total for the directions. The figure shows prevailing wind directions coming from the northwest. Winds from the southwest quadrants are also detected. Based on the Meteorological Data Summary for SCCC, the average wind speed for 2005 was 7.4 miles per hour; however, velocities in excess of 25 miles per hour are common throughout the year (SCCC 2005). Hot, dry summer winds commonly blow and strong winds accompanying winter snow storms often cause drifting and ground blizzards.

3.2 Topography and Physiography

The SCCC Mine area is physiographically near the western edge of the Great Plains province. This province can be characterized as a plateau-like area that is interrupted in the western portion by mountainous uplifts separated from one another by structural basins, one of which is the Powder River Basin. The SCCC area is located near the northwest limb of the structural basin lying in the Tongue River Valley.

The Powder River Basin is a large structural depression that is bounded on the west by the Bighorn Mountains and Wolf Mountains, on the east by the Black Hills Uplift, and on the south by the Laramie Mountains, the Casper Arches and Hartville Uplift. The basin extends northward in Montana where it is separated from the Williston Basin by the Miles City Arch (Glass, 1976).

The LBM and LUL tracts are bisected by Pearson Creek and small, incised drainages that flow towards Pearson Creek. Numerous flat benches and bluff features are present in the tracts. Portions of Spring Creek, South Fork of Spring Creek, Pearson Creek, and Pond Creek drain the Spring Creek RFD. The Tongue River Reservoir lies down gradient of the tracts and the Spring Creek South RFD.

3.3 Geology, Mineral Resources, and Paleontology

3.3.1 General Geology

Information on the geology within the LBM and LUL tracts has been summarized from the following sources:

- Spring Creek Original Permit Application, Spring Creek Coal Company, Environmental Baseline Study, Volume 2.

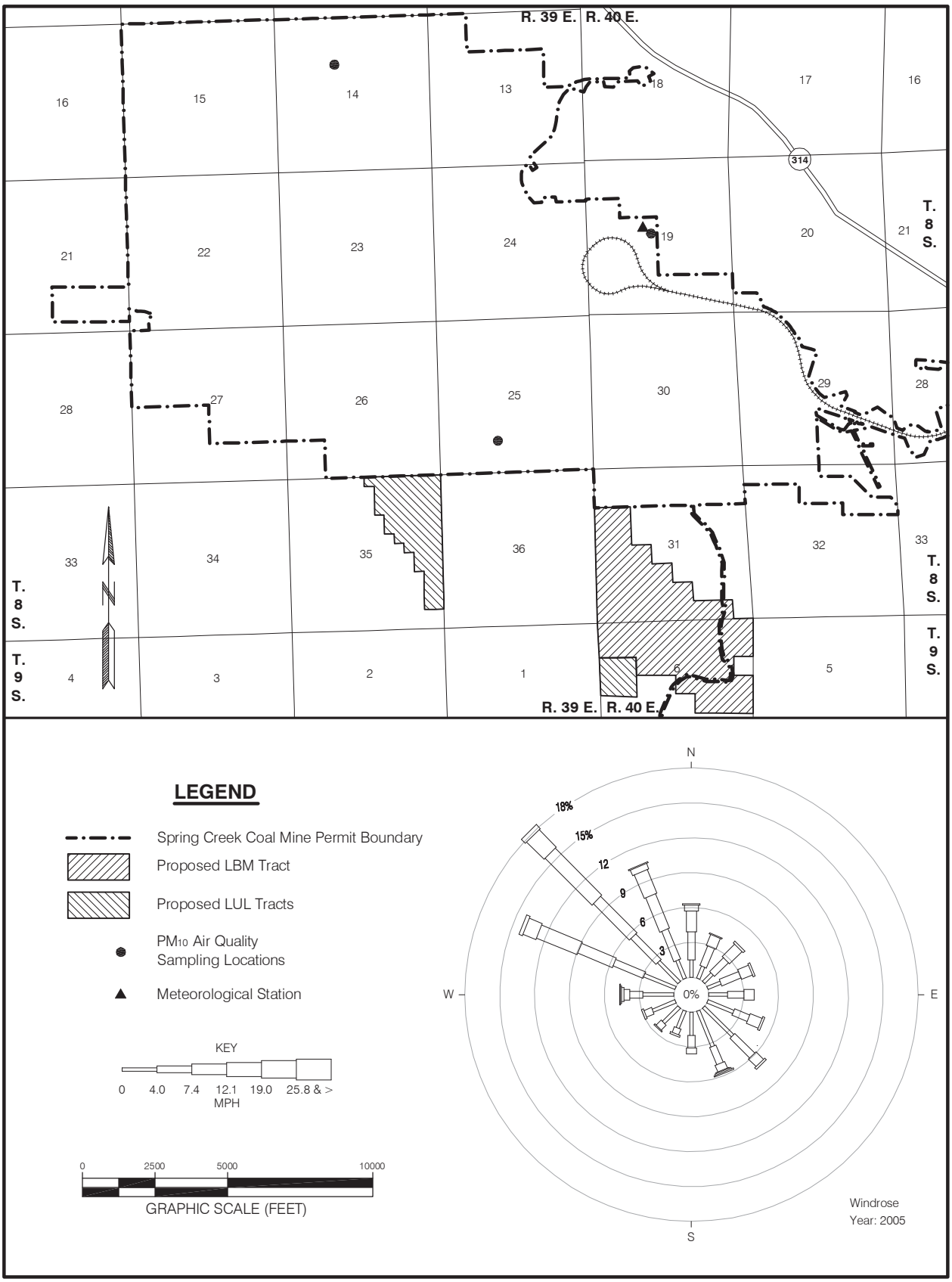


Figure 3-1. Wind Rose, Air Quality, and Meteorological Stations at the Spring Creek Coal Mine.

- Spring Creek 5-Year Permit Application, Spring Creek Coal Company, Volume 1, Rule 17.24.322, (SCCC 2001).
- Environmental Assessment and Powder River Resource Area Resource Management Plan Amendment for Spring Creek Coal Company's Lease by Application MTM 88405 and State of Montana Coal Lease Applications C-1099-XX and C-1101-XX, July 2000.
- EA for Spring Creek Coal Company's Lease by Application MTM 94378 – EA# MT-020-2007-34, November 2006.

The oldest coal deposit associated with the LBM tract is in the Paleocene age Fort Union Formation. At the SCCC Mine, this formation is approximately 3,400 feet thick in this vicinity and consists of interbedded sandstone, siltstone, shale and numerous thick to thin coal beds.

The Fort Union Formation is divided into three members including, in descending order, the Tongue River, Lebo Shale, and the Tullock Members. The thick coal beds occur in the upper 900 feet of the Tongue River Member, which consists of interbedded gray to cream-colored, fine-grained sandstone, sandy shale, siltstone, brownish-carbonaceous shale, thick clinker beds, and coal. Regionally, these beds are uncomplicated by post-depositional structural events and exhibit a slight, regional southeastward dip of less than 1 degree.

The Tongue River Member was deposited on floodplains of large rivers, in river and stream channels, or on deltas extending outward into swamps. The clastic beds tend to be lenticular in shape and limited in areal extent. As a result, the lithology of the rocks often changes over short distances, making it difficult to characterize the exact lithology of the overburden or the interburden for any great distances. A conspicuous rock type in the overburden is clinker, also called scoria or red shale. Clinker is formed by the natural burning of coal beds, the heat from which either bakes or fuses the overlying strata. The baked rock has a hard, brick like appearance and generally is characterized by extreme fracturing and consequent moderate to high permeability. Both baked and fused clinker are resistant rock types that cap many of the hills and ridges in the area and are easily recognized by the hummocky terrain and characteristic reddish color.

The most important geologic features affecting the flow and interaction of surface water and groundwater in the Spring Creek Mine area are the Spring Creek and Carbone faults. These northeast-trending normal faults have offset the coal-bearing strata, influence the distribution of clinker at the surface and therefore, the migration of surface water into and through the subsurface. The Carbone Fault, upthrown to the north, brought the A/D coal bed close enough to the surface that burning resulted in the loss of large quantities of coal north of the fault. Spring Creek and North Fork Spring Creek both traverse this extensive area of baked and fused collapse breccia, which absorbs all but the most intense precipitation that occurs upstream of the mine area. According to U.S. Geological Survey (USGS) mapping (Heffern, et al. 1993), the burn extends over 5 miles east of the mine area to the Tongue River Reservoir. Offset on the Carbone Fault ranges between 40 and 70 feet based on the relative offset between the base of the A/D coal and its burn on opposite sides of the fault. The Spring Creek Fault, downthrown on the north, has offset of between 170 and 220 feet in the local area. This places the A/D coal within the Pit 4 area (north of the Spring Creek Fault) adjacent to the Canyon coal bed south of the fault. Both of these faults are located over 1 mile northwest of the LBM and LUL areas.

3.3.2 Mineral Resources

The PRB contains large reserves of fossil fuels including coal, oil, and natural gas (from conventional reservoirs and from coal beds), all of which are currently being produced. In addition, uranium, bentonite, and scoria are mined in the PRB, (Montana Bureau of Mines and Geology (MBMG) 1963 and Wyoming State Geological Survey (WSGS) 2004).

Coal. Figure 3-2 depicts a generalized stratigraphic column of the LBM tract. This cross section is representative of the geology in the vicinity of the tract. Eight coal seams are generally found within the Fort Union Formation in the Tongue River area. Locally, these have been called (from youngest to oldest):

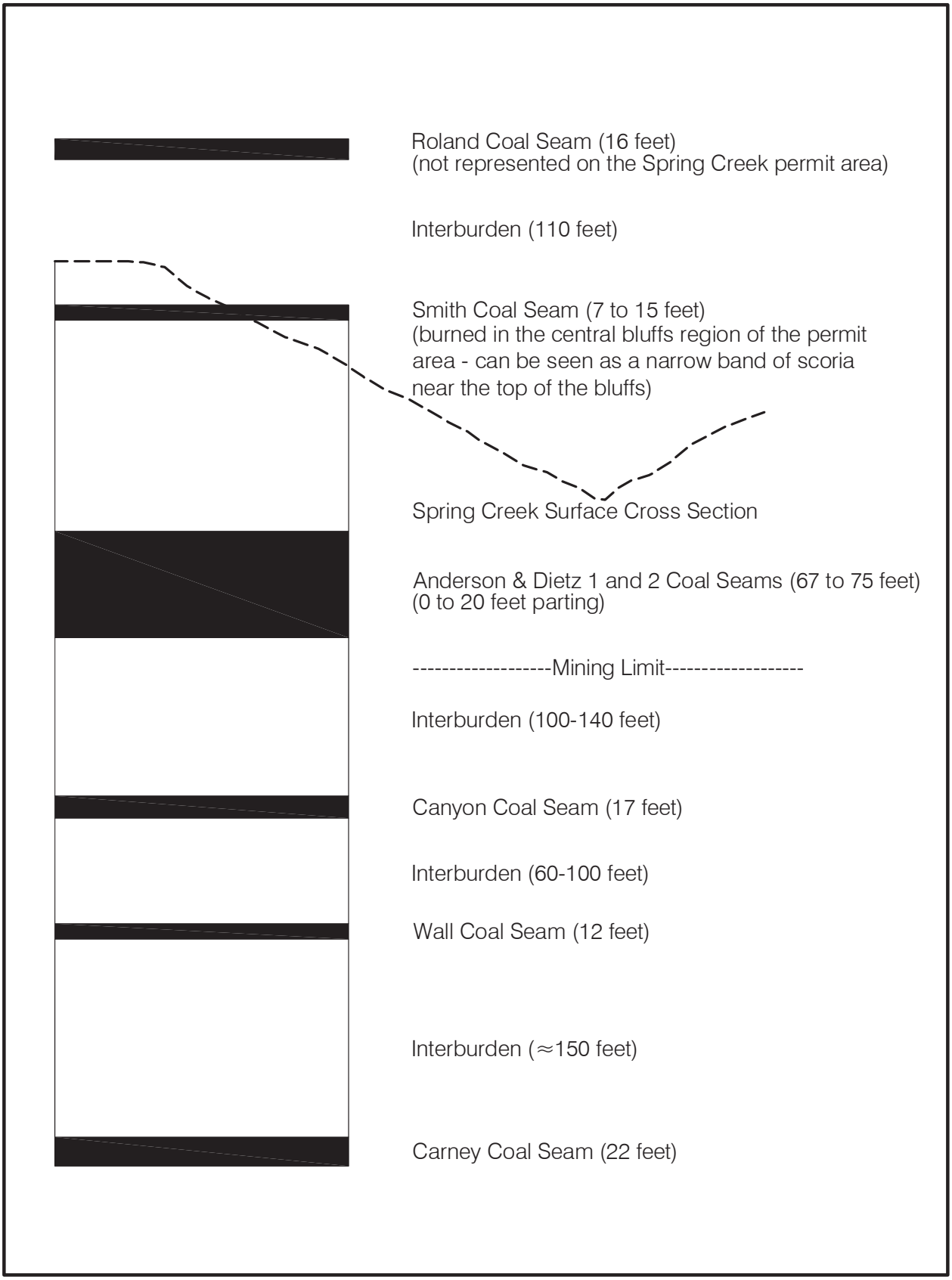


Figure 3-2. Generalized Stratigraphic Cross Section Through the Spring Creek Coal Mine Area.

Roland; Smith; Anderson; Dietz No. 1; Dietz No. 2; Canyon; Wall and Carney (D4 and D6). In the proposed lease areas, the Anderson, Dietz No. 1, and Dietz No. 2 are combined to form the Anderson-Dietz (A/D) seam. Only one seam, the A/D, is considered economically recoverable within the tract. The Roland and Smith beds are found only in high knobs throughout the Spring Creek study area. These beds are mostly burned in the area. The depth of the Canyon coal seam makes it uneconomical to mine (Cole & Sholes 1980). The A/D coal to be mined is a composite bed approximately 70 to 85 feet thick consisting of the combined beds. These beds were formed in the portion of the Decker Delta complex of Paleocene age Lake Lebo where little clastic sediment reached during peat accumulation (Ayers 1986). According to USGS mapping, the beds diverge east and west of the Spring Creek Mine area (Denson & Pierson 1991). Extensive clinker deposits at the surface north and east of the property indicate that the thick coal seam has burned near the outcrop (Heffern, et al. 1993).

The general physical characteristics of A/D coal are shown on Table 3-2. The A/D sub-bituminous coal seam is of high quality having low sulfur content and high British thermal units (Btu) values for the Great Plains. The stripping ratio is within the limits necessary for economic mining in western coal.

Table 3-2. Average Physical Characteristics of Anderson-Dietz Seam in the Area.

Parameter	**A/D**
BTU's per pound	9392
Sulfur	0.33 percent
Ash	3.8 percent
Range of Thickness	70 – 85'
Range of Depth	180' – 260'

Oil and Gas. There are no known reserves of conventional oil and gas in the areas proposed for project activity. Nearest production is from the Ash Creek Field about 10 miles southwest of the LBM and LUL tracts. Four oil and gas test holes were drilled in the vicinity of the SCCC Mine to depths of between 5,000 and 8,200 feet and all four holes were dry. Undiscovered reserves of oil and gas may underlie the SCCC Mine area at greater depths or in untested parts of the area, but the lack of successful exploration for these reserves makes this an unattractive area for that type of exploration.

CBNG occurs predominantly in the coal beds of the Fort Union and Wasatch Formations throughout the PRB. It has been commercially produced in the PRB since 1989 when production began at the Rawhide Butte Field, west of the Eagle Butte Mine in Campbell County, Wyoming (De Bruin and Lyman 1999). Exploration and development has been expanding rapidly since 1993 (Flores, et al. 2001) and began accelerating in 1997 (De Bruin, et al. 2001). In Wyoming portion of the PRB there were 12,082 producing wells in place, while 9,395 shut-in wells were waiting to go online as of October 2009 (WOGCC 2009). The predominant CBNG production to date in the Montana portion of the PRB has occurred from coal beds of the Wyodak-Anderson zone in the Anderson, D1, D2, Canyon and Carney (D4) seams, however each company uses its own nomenclature. These are the same (or equivalent) seams that are being mined along the western margin of the basin, including the Spring Creek Mine, the applicant for the proposed LBM and LUL tracts.

CBNG is being produced from other, deeper seams locally throughout the PRB. The nearest CBNG production is from the CX Field adjacent to and south of the LBM and LUL tracts. CBNG well completions in the area of the tracts to date have been within the Anderson, D1, D2, Canyon and Carney coal seams. Coal mining does not directly affect production of CBNG from coal seams below the D1 and D2; however, it does delay any proposed CBNG development in the deeper seams in order to avoid interference with mining. The location of the tracts so close to active mining likely reduces the potential for recovering CBNG from the D1 and D2 coal seams within the LBM and LUL tracts.

The assigned spacing for CBNG wells in this area is four wells per coal seam per quarter section (MBOGC Orders 108-1997 & 174-2000). Actual well spacing in the CX field is occurring at a spacing of two wells per quarter section (essentially 80 acre spacing), with one well being completed in all the productive coals (monobore completions). As such, a total of six CBNG wells could potentially be drilled within the boundary of the federal coal being considered for lease. As of September 2008, CBNG was not being produced on the LBM and LUL tracts.

The ownership of oil and gas resources, including CBNG, in the LBM and LUL tracts is discussed in Section 3.11 of this EA.

Bentonite. No mineable bentonite reserves have been identified on the LBM tracts.

Uranium. No known uranium reserves exist on the LBM and LUL tracts.

Scoria. Several small pits have been excavated locally for use on roads in the SCCC Mine area.

Paleontology

The sedimentary rocks exposed on the surface within the central portion of the PRB are the Eocene age Wasatch Formation and Paleocene age Fort Union Formation, both of which are known to contain fossil plant and animal remains. According to USGS mapping (Map I-1128), no Wasatch Formation occurs within the LBM or LUL tracts (Law, et al. 1979).

The Fort Union Formation contains fossils of plants, reptiles, fish, amphibians, and mammals. The principal paleontological fauna in the Tongue River Member of the Fort Union Formation is limited primarily to several species of molluskan (snail and clam) shells in thin beds. The lack of well-exposed rock outcrops contributes to the scarcity of vertebrate fossils, as does the low preservation potential of terrestrial fauna and conditions of deposition of the Fort Union Formation.

In contrast to the lack of fossil animal material, fossil plant material (leaves, wood spores and pollen) is common. The fossil plants inventoried are primarily leaves and fossilized wood. The leaves usually occur as carbonaceous impressions in sandstone and siltstone and as compact masses in shale. Leaves are the most abundant fossils found during paleontological surveys and are frequently encountered during mining operations. The fossilized wood often occurs near the top of a coal seam, in carbonaceous shale or within channel sandstone. Exposures of fossil logs are common, but usually very fragmentary. Like fossil leaves, fossil logs can be readily found in many areas of the PRB.

No significant or unique paleontological resource localities have been documented on federal lands in the tracts, and no specific mitigation has been recommended for paleontology and no additional paleontological work is recommended.

3.4 Air Quality

3.4.1 Background

The air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is strongly affected by local topography.

Air quality conditions in rural areas are likely to be very good, as they are characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations. However, the potential exists for localized pockets of high concentrations of PM_{10},

sulfur dioxide (SO_2), and nitrogen dioxide (NO_2), due to the large number of minor sources in the area (BLM 2005b).

Surface coal mining activities generate fugitive dust and particulate and gaseous tailpipe emissions from large mining equipment. Specifically, activities such as blasting, excavating, loading and hauling of overburden and coal, and wind erosion of disturbed and unreclaimed mining areas produce fugitive dust. Coal crushing, storage, and handling facilities are the most common stationary or point sources associated with surface coal mining and preparation. Particulate matter is the pollutant emitted from coal mine point sources, although small amounts of gaseous pollutants are emitted from small boilers and off-road diesel engines.

Blasting is also responsible for another type of emission from surface coal mining. Overburden and coal blasting sometimes produces gaseous, orange-colored clouds that contain NO_2. Exposure to NO_2 may have adverse health effects. NO_2 is one of several products resulting from the incomplete combustion of explosives used in the blasting process.

Other existing air pollutant emission sources within the region include:

- CO and nitrogen oxides (NO_X) from internal combustion engines used at natural gas and CBNG pipeline compressor stations;
- CO, NO_X, particulates (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) from gasoline and diesel vehicle tailpipe emissions;
- Particulate matter (dust) generated by vehicle travel on unpaved graded roads, agricultural activities such as plowing, and paved road sanding during the winter months, as well as windblown dust from neighboring areas;
- NO_2 and PM_{10} emissions from railroad locomotives used to haul coal;
- SO_2 and NO_X from power plants. The closest coal-fired power plants are the Colstrip plant, located about 56 miles north northeast of the LBM and LUL tracts, and the Hardin plant, located about 57 miles northwest of the LBM and LUL tracts;
- Air pollutants transported from emission sources located outside the PRB; and
- Ground level ozone (O_3) is not emitted directly into the air, but is created by chemical reactions between NO_X and VOCs in the presence of sunlight.

The basic regulatory framework that governs air quality in Montana is the Environmental Quality Act, the accompanying Air Quality Rules and Regulations (Montana Ambient Air Quality Standards [MAAQS]), and the Air Quality Bureau of the Montana Department of Health and Environmental Sciences approved by the Environmental Protection Agency (EPA) under the Clean Air Act. This regulatory framework includes state air quality standards, which must be at least as stringent as National Ambient Air Quality Standards (NAAQS), and allowable increments for the prevention of significant deterioration (PSD) of air quality. Table 3-3 lists the Montana and federal ambient air quality standards.

The program is designed to limit the incremental increase of specific air pollutants from major sources of air pollution above a legally defined baseline level, depending on the classification of a location. Table 3-4 presents the maximum allowable increases for Federal PSD. Class I and II areas located nearest to the tracts is listed in Table 3-5. Incremental increases in PSD Class I area is strictly limited; while increases allowed in Class II area is less strict. The project area and surrounding area is classified as PSD Class II. The closest PSD Class I area, the Northern Cheyenne Indian Reservation, lies approximately 16 miles northeast of the project. Figure 3-1 shows that this is not downwind from the prevailing wind direction.

States designate areas within their borders as being in “attainment” or “non-attainment” with the Ambient Air Quality Standards (AAQS). Since the tracts are near the border of Montana and Wyoming, the attainment status of nearby areas in both states is considered. The LBM and LUL tracts are in an area that is designated an attainment area for all pollutants. However, the town of Sheridan, Wyoming, located about 32 miles south of the project area, is a non-attainment area for particulates finer than 10 microns in effective diameter (PM_{10}).

The town of Lame Deer, Montana, located about 35 miles north, is also a non-attainment area for PM_{10}. The towns of Laurel and Billings, Montana, non-attainment areas for SO_2, are located about 90 miles northwest of the project area. None of these cities/towns are in line with prevailing winds (Figure 3-1). There are no non-attainment areas for particulates finer than 2.5 microns in effective diameter ($PM_{2.5}$) in southeastern Montana (MDEQ/ARM 2009a).

Table 3-3. Federal and Montana Ambient Air Quality Standards.

Emissions	Averaging Period	Montana Standard (MAAQS)	Federal Standard (NAAQS)
Carbon Monoxide (CO)	1-hour[a]	23 ppm[a]	35 ppm[a]
	8-hour[a]	9 ppm[a]	9 ppm[a]
Sulfur Dioxide (SO_2)	1-Hour	0.50 ppm[h]	--
	3-hour[a]	--	0.50 ppm[a]
	24-hour[a]	0.10 ppm[b,j]	0.14 ppm[a,i]
	annual	0.02 ppm[e]	0.03 ppm[d]
Nitrogen Oxide (NO_x)	1-Hour	0.30 ppm[b]	--
	annual	0.05 ppm[e]	0.053 ppm[d]
Hydrogen Sulfide	1-Hour	0.05 ppm[b]	--
Ozone (O_3)	1-hour[a]	0.10 ppm[b]	0.12 ppm[f]
	8-hour[a]	--	0.08 ppm[g]
PM_{10}	24-hour[a]	150 μg/m^3 [k]	150 μg/m^3 [k]
	annual	50 μg/m^3	--
$PM_{2.5}$	24-hour[a]	--	35 μg/m^3 [m]
	annual	--	15 μg/m^3 [n]
Visibility	annual	3 x 10^{-5}/m [e]	--
Lead (Pb)	90-Day	1.5 μg/m^3 [c]	1.5 μg/m^3 [c]

[a] Federal violation when exceeded more than once per year.
[b] State violation when exceeded more than once per year.
[c] Not to be exceeded (ever) for the averaging time period as described in the state and/or federal regulation.
[d] Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard.
[e] State violation when the annual arithmetic average exceeds the standard.
[f] Applies only to NA areas designated before the 8-hour standard was approved in July, 1997. Mt. has none.
[g] Federal violation when 3-year average of the annual 4th-highest daily max. 8-hour concentration exceeds standard.
[h] State violation when exceeded more than 18 times in any 12 consecutive months.
[i] Federal standard is based upon a calendar day (midnight to midnight).
[j] State standard is based upon 24-consecutive hours (rolling).
[k] State and federal violation when more than one expected exceedance per calendar year, averaged over 3-years.
[l] State and Federal violation when the 3-year average of the arithmetic means over a calendar year at each monitoring site exceed the standard.
[m] Federal violation when 3-year average of the 98th percentile values at each monitoring site exceed the standard.
[n] Federal violation when 3-year average of the spatially averaged calendar year means exceed the standard.

Table 3-4. Maximum Allowable Increases for Federal Prevention of Significant Deterioration of Air Quality.

		Maximum Allowable Increments of Deterioration ($\mu g/m^3$)		
Emission	**Averaging Time**	**Class I**	**Class II**	**Class III**
PM_{10}	Annual Geom. Mean	4	17	34
	24-hour	8	30	60
Sulfur Dioxide (SO_2)	Annual Arith. Mean	2	20	40
	24-hour [a]	5	91	182
	3-hour	25	512	700
Nitrogen Dioxide (NO_2)	Annual Arith. Mean	2.5	25	50

[a] Maximum allowable increment may be exceeded once per year at any receptor site.
Source: MDEQ/ARM (2009b).

Table 3-5. Approximate Distances and Directions from the Tract to PSD Class I and Class II Sensitive Receptor Areas.

Receptor Area	**Distance (miles)**	**Direction to Receptor**
Mandatory Federal PSD Class I		
Badlands Wilderness Area[1]	225	SE
Bridger Wilderness Area	184	SW
Fitzpatrick Wilderness Area	176	SW
Gates of the Mountain Wilderness Area	276	WNW
Grand Teton National Park	192	WSW
North Absaroka Wilderness Area	127	WSW
Red Rocks Lake Wilderness Area	242	W
Scapegoat Wilderness Area	309	NW
Teton Wilderness Area	156	WSW
Theodore Roosevelt National Park (North Unit)	232	NE
Theodore Roosevelt National Park (South Unit)	198	NE
U.L. Bend Wilderness Area	158	NNW
Washakie Wilderness Area	134	WSW
Wind Cave National Park	200	SE
Yellowstone National Park	153	W
Tribal Federal PSD Class I		
Fort Peck Indian Reservation	198	NNE
Northern Cheyenne Indian Reservation	16	N
Federal PSD Class II		
Absaroka-Beartooth Wilderness Area	137	W
Agate Fossil Beds National Monument	247	SE
Badlands National Park	225	SE
Bighorn Canyon National Recreation Area	62	W
Black Elk Wilderness Area	183	SE
Cloud Peak Wilderness Area	54	SSW

Table 3-5. Approximate Distances and Directions from the Tract to PSD Class I and Class II Sensitive Receptor Areas (Continued).

Receptor Area	Distance (miles)	Direction to Receptor
Federal PSD Class II		
Crow Indian Reservation	4	W
Devils Towner National Monument	116	ESE
Fort Belknap Indian Reservation	196	NNW
Fort Laramie National Historic Site	235	SSE
Jewel Cave National Monument	175	SE
Mount Rushmore National Memorial	190	SE
Popo Agie Wilderness Area	193	SSW
Soldier Creek Wilderness Area	258	SE

[1] The U.S. Congress designated the Wilderness Area portion of Badlands National Park as a mandatory Federal PSD Class I area. The remainder of Badlands National Park is a PSD Class II area.

3.4.2 Particulate Emissions

The federal standard for particulate matter pollutant was specified as total suspended particulates (TSP) until 1987. This measurement included all particulates generally less than 100 microns in diameter. In 1987, the form of the standard was changed from TSP to PM_{10} to better reflect human health effects. PM_{10} represents particulate matter with a mean aerodynamic diameter of 10 microns or less that can potentially penetrate into the lungs and cause health problems. In 1997, EPA set separate standards for fine particles (particulate matter with a mean aerodynamic diameter of 2.5 microns or less, or $PM_{2.5}$), based on their link to serious health problems. In 2006, EPA revised the air quality standards for particulate matter by tightening the 24-hour fine particle standard from the previous level of 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and revoking the annual PM_{10} standard of 50 $\mu g/m^3$. EPA retained the existing annual $PM_{2.5}$ standard of 15 $\mu g/m^3$ and the 24-hour PM_{10} standard of 150 $\mu g/m^3$. These revisions took effect on December 18, 2006.

Montana added PM_{10} based standards to match the federal standards in 1989 and Spring Creek Coal is currently utilizing the PM_{10} based standard to monitor particulate emissions. Montana's ambient air standards for PM_{10} and $PM_{2.5}$ are shown in Table 3-3.

Spring Creek has monitored particulate matter levels around the mine throughout the life of the operation. $PM_{2.5}$ is not monitored at the mine. The current air monitoring plan consists of four samplers at three sites that monitor concentrations of PM_{10} and a meteorological site (Figure 3-1). The annual PM_{10} (2003-2007) have ranged from 13.1 to 26.0 micrograms per cubic meter ($\mu g/m^3$). These concentrations ranged from about 26 to 52 percent of the annual standard of 50 $\mu g/m^3$. During the same time period, the maximum 24-hour concentrations have ranged from 1 to 110 $\mu g/m^3$. Thus, these maximum 24-hour concentrations have ranged from about 1 to 73 percent of the 24-hour standard of 150 $\mu g/m^3$ Montana Department of Environmental Quality/Air Resources Management Bureau (MDEQ/ARM) Permit #1120-08. Table 3-6 lists the current estimated particulate matter emissions for the Spring Creek mine.

3.4.3 Blasting Emissions

Blasting is responsible for another type of emission from surface coal mining. Overburden blasting sometimes produces gaseous, orange-colored clouds that contain NO_2. NO_2 is one of several products resulting from the incomplete combustion of explosives used in the blasting process. Exhaust emissions from large-scale mining equipment, other vehicle tailpipe emissions, emissions from compressor engines used in

Table 3-6. Estimated Particulate Matter (PM) and NOx Emissions Permitted – tons/year (tpy).

Mining Operation	PM10 Emission Factor Equation	Uncontrolled PM_{10} Emission Factor	Percent Control	PM10 Emission Rate (ton/year)
Topsoil dumping	625,656 yd3 * 0.01 lb/yd3 * 0.0005 lb/ton	0.01 lb/ton	0	3.13
OB drilling	18,861 holes drilled * 1.5 lb/hole * 0.0005 lb/ton	0.16 lb/hole	0	1.51
OB blasting	78 blasts * 18.75 lb/blast * 0.0005 lb/ton	18.75 lb/blast	0	0.73
OB removal (truck/shovel)	0.009 lb/yd3 * 20,318,561 yd3 * 0.0005 lb/ton	0.009 lb/yd3	0	92.64
OB truck travel	707,469 VMT * 3.6 lb/VMT * 0.0005 lb/ton * (1-0.85)	3.6 lb/VMT	85	191.02
OB removal (cast blast)	14,650,869yd3 * 0.009 lb/yd3 * 0.0005 lb/ton	0.009 lb/yd3	0	65.93
OB removal (dragline)	38,205,100 yd3 * 0.009 lb/yd3 * 0.0005 lb/ton	0.009 lb/yd3	0	171.92
Coal drilling	16,901 holes drilled * 0.028 lb/hole * 0.0005 lb/ton	0.028 lb/hole	0	0.24
Coal blasting	60 blasts * 13.125 lb/blast * 0.0005 lb/ton	13.125 lb/blast	0	0.39
Coal removal	24,000,000 tons * 0.005 lb/ton * 0.0005 lb/ton	0.005 lb/ton	0	60.00
Coal truck travel	606,208 VMT * 3.6 lb/VMT * 0.0005 lb/ton * (1-0.85)	3.6 lb/VMT	85	163.68
Coal dumping at conveyor	7,601,139 tons * 0.001 lb/ton * 0.0005 lb/ton	0.001 lb/ton	0	3.80
Coal dumping at truck dump	16,398,861 tons * 0.001 lb/ton * 0.0005 lb/ton * (1-0.90)	0.001 lb/ton	90	0.82
Water truck travel	40,320 VMT * 3.6 lb/VMT * 0.0005 lb/ton * (1-0.85)	3.6 lb/VMT	85	10.89
Wind erosion of open acres	1,250 acres * 0.19 ton/acre-year	0.19 ton/acre-year	0	237.50
Wind erosion of storage pile at conveyor	1 acre * 0.19 ton/acre-year	0.19 ton/acre-year	0	0.19
Wind erosion of storage pile at truck dump	1 acres * 0.19 ton/acre-year	0.19 ton/acre-year	0	0.19
Vehicle travel on paved access road	19,250 VMT * 1.08 lb/VMT * 0.0005 lb/ton * (1-0.85)	1.08 lb/VMT	85	1.56
Stoker loadout	80,000 tons * 0.1 lb/ton * 0.0005 lb/ton	0.1 lb/ton	0	4.00
Train loading at loadout #1	24,000,000 tons * 0.0059 lb/ton * 0.0005 lb/ton * (1-0.99)	0.0059 lb/ton	99	0.71
Train loading at loadout #2	24,000,000 tons * 0.0059 lb/ton * 0.0005 lb/ton * (1-0.99)	0.0059 lb/ton	99	0.71
Diesel fuel usage	5,290,802 gallons * 0.00785 lb/gallon * 0.0005 lb/ton	0.00785 lb/gal	0	20.77
Gasoline usage	120,000 gallons * 0.0126 lb/gallon * 0.0005 lb/ton	0.0126 lb/gal	0	0.76
Primary crusher at truck dump	24,000,000 tons * 0.006 lb/ton * 0.0005 lb/ton * (1-0.99)	0.006 lb/ton	99	0.49
Secondary crusher	24,000,000 tons * 0.006 lb/ton * 0.0005 lb/ton * (1-0.99)	0.006 lb/ton	99	0.49
Primary crusher at conveyor	7,601,139 tons * 0.006 lb/ton * 0.0005 lb/ton * (1-0.99)	0.006 lb/ton	99	0.23
Total				**1,038.84**

Mining Operation	NOx Emission Factor Equation	NOx Emission Factor	NOx Emission Rate (ton/year)
Explosives on coal	3,498 tons explosives * 17 lb/ton * 0.0005 lb/ton	17 lb/ton	29.73
Explosives on OB	20,987 tons explosives * 17 lb/ton * 0.0005 lb/ton	17 lb/ton	178.39
Vehicle exhaust (diesel)	2,727,872 gallons * 0.286 lb/gallon * 0.0005 lb/ton	0.286 lb/gal	390.09
Vehicle exhaust (gasoline)	50,000 gallons * 0.205 lb/gallon * 0.0005 lb/ton	0.205 lb/gal	5.13
Total			**603.33**

the production of natural gas, emissions from railroad locomotives, and coal-fired power plants emissions all contain NO_x.

Mine operators in the eastern PRB have been working with blasting agent manufacturers to reduce NO_2 emissions by changing the size of the blasts and using different blasting agents, mixtures, and additives. Operators have tried adding substances like microspheres and rice hulls, using different blends of ammonium nitrate fuel oil (ANFO) and slurries and gels, using electronic detonation systems that can vary shot timing, different shot hole patterns, and using plastic liners within the shot holes. No one single procedure or variation has proven consistently successful due to the numerous factors that are believed to contribute to the production of NO_2. The most successful control measure has been reducing the size of the cast blasting shots. (Emme 2003; Chancellor 2003).

3.4.4 Emission Control Techniques

The following list contains the required emission control technologies and techniques employed by SCCC:

- The above ground conveyor sides and roof are enclosed by metal siding. The conveyor floor is partially enclosed by stairs or walkways and the remaining space is covered by expanded metal.
- The truck dump pit is enclosed on two sides, a partial third, and the top. The opening faces the prevailing wind direction. A dust suppression system is installed at the top of the truck dump hopper to suppress dust as the trucks are unloaded. The sprays provide a curtain across the top of the hopper to contain the dust generated by falling coal. Overhead sprays are used to control dust near the bed level of the trucks as they dump. Dust suppression systems work only when coal is being loaded on an as-necessary basis. Such systems are to be designed for year-round use.
- An Agglomeration Dust Suppression (ADS) system is used to control dust during the primary crusher's operations. The ADS system is also used at strategic points in the primary crusher.
- An ADS system is used to control dust during the secondary crusher's operations. The ADS system is also used at strategic points in the secondary crusher.
- An ADS system is used to collect dust during the loading of the 200-ton silo load-out bin. A baghouse shall be used to control dust during the loading of the 400-ton load-out bin. Telescoping chutes are used during railcar loading. A combination of an ADS system and a Passive Emission Control (PEC) system is used to control emissions from the transfer of coal onto belt conveyor #5. Telescoping chutes is used during railcar loading.
- The in-pit crusher emissions are controlled by a combination of an ADS system and a PEC system.
- The 40,000-ton coal storage pile is completely enclosed in a storage barn. The coal storage barn stacker is designed to minimize the free fall distance of the coal, thus helping to minimize the creation of coal dust. An open coal stockpile may be maintained adjacent to the truck dump for blending purposes.
- Best Management Practice is defined as the minimization of fall distance of coal and overburden into the trucks.
- Blasting is conducted in such a manner as to prevent overshooting and to minimize the area to be blasted.
- Wind erosion is controlled by the use of temporary vegetative covers.
- Fugitive dust from haul roads is controlled by a combination of chemical dust suppressants and road watering.
- Haul roads are graded as required. Loose debris is removed from haul roads. Chemical dust suppressants are reapplied as required.
- Reclamation of reclaimed surface begins within one growing season.
- The paved mine access road is approximately 13,300 feet long. The road is maintained by Spring Creek.
- The conveyor is covered. The drop distance is minimized at the one transfer point in the system. ADS system and a PEC system are used at the in-pit truck dump/crusher and the transfer point from the buffer conveyor to the overland conveyor.
- The emissions from the Coal Quality Analytical Laboratory are controlled by a baghouse. Approximately 80 tons of coal per year will be crushed and analyzed at the laboratory.

- The lump operation, located at the truck dump, has a reject conveyor, which places the incorrectly sized product back in the truck dump. This operation processes, over a 3-year average, approximately 13,800 tons per year, with a 60 percent reject tonnage. The remaining 40 percent is transported via trucks to the predefined customer. Emissions from the reject product are controlled by the truck dump suppression system.

The application of these measures have contributed to the maintenance of existing air quality standards. By continuing the use of these and other improved practices SCCC mine will continue to meet air quality standards.

The various motor vehicles used in mining, transportation of coal and people, agricultural operations, and wind erosion from exposed areas, also produce carbon monoxide, nitrogen oxides, sulfur oxides, volatile organic compounds, and by secondary processes, ozone at the SCCC mine area. These gaseous pollutants are not required to be monitored by the mines since the mines are not considered major emitters of these pollutants.

3.4.5 Visibility

Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. $PM_{2.5}$ particulates are the main cause of visibility impairment. Potential impacts to visibility were considered at 29 PSD Class I and sensitive Class II areas in the vicinity of the PRB. Table 3-5 shows the nearest distances from the sensitive receptor areas to the LBM and LUL tracts.

Visibility impairment is expressed in terms of deciview (dv). The dv index was developed as a linear perceived visual change (Pitchford and Malm 1994), and is the unit of measure used in the EPA's Regional Haze Rule to achieve the National Visibility Goal. A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment. Figure 3-3 shows annual averages for the 20 percent best, worst, and middle visibility days at Badlands and Bridger Wilderness Areas from 1988 to 1998, respectively (Interagency Monitoring of Protected Environments (IMPROVE) 2002)[2].

3.4.6 Acidification of Lakes

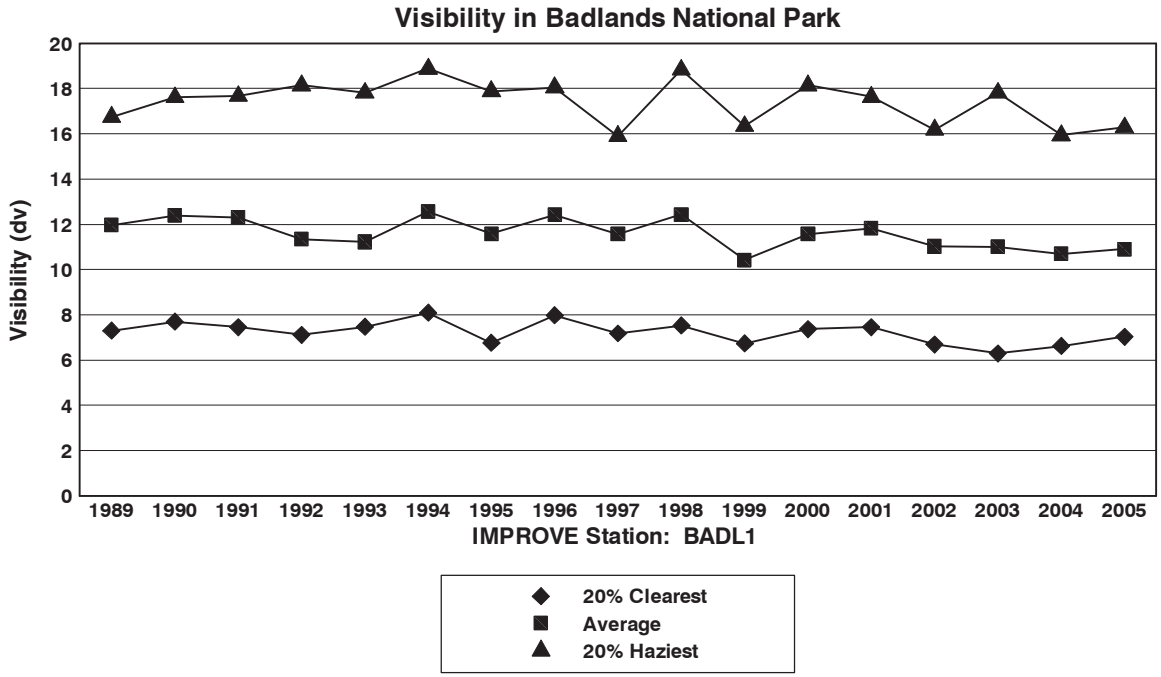
The acidification of lakes and streams is caused by atmospheric deposition of pollutants (acid rain). Lake acidification is expressed as the change in acidification neutralization capacity (ANC) measured in microequivalents per liter (μeq/L), the lake's capacity to resist acidification from acid rain. Table 3-7 shows the existing ANC monitored in some mountain lakes.

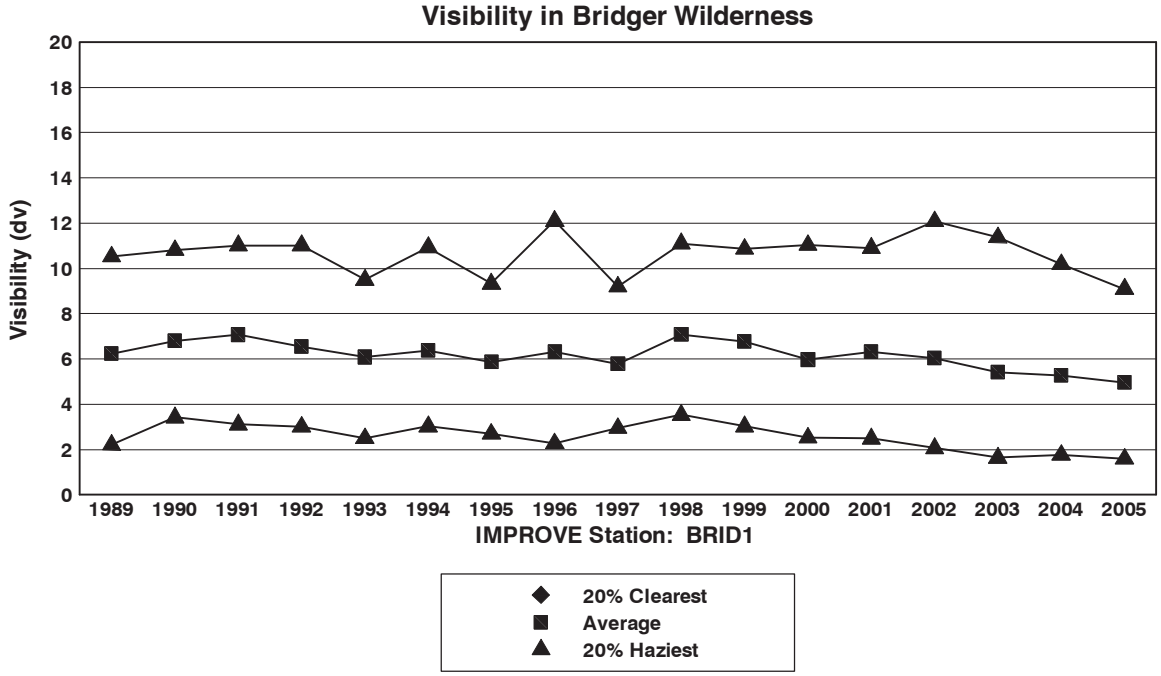
3.5 Water Resources

3.5.1 Groundwater

There are four major shallow geologic units in the proposed LBM and LUL tracts and Spring Creek South RFD containing groundwater that could be impacted by coal mining. These shallow units are the Quaternary alluvium, the clinker (scoria or burn), overburden, and the A/D coal seam.

[2] Summaries are based on IMPROVE aerosol data using procedures from the EPA *Draft Guidance for Tracking Progress under the Regional Haze Rule*.





Source: IMPROVE (2007)

Figure 3-3. Visibility in the Badlands and Bridger Wilderness Area.

Table 3-7. Existing Acid Neutralizing Capacity in Sensitive Lakes.

Wilderness Area	Lake	Background ANC (µeq/L)	Distance from General Analysis Area (miles)
Bridger	Black Joe	69.0	240
	Deep	61.0	230
	Hobbs	68.0	245
	Upper Frozen	5.8[1]	250
Cloud Peak	Emerald	55.3	105
	Florence	32.7	95
Fitzpatrick	Ross	61.4	240
Popo Agie	Lower Saddlebag	55.5	230

[1]The background ANC is based on only six samples taken between 1997 and 2001.
Source: Argonne (2002)

The coal seam aquifer is the most predictable source of groundwater due to its areal continuity. The coal bed aquifer is sufficiently permeable to yield the small amounts of water required for domestic and livestock use from wells. In this area, the seam has sufficient hydrostatic head to raise the water levels above the top of the coal.

The alluvium and clinker are the most permeable geologic units in the SCCC Mine area and allow higher individual well yields. Water supplies obtained from the alluvium and clinker are utilized less due to the limited areal extent of these water-bearing units.

Water quality is highly variable depending on the aquifer from which it is obtained. The dominant ionic constituents within the coal waters are sodium and bicarbonate. The average total dissolved solids (TDS) concentration in the A/D coal aquifer (from 17 wells monitored in 2003) was recorded at approximately 2,411 milligrams per liter (mg/L). As the groundwater moves downward through the overburden and into the coalbed aquifers the water becomes less mineralized, which is due mainly to cation exchange (softening and sulfate reduction) mechanisms. The quality of groundwater from the A/D coal seam is generally suitable for domestic and livestock purposes; however due to the high SAR (between 1.9 and 50.4), only crops with high salt tolerance can be irrigated with water directly from the A/D coal seam (SCCC 2003).

Water quality in the alluvium of ephemeral drainages in the area is variable but typically poor and of sodium-magnesium sulfate chemistry. Historic monitoring of Spring Creek alluvium indicates the TDS concentrations typically range between 2,000 and 4,000 mg/L (SCCC 2003). This water is unsuitable for domestic use and only crops with high salt tolerance can be irrigated with alluvial water. Alluvial groundwater in the area is generally suitable for livestock consumption.

Water from the clinker is highly variable in quality depending on its source of recharge. At the Spring Creek Mine area, the clinker is generally recharged by overland runoff. The dominant ionic constituents in the clinker aquifer are calcium, magnesium, and sulfate. Recent data from one clinker well in the Spring Creek Mine area indicate the median TDS concentration is approximately 787 mg/L (SCCC 2003). The water from the clinker is generally suitable for domestic livestock and irrigation purposes.

The A/D coal aquifer, which subcrops beneath the Tongue River Reservoir, receives recharge in the uplands to the west of the LBM and LUL tracts, flows downdip to the east and south, and discharges into the Tongue River Reservoir at the subcrop. During periods of high water levels in the reservoir, flow may be locally reversed with water from the reservoir moving back into the coal aquifer.

3.5.2 Surface Water

The general hydrologic setting of the SCCC mine area is discussed in the Spring Creek Mine permit document (SCCC 2001). Information on surface water is summarized in the Final Technical Examination & Environmental Assessment (TEEA) (BLM 1979).

The proposed LBM and LUL tracts and Spring Creek South RFD are located within the Pearson Creek and Spring Creek watersheds. Pearson Creek and Spring Creek are ephemeral tributaries of the Tongue River watershed. The main surface water features within and adjacent to the area proposed for mining activities include the Tongue River Reservoir, North Fork Spring Creek, South Fork Spring Creek, Spring Creek, and Pearson Creek. The ephemeral stream channels within the Spring Creek Mine area convey runoff and transport sediment loads based on the magnitude of the runoff event.

Streamflow in the Spring Creek drainage basin is ephemeral, occurring only in direct response to rainfall or snowmelt runoff events. Snowmelt runoff events can last for several days or more but rarely have large peak flows. Most of the peak annual flow events occur during the late spring and summer as a result of precipitation events.

Table 3-8 presents a summary of the surface water flow monitoring data recorded at Spring Creek Mine surface water monitoring sites. A mean annual runoff of 39.79 acre-ft/year for Station RS-2 on Spring Creek and 47.82 acre ft/year at Station RS-5 on South Fork Spring Creek was obtained after review of the historical streamflow records.

Table 3-8. Surface Water Flow Summary.

Station	Discharge			Period of Record	Number of Flow Events
	Mean (cfs[1])	Instantaneous Max (cfs)	Min Dailey (cfs)		
RS-2*	0.055	48.65	0.00	5/9/75-12/31/06	147
RS-5	0.066	101.00	0.00	3/10/76-6/19/08	134
RS-7	0.027	37.72	0.00	6/1/79-6/16/07	221
CB-1	0.009	5.04	0.00	8/16/96-11/15/01	161
CB-2	0.048	93.3	0.00	8/26/96-9/30/07	19
CS-1	0.005	38.10	0.00	5/25/79-12/17/01	57
CS-2	0.037	50.0	0.00	10/1/90-2/21/07	9
CS-3	0.064	50.0	0.00	10/1/90-1/13/99	8

[1] Cubic feet per second
* DCC operates and maintains this gaging station

The contributing drainage to Pearson Creek is approximately 9.9 mi^2 with an estimated annual runoff of 90 acre ft/year (BLM 2000).

The surface water quality varies with stream flow rate; the higher the flow rate, the lower the TDS concentration but the higher the suspended solids concentration. Due to the flow fluctuations in South Fork of Spring Creek and Pearson Creek, the surface water quality is usually unsuitable for domestic use and suitable for irrigation and livestock use (SCCC unpublished data and BLM 2006b). The surface water constituents that generally limit the suitability of these drainage waters are TDS and sulfate concentrations.

The flows of Spring Creek and its North and South Forks are currently detained in flood control reservoirs located upstream from the mining operation in order to keep the runoff out of the Spring Creek Mine pits. Pearson Creek flow is not currently detained by SCCC but flows have been substantially altered by a man-

made diversion and impoundment associated with the West Pit of the Decker Mine. These flood controls have been in place for several years, effectively cutting off Spring Creek and Pearson Creek flows upstream of the Tongue River.

Drainage basin and channel characteristics of the various channels in the Spring Creek Mine area are discussed in the baseline documents. Surface water runoff estimating techniques have varied over the years. Peak discharges are generally computed from precipitation frequency-duration values and watershed characteristics using some form of the SCS triangular hydrograph technique.

Surface water inflow to the Tongue River Reservoir is largely from snowmelt runoff that originates from the nearby Bighorn Mountains. The major stream carrying surface runoff to the Tongue River Reservoir is the Tongue River, which contributes approximately 98 percent of all inflow to the reservoir. The Tongue River and the Tongue River Reservoir are listed on the 2008 MDEQ 303 list of impaired waterbodies with one or more beneficial uses listed as impaired and a total maximum daily load (TMDL) is required (MDEQ 2008). The reach of the Tongue River from the Tongue River Dam to Prairie Dog Creek is listed as fully supporting the beneficial uses for agricultural, drinking water, and industrial uses and not supporting the beneficial uses for aquatic life and cold water fisheries with the probable causes listed as low flow alterations. The probable sources are listed as impacts from hydrostructure flow regulation/modification, irrigated crop production, and streambank modifications/destabilization.

The Tongue River Reservoir is listed as not supporting the beneficial uses for aquatic life and cold water fisheries with the probable causes listed as chlorophyll-a dissolved oxygen, and solids (suspended/bedload). The probable sources listed are irrigated crop production and municipal point source discharges (MDEQ 2008).

The quality of the water in the reservoir and the Tongue River immediately downstream from the Tongue River dam is generally good and meets suitability standards for drinking, culinary, and food processing after conventional treatment such as coagulation, sedimentation, filtration and disinfection. Average sulfate and TDS concentrations of 205 mg/L and 440 mg/L, respectively, were recorded at the Tongue River Reservoir dam (BLM 1998). The reservoir is used primarily for water storage for irrigation along the Tongue River valley in Montana.

3.6 Alluvial Valley Floors

The provisions of SMCRA include specific prohibition from mining certain alluvial valley floors (AVFs), stringent reclamation standards for those AVFs not prohibited from mining, and requirements that mining operations not materially damage the hydrologic function of any AVFs that would otherwise be prohibited from mining.

Two possible AVFs, Spring Creek and South Fork Spring Creek, were investigated in 1980 to determine their AVF status (Volume 1, Section 17.24.325, SCCC 2001). Spring Creek was found not to be an AVF but approximately 90 acres of AVF were delineated on South Fork Spring Creek were found to be an AVF that is insignificant to agriculture (Figure 3-4). Much of the South Fork Spring Creek AVF has already been disturbed, as approved in the current permit document. Hydrologic investigations of valley fill deposits of Spring Creek since 1979 and on North Fork Spring Creek since 1993 within the Pit 4 area were conducted by SCCC to assess whether these ephemeral streams meet the definitions of an AVF (Volume 1, Section17.24.325, SCCC 2001). Based on the results of these investigations, the previously unsurveyed portions of Spring Creek and North Fork Spring Creek were found not to be AVFs.

There are no unconsolidated stream laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities within the LBM and LUL tracts or the Spring Creek South RFD; therefore, no AVFs have been delineated within the tracts disturbance area or the Spring Creek South RFD.

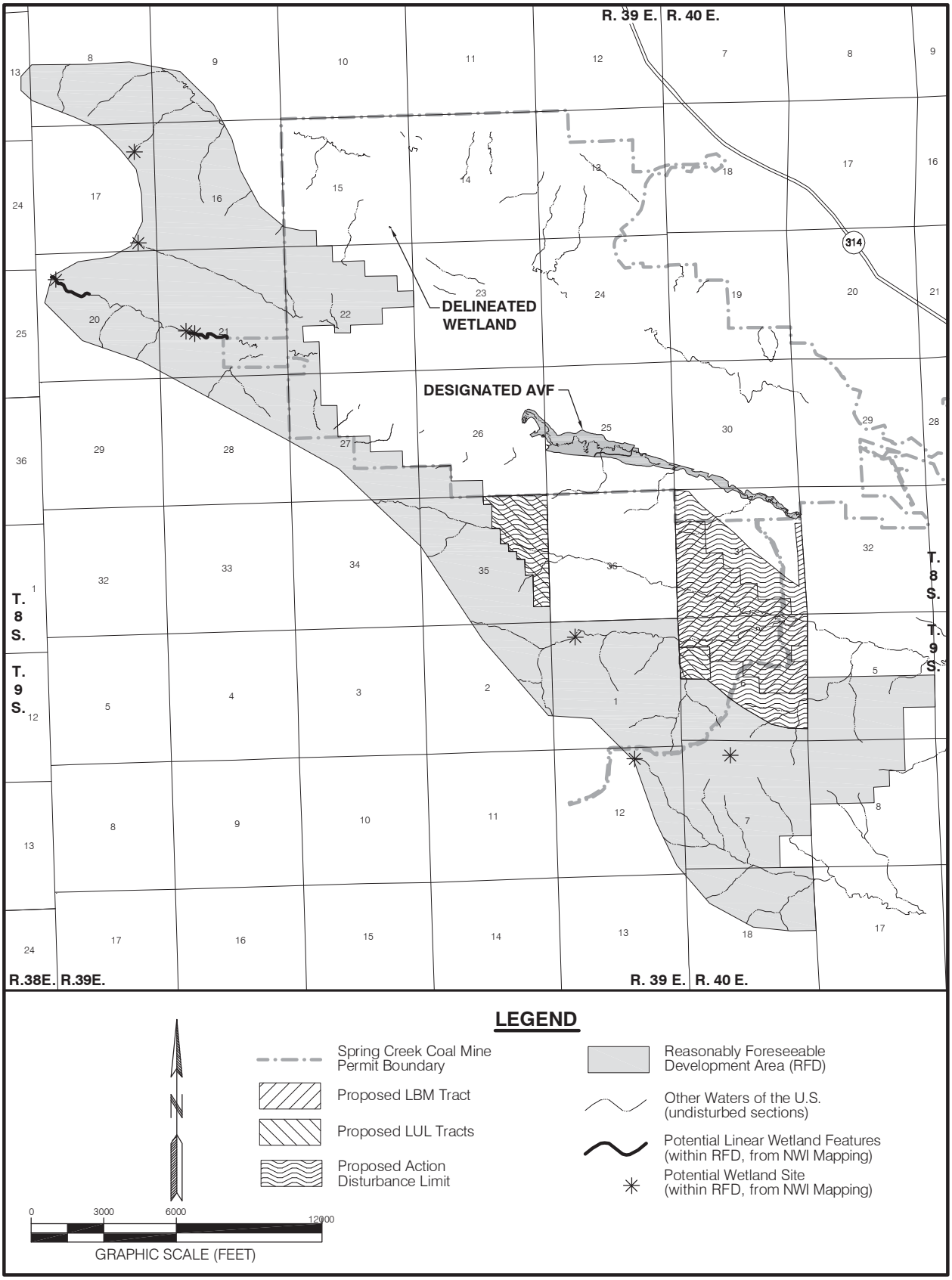


Figure 3-4. Delineated Wetlands and Designated AVF's Associated with the Proposed LBM and LUL Tracts and RFD Area.

3.7 Wetlands

Wetlands are considered sensitive and valuable resources. According to Appendix L2 of the Spring Creek Mine permit document (SCCC 2001), two jurisdictional wetlands areas that require mitigation have been delineated and verified by the U.S. Army Corps of Engineers (COE) within the SCCC permit boundary (Figure 3-4). The entire LBM and LUL areas have recently been surveyed for wetlands. National Wetland Inventory (NWI) wetlands mapping indicates two potential areas of wetlands on Pearson Creek within and adjacent to the areas.

No potential jurisdictional wetlands were identified during field surveys of the LBM and LUL tracts. The NWI mapped areas were associated with old stock ponds and these areas did not have wetlands soils or hydrology when investigated for wetlands. The two jurisdictional wetlands within the SCCC permit boundary cover approximately 0.32 acres. Approximately 72.5 acres of non-jurisdictional other waters of the U.S. were delineated in 1997 within the SCCC permit boundary. There are approximately 1 and 2.4 acres of non-jurisdictional other waters of the U.S. within the LBM and LUL, respectively (Figure 3-4). Although the entire RFD has not been surveyed for wetlands, NWI mapping indicates that there are 10 potential wetland sites within the area (Figure 3-4).

3.8 Soils

Soil series and soil taxonomy descriptions have changed since soil data were collected for the original permit and subsequent revisions. Mapped soils in the tracts are shown on Figures 3-5 and 3-6.

With the addition of the proposed LBM and LUL tracts, the entire Spring Creek life-of-mine disturbance area will be about 5,536 acres. Approximately 1,017 additional acres of soils resource would be disturbed in the area proposed for mining activities under the Proposed Action (498 acres within the LBM tract, 322 acres of associated disturbance adjacent to the LBM tract, and 197 acres within the LUL tracts) (Table 2-1).

The LBM and LUL tracts do not contain areas considered prime farmland. One map unit (42B) fits the criteria for prime farmland if irrigated. Cultivation has not been historically practiced in this area and no reasonable sources of irrigation water are currently available.

No soils in the LBM and LUL disturbance areas have been designated as “unique” farmland. According to soils information from the Soil Survey of Big Horn County Area, Montana (Meshnick, et al. 1977), one soil mapping unit (Re - as mapped by the Natural Resources Conservation Service) within the proposed disturbance areas of the LBM and LUL tracts and two soil units (Cz and Re) within the Spring Creek South RFD have been specified as potential “farmland of statewide importance”. Farmland of statewide importance generally includes “areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods” (USDA 2009). Approximately 109 acres of the Re soil mapping unit occur within the LBM and LUL tracts. The LBM, LUL, and RFD areas have not been historically treated and managed according to acceptable farming methods and no reasonable sources of irrigation water are currently available.

3.9 Vegetation

Vegetation community type mapping studies of the LBM and LUL tracts were completed by SCCC (SCCC 2008a). The plant communities present in the tracts are representative of the Montana Mixed Prairie Association. There are 19 primary vegetation community types or map units found within the application disturbance areas:

- Agropyron smithii c.t.
- Agropyron smithii – Bromus japonicus
- Andropogon hallii

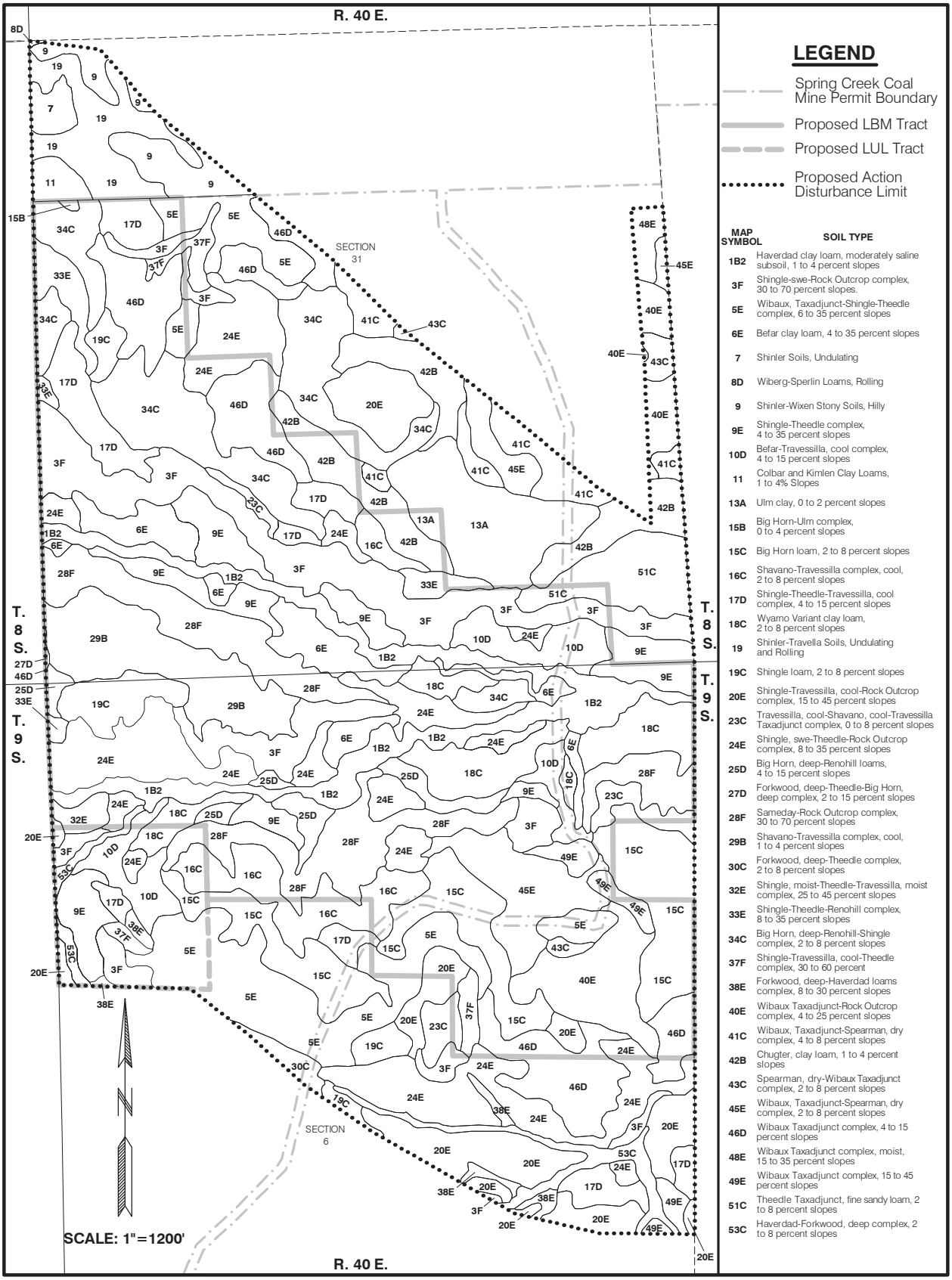


Figure 3-5. Soil Mapping Units Within the Proposed Action Disturbance Limit.

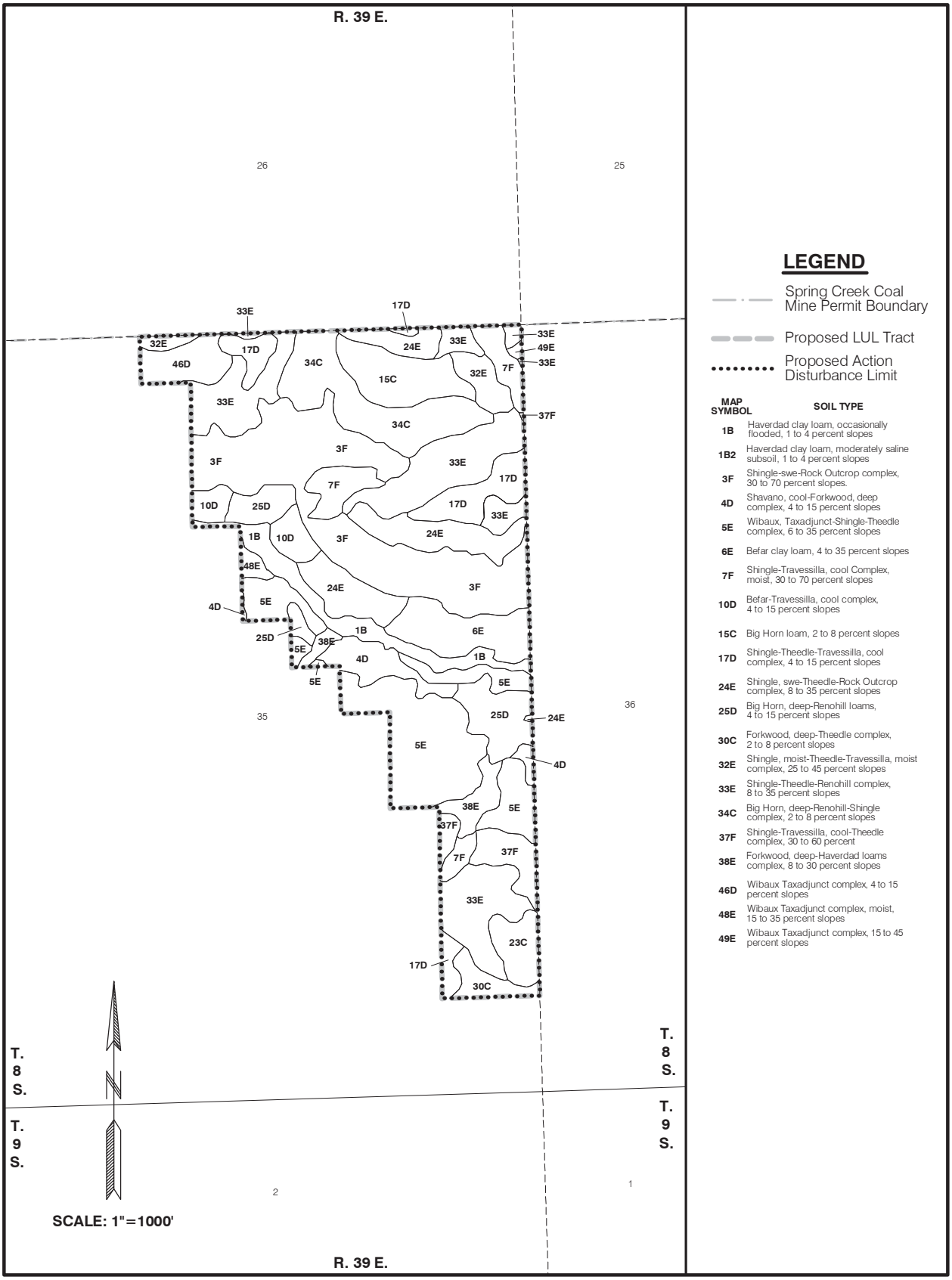


Figure 3-6. Soil Mapping Units Within the Proposed Action Disturbance Limit.

- Artemisia cana c.t.Artemisia tridentata/Agropyron smithii, c.t.
- Artemisia tridentata/Agropyron spicatum
- Artemisia tridentata/Agropyron cristatum
- Atriplex confertifolia
- Bromus japonicus
- Ceratoides lanata
- Rhus trilobata c.t.
- Sarcobatus vermiculatus
- Stipa comata c.t.
- Coal Bed Methane Disturbance
- Drainage Bottom
- Shallow shaley type
- Pine-Juniper c.t., open-canopy phase
- Pine-Juniper c.t., closed-canopy phase
- Grass, half-shrub, forb type

The vegetation communities within LBM and LUL disturbance areas are shown on Figures 3-7 and 3-8.

With the addition of the proposed tracts, the entire Spring Creek life-of-mine disturbance area will be about 5,536 acres. Approximately 1,017 additional acres of vegetation resource would be disturbed in the area proposed for mining activities under the Proposed Action (498 acres within the LBM tract, 197 acres within the LUL tracts, and 322 acres of associated disturbance adjacent to the LBM tract) (Table 2-1).

Sites with sparse vegetative cover and impeded soil drainages exist within the tracts; thus, erosional problems do occur. Saline-alkali soils in the area can limit forage productivity and restrict vegetation to saline-tolerant species. These factors and others related to past grazing use attribute to overall livestock carrying capacities of approximately 60 acres per animal unit (AU) per year, depending on the site.

No crop lands are located within the LBM and LUL disturbance areas or the Spring Creek South RFD.

Surveys for threatened and endangered (T&E) plant species have been performed for the Spring Creek Mine area. No T&E plant species (including Ute Ladies' Tresses) were located within the vicinity of the LBM and LUL tracts. The entire RFD area has not been surveyed for Ute Ladies Tresses.

A representative species list of the Montana Natural Heritage Program (MNHP) – 2008 Plant Species of Concern (MNHP 2008) is included in Appendix C. One vegetative species of concern was recorded during the 2006-2007 vegetation surveys for Pearson Creek. Barr's milkvetch (*Astragalus barrii*) has been identified as occurring in the area. Barr's milkvetch is listed as sensitive under the BLM classification. Barr's milkvetch has a S3 state rank (potentially at risk because of limited range, population and/or habitat). The 2006-2007 vegetation surveys indicated that Barr's milkvetch was broadly distributed, if not abundant, within the Project Area. Two other S1 ranked species (at high risk because of extremely limited and/or rapidly declining population numbers, range and/or habitat) have been observed in southeastern Montana. The woolly twinpod (*Physaria didymocarpa var. lanata*) and Nuttall desert-parsley (*Lomatium nuttallii*) have not been observed in the Spring Creek area.

Two subspecies and one variety of very common species collected within the Spring Creek area are listed by MNHP as species of concern: limestone larkspur (*Delphinium bicolor* ssp. *Calcicola*), ballhead gilia (*Ipomopsis congesta* ssp. *Crebrifolia*), and hares-foot locoweed *Oxytropis lagopus* var. *conjugens*. Generic *Delphinium bicolor* is sparingly present in the study area. The unusual subspecies is a calciphyte (common name: limestone larkspur) and can be ruled out at Pearson Creek (SCCC 2008a). *Ipomopsis congesta* is common in the Pearson Creek area in the SS type and on eroding, somewhat sandy substrates. *Ipomopsis*

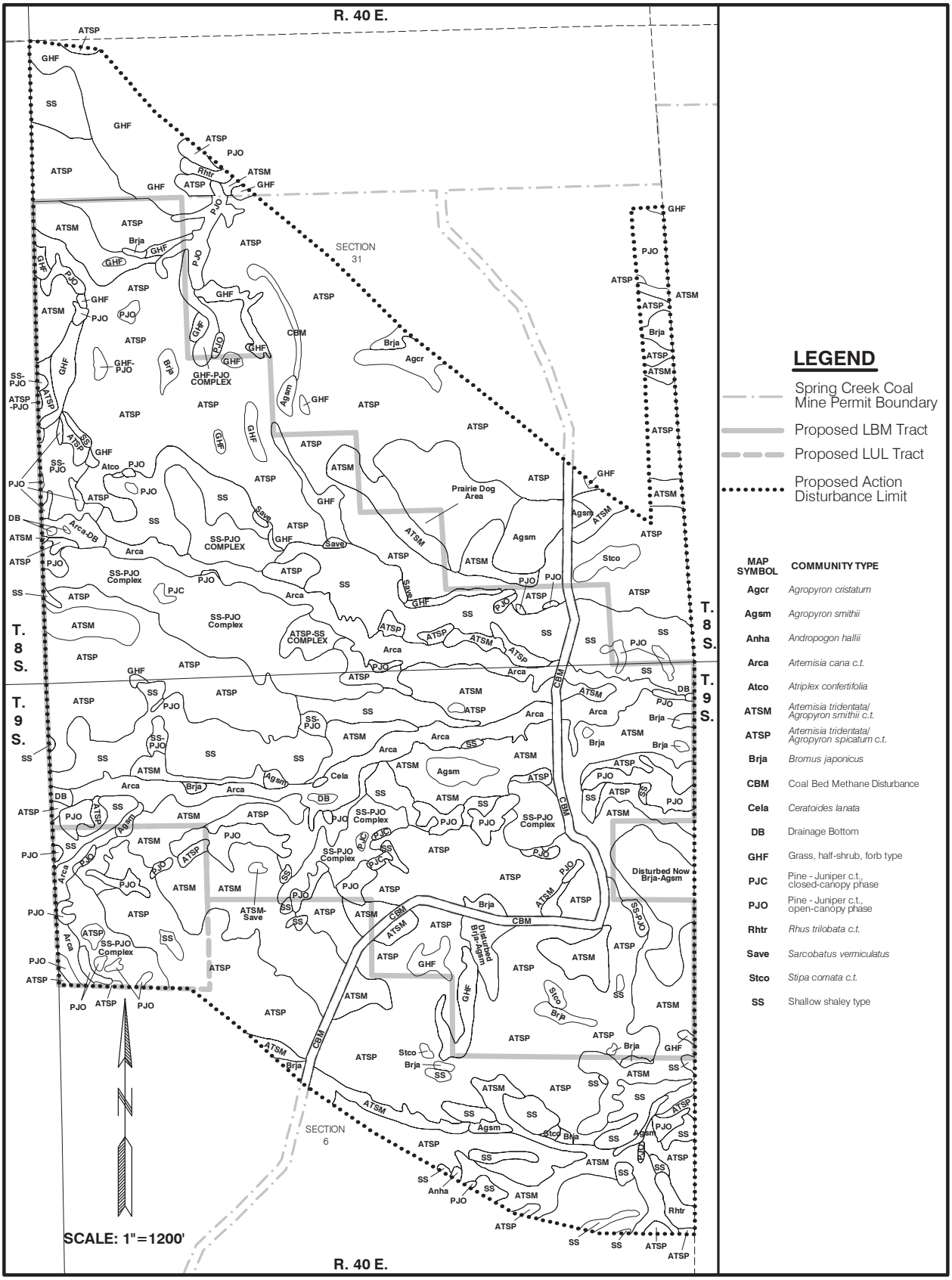


Figure 3-7. Vegetation Communities Within the Proposed Action Disturbance Limit.

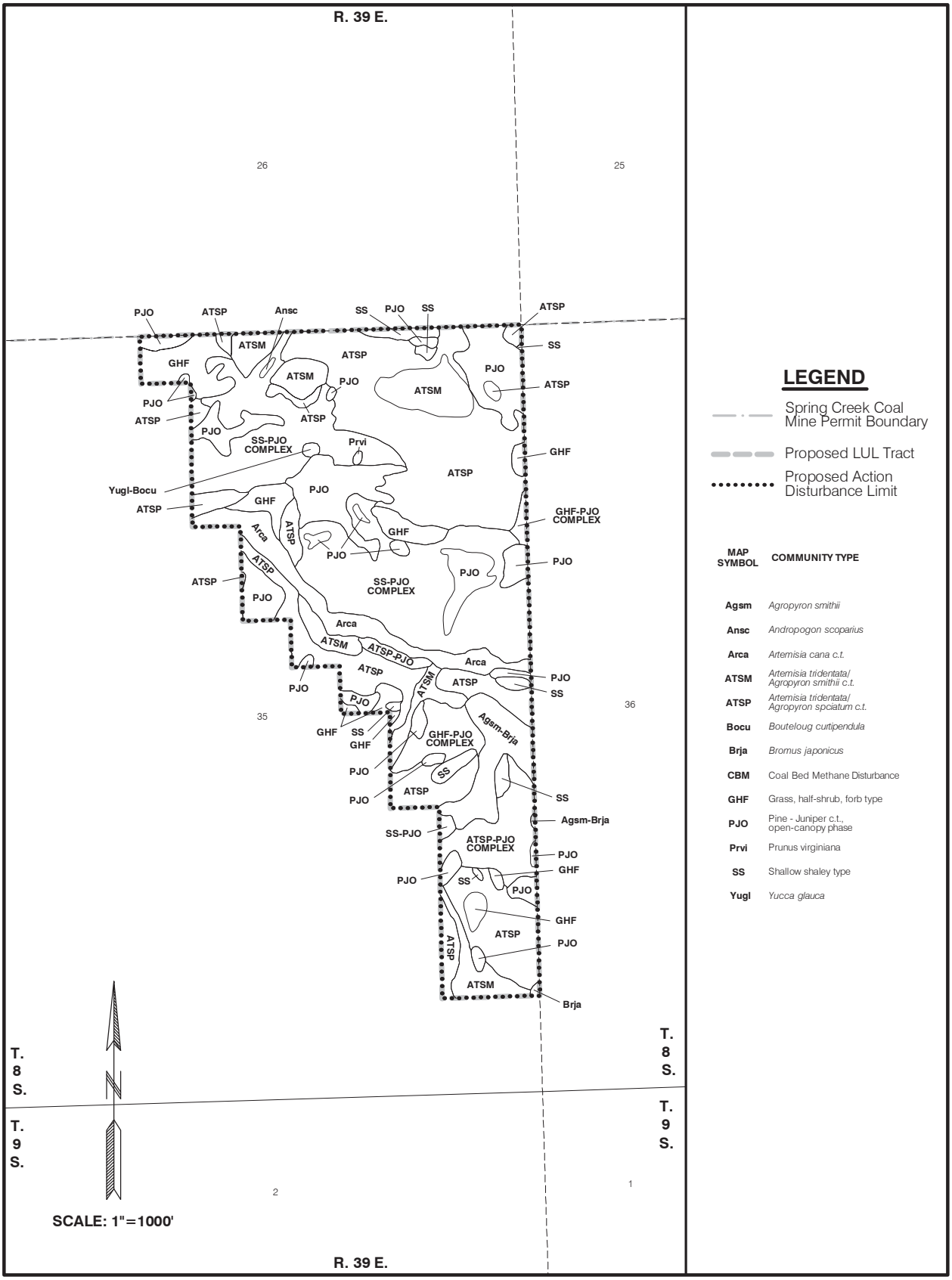


Figure 3-8. Vegetation Communities Within the Proposed Action Disturbance Limit.

congesta (Hook.) V. Grant ssp. *crebrifolia* (Nutt.) Day, was not identified for the Pearson Creek area (SCCC 2008a).

Hares-foot locoweed (*Oxytropis lagopus*) is one of the less abundant locoweeds in the Pearson Creek area. The status of *Oxytropis lagopus* Nutt. var. *conjugans* Barneby is S3, but a map of known occurrences is unavailable from MNHP and the only referenced inventory was in the Helena Valley. *Oxytropis lagopus* var. *conjugens* can be distinguished by 5-9 leaflets per leaf vs. 11 or more for other varieties. The specimen collected within the Pearson Creek study area had more than nine leaflets (SCCC 2008a).

3.10 Wildlife

Spring Creek Coal Company has collected extensive wildlife data. The initial baseline inventory on the mine area was conducted in 1976 and 1977 in relation to the permit application for the present Spring Creek Mine (VTN 1977). Annual monitoring was initiated in 1978 and continues at present. The following information is derived from the baseline data and the subsequent studies and MDEQ Annual Reports that have been completed for the Spring Creek study area of Spring Creek Coal.

3.10.1 Big Game

Pronghorn antelope, mule deer, and white-tailed deer are the big game species which are common year round residents of the Spring Creek study area. As part of the MDEQ approved wildlife monitoring plan, winter aerial surveys are conducted over the Spring Creek study area to document big game distribution, population trends, and habitat use. The flight grid encompasses approximately 50 mi^2 in 2007. A 1-day ground survey is also conducted in August or September to collect big game production data. The survey area includes the proposed LBM and LUL tracts.

Mule Deer

The maximum density of mule deer observed during the annual winter aerial surveys from 1997 through 2008 ranged from 0.8 to 8.5 mule deer/ mi^2 (Table 3-9). Densities were relatively stable from 1997 through 2000, increased markedly in 2001, and decreased approximately 90 percent to an all-time low in 2002. Mule deer density increased considerably from 2003 through 2005, but fluctuated widely since then. During 2008, winter mule deer density was near the long-term average of 4.8 mule deer/mi^2. The observed variations in minimum population density estimates among survey years may be influenced by fluctuations in the regional population, seasonal movements of deer in or out of the survey area, sightability (ability to observe the species), or a combination of those and other factors.

Table 3-9. Maximum Density of Mule Deer and Pronghorn Recorded During Winter Aerial Surveys From 1997 Through 2008 at the Spring Creek Mine.

Year	Mule Deer/mi^2	Pronghorn/mi^2
1997	5.8	2.3
1998	4.7	2.1
1999	4.4	1.7
2000	6.0	1.3
2001	8.5	2.7
2002	0.8	1.3
2003	3.1	3.6
2004	5.0	2.5
2005	7.1	3.0
2006	5.3	4.2
2007	2.5	3.0
2008	4.6	3.8

Some consistencies in the winter distribution of mule deer across the SCCC mine area have been observed during surveys from 1997 through 2008. Deer were generally present throughout the survey area. Although individuals did not concentrate in large numbers at any specific location, they were regularly seen more often in some portions of the survey area and less often in other areas. Mule deer were often recorded in areas immediately north of the SCM permit area and in the south-central part of the survey area. Those locations are characterized by a mixture of ponderosa pine, rough breaks, and sagebrush-grassland habitats. It is possible that deer are attracted to the cover provided by trees and terrain in those areas, and to more accessible forage in sagebrush stands located on south-facing slopes. Those include lands immediately north of the SCCC permit area and the south-central part of the survey area. Prior to 1999, wintering deer were routinely observed around the mine facilities, in reclamation, and in native habitats in the permit area. However, fewer deer have been documented within the permit area in recent years, as an increase in mining activities has resulted in a greater presence of active pits, roads, and other facilities.

Each winter, deer were noticeably absent or rare in the northeastern portion of the survey area, east of State Highway 314. Apparently, the habitats (predominantly grasslands) east of the highway are not particularly attractive to wintering deer. During some years, deer were infrequently observed on the sagebrush plateaus in the southwestern corner of the survey area, and in the agricultural fields along its extreme north-central edge. Given the openness of the habitats in those areas, it is unlikely that deer were overlooked during those surveys. In 2008, deer were present throughout the entire southern portion of the area during all five surveys, predominantly within sagebrush-grassland habitats.

Habitat associations from the five 2008 winter surveys are summarized in Table 3-10. Each year through 2008 (except 2002), more mule deer were observed in sagebrush-grassland (43-73%) than any other habitat. In 2008, 49% of the deer were seen in sagebrush-grassland. Those results were not surprising, as sagebrush-grassland is one of the most extensive habitats in the area, and animals in shrublands are more visible from the air. That result was not surprising, as sagebrush-grassland is one of the most extensive habitats in the area and animals occurring in shrublands are very visible from the air. A modest proportion of the deer recorded each year were in native grassland (5-31%), including 28% in 2008. Mule deer were observed in reclaimed grassland during 10 of the last 14 winters (Figure 2). In some years, the percentage of deer in reclamation was much greater than would be expected based on the limited availability of that habitat in the survey area.

Table 3-10. Habitat Associations of Mule Deer and Pronghorn [# (percent)] Observed During the Five Aerial Surveys at the Spring Creek Mine From January Through March 2008.

Habitat	Mule Deer	Pronghorn
Ponderosa pine	103 (15%)	8 (1%)
Juniper	3 (<1%)	--
Sagebrush-grassland	340 (50%)	318 (52%)
Grassland	190 (28%)	286 (46%)
Seeded grassland	6 (1%)	--
Reclamation	17 (3%)	--
Bottomland	18 (3%)	--
Agricultural	--	4 (1%)
Total	677	616

As depicted on Figure 1-3, approximately 675 acres associated with the LBM disturbance area (not including 37 overlapping acres of disturbance associated with the LUL tract) and all of the LUL amendment area (197 acres) were determined to be *Suitable for Leasing With Stipulations* for mining under Criterion 15 (mule deer and pronghorn winter range). A special stipulation would normally be added to the coal lease requiring that these lands be reclaimed back to suitable wildlife habitat. Since there is overlap between the big game winter

range lands and the sage-grouse habitat areas, the reclamation of any sage-grouse habitat outlined in the HRRP would fulfill the reclamation requirements in place for mule deer and pronghorn antelope. The HRRP would provide quality habitat for both big game and grouse, primarily be requiring reestablishment of big sagebrush.

Pronghorn

The maximum pronghorn density recorded each winter from 1997 through 2008 ranged from 1.3 to 4.2 pronghorn/mi^2 (Table 3-9). Wintering pronghorn numbers fluctuated from 1997 through 2008. Since most pronghorn occur near the northern edge of the survey area, it is probable that observed variations in abundance are influenced considerably by the movement of pronghorn onto and off of the survey area.

Each winter from 1997 through 2003 and again from 2005 through 2008, pronghorn were most common east of Highway 314 or in the northern part of the survey area. Gently rolling grassland is the predominant habitat type east of Highway 314, while grasslands and agricultural fields occur in the north. However, in 2004, pronghorn were relatively absent east of Highway 314 and more abundant in the north-central portion of the survey area, which is characterized mostly by native and improved grasslands, including hayfields and agricultural fields. In all years, pronghorn were largely absent from the central and southern-most parts of the survey area. Based on long-term big game monitoring related to the Spring Creek mine, it is unlikely that the development of SCCC over the years has displaced pronghorn from the central portion of the survey area (SCCC 2007a and 2008b).

Habitat use for pronghorn that were observed during 2008 aerial surveys over the Spring Creek study area is presented in Table 3-10. Fifty-two percent of pronghorn (318) were observed in sagebrush-grassland habitats. Approximately 46 percent (286) of the pronghorn were observed in the native grassland habitat (SCCC 2009). While habitat utilized by pronghorn exists within the proposed LBM and LUL tracts, annual monitoring indicates relatively little use by pronghorn (SCCC 2007a, 2008b, and 2009).

Elk

Elk have not been observed within the big game survey area.

3.10.2 Other Mammals

Year round mammals common to the Spring Creek study area include the porcupine, black-tailed prairie dog, Ord's kangaroo rat, plains harvest mouse, bushy-tailed woodrat, olive-backed pocket mouse, shrew, striped skunk, yellow bellied marmot, cottontail rabbit, white tailed jack rabbit, deer mouse, vole, house mouse, the least chipmunk, and five bat species (little brown bat, long-eared myotis, long-legged myotis, small-footed myotis, and western big-eared bat). The coyote, red fox, bobcat, raccoon, and badger are also year-round common residents. All of these species could potentially occur within the LBM and LUL tracts.

BLM sensitive mammal species that could potentially occur in the area include the Townsend's big-eared bat, spotted bat, long-legged myotis, long-eared myotis, pallid bat, and black-tailed prairie dog (Appendix C). Black-tailed prairie dogs have been observed frequently in the wildlife study area and one prairie dog colony (approximately 18 acres) is within the LBM Tract. No prairie dog colonies are within the LUL tracts or within the Spring Creek South RFD area (Figure 3-9).

3.10.3 Raptors

The baseline studies completed in conjunction with the Spring Creek study area show that 24 species of raptors nest, winter, or migrate through the region. Nineteen species have been documented within the Spring Creek study area.

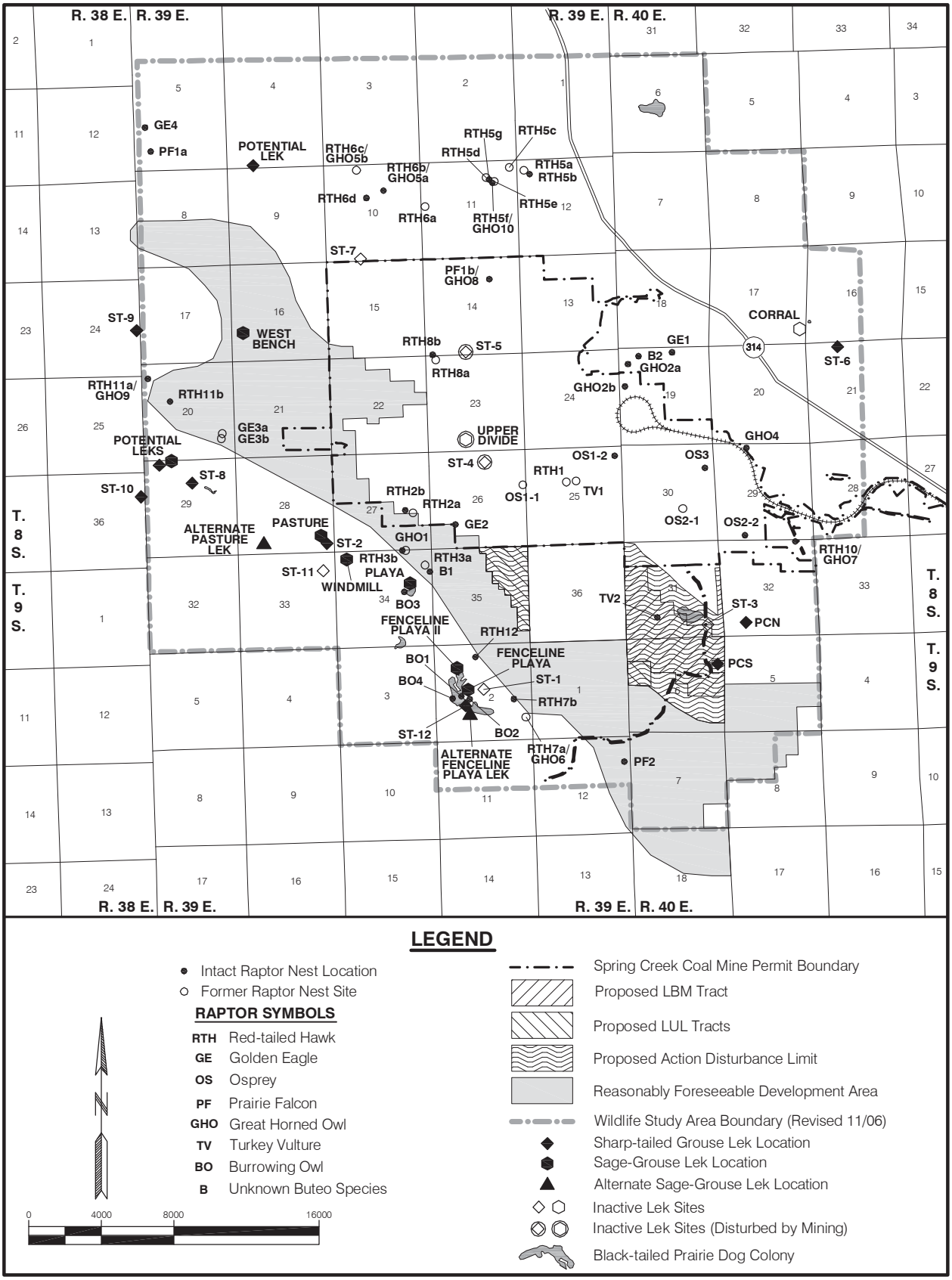


Figure 3-9. Wildlife Use Associated with the Proposed LBM and LUL Tracts and the Spring Creek Coal Mine Area.

The baseline studies showed that the wintering population consists of approximately six to eight species. Nesting raptors include red-tailed hawk, golden eagle, turkey vulture, osprey, burrowing owl, prairie falcon, and great horned owl. These species are monitored in conjunction with SCCC's approved raptor monitoring plan. All seven of these raptor species have nested within 1 mile of the Spring Creek LBM and LUL tracts and the Spring Creek South RFD (Figure 3-9). One intact raptor nest (TV2) is located within the proposed LBM and no intact nests are within the LBM and LUL tracts (Figure 3-9). The one nest within the LBM tract has not been used since at least 1994. Eleven raptor nests (four species) have been documented within the Spring Creek South RFD (Figure 3-9). Eight of these nests are still intact. No portions of the LBM and LUL tracts or the Spring Creek South RFD have been designated *Unsuitable Without Exception* for lease under Criterion 11 (buffer zone for golden eagle nest) or Criterion 13 (falcon cliff nesting site) although prairie falcon nest PF2 is located within the Spring Creek South RFD boundary (Figure 3-9).

PF2 was active from 2004 through 2008, producing at least nine young (DCC, unpublished data). Prairie falcons were first documented at site PF2 in 1981 but use of the site was sporadic until 2004. Disturbance associated with the Decker Mine (the closest current disturbance) is within 1.5 miles of the site.

BLM sensitive raptor species that could potentially occur in the area include the burrowing owl, ferruginous hawk, golden eagle, northern goshawk, Swainson's hawk, and peregrine falcon (Appendix C). All of these species have been observed in the Spring Creek wildlife study area but none nest within the LBM or LUL disturbance areas. A burrowing owl nest occurs within the Spring Creek South RFD area (Figure 3-9).

3.10.4 Upland Game Birds

Six species of game birds have been observed in the Spring Creek area. These include the greater sage-grouse, sharp-tailed grouse, ring-necked pheasant, Merriam's wild turkey, mourning doves, and the gray partridge.

Sage-grouse, sharp-tailed grouse, ring-necked pheasants, turkey, and gray partridge are year-round residents in the study area. Sage-grouse are closely associated with big sagebrush communities, whereas sharp-tailed grouse use grasslands, woody draws, and sagebrush communities. Hungarian partridge, a non-native species, also are present in the project area in low numbers.

Long-term monitoring has documented that sage-grouse strutting grounds (leks) and important sage-grouse use areas are present in the study area. Sage-grouse lek locations are shown on Figure 3-9 and BLM designated crucial habitat are shown on Figure 1-3. Although sage-grouse have historically been an abundant species in the Spring Creek area, long-term population trends, as determined from 1979 through 2008 total peak (combined male and female) lek counts, indicate sage-grouse numbers have declined since the early 1980s (Table 3-11).

Table 3-11 shows the cyclic nature of sage-grouse numbers in the Spring Creek Mine area, with peak and low counts occurring at approximately 10-year intervals. During the period of monitoring, the sage-grouse population was highest during the late 1970s, the early 1990s, from 1999 through 2001, and again in 2007. Observed population levels were generally lowest during the mid-1980s, mid-1990s, and mid 2000s. In 2008, the peak total count decreased approximately 67 percent over 2007 total count.

Natural cyclic fluctuations in sage-grouse numbers over time are likely influenced or exacerbated by various factors, including persistent drought, excessive spring precipitation, and diseases such as West Nile virus. Other confounding variables such as grazing pressure, inclement weather, predators, and stochastic events could have also negatively affected sage-grouse populations in the area. Drought reduces amounts of succulent forage and associated insects that are the primary diet of young sage-grouse. West Nile virus has been shown to reduce late-summer survival in sage-grouse populations by as much as 25% (Naugle, et al. 2004). Lek counts done by Decker Coal Company show declines in sage-grouse numbers in recent years on leks unaffected by development (DCC unpublished data).

Table 3-11. Peak Counts of Sage-Grouse from 1979 Through 2008 at Leks in the Vicinity of the Spring Creek Mine.

	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
Upper Divide	14	13	9	6	18	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---	---
Windmill	11	29	16	15	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Pasture	--	--	7	0	0	3	7	9	9	2	18	5	12	6	4	0	2	1	0	4	5	9	10	6	0	4	18	15	18	13
Playa	--	--	10	0	0	0	0	1	2	2	0	0	3	0	0	0	4	0	0	0	1	1	0	0	0	1	0	6	5	2
Corral	10	17	6	6	7	7	0	5	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fenceline Playa	--	--	--	--	--	--	--	--	--	--	--	7	12	12	10	3	2	6	8	0	1	1	0	0	0	9	0	1	0	0
Fenceline Playa II	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	23	17	7	9	5	3	2	17	0
West Bench	--	--	--	--	--	--	--	--	--	--	--	--	--	5	5	2	1	1	10	1	5	5	0	0	0	0	0	1*	2	0
Yearly Total	35	59	48	27	25	12	7	15	12	5	21	12	27	23	19	5	9	8	18	5	24	39	27	13	9	19	21	25	42	15

* One female observed during one lek count

Mining has removed bottom-land sagebrush habitat, the Upper Divide Lek, and a wintering area associated with sagebrush habitat on relatively flat and gently south-facing slopes along the South Fork of Spring Creek (VTN 1977). The Upper Divide Lek, removed by mining in 1991, was not active from 1985 through 1991. It is possible that the loss of the sage-grouse wintering area along Spring Creek contributed to sage-grouse declines in the Spring Creek Coal Mine study area. Winter use areas are often located on large, flat expanses of sagebrush tall enough to be partially exposed through deep snow. During mild winters, sage-grouse tend to be widely dispersed over the entire wintering area. As snow depths increase, areas with exposed sagebrush decrease and grouse become more concentrated. Eustace (1995) found that during normal winters, sage-grouse in his Montana study area occupied about 25,500 acres of sagebrush wintering habitat. However, during winters when snow accumulations exceeded 12 inches, only about 1,700 acres were available to sage-grouse. According to Eustace, sage-grouse wintering areas are extremely important and should be protected. With loss of this wintering area, it is possible that the capacity to support sage-grouse within the Spring Creek area has been reduced.

As presented in the Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement (FSEIS), BLM has identified four distinct crucial sage-grouse habitat areas within southeastern Montana (BLM 2008a). Approximately 99 percent of the disturbance area associated with the LBM tract (811 acres), approximately 19 percent (37 acres – included in the LBM tract disturbance area) of the LUL tracts, and approximately 51 percent (2,873 acres) of the Spring Creek South RFD area are within polygons identified by BLM as crucial sage-grouse habitat (Figure 1-3). Since the habitat data are new, the coal unsuitability screen for wildlife will be applied to these lands during this environmental review process. As part of the evaluation of the lease of federal coal within the LBM tract, BLM has required SCCC to develop a HRRP for inclusion in this analysis (Appendix B). The plan has been reviewed and approved by the BLM, MDEQ, and the MDFWP. A decision approving the Proposed Action would result in approximately 848 acres of the important habitat lands within the disturbance area associated with the Proposed Action as being designated as *Unsuitable for Leasing With Exceptions Applied* and a stipulation would be placed on the coal lease making the HRRP a mitigation requirement of the lease.

Sharp-tailed grouse are present in the study area, using habitats with shrubs and trees for feeding and wintering and sagebrush/grasslands for nesting. Two dancing grounds are located within the LBM disturbance area (Figure 3-9). St-3 is classified as inactive (last active in 1985) and PCS is classified as active. There are no active sharp-tailed leks within the Spring Creek South RFD, but there are several leks within the study area (Figure 3-9). Two leks (ST-4 and ST-5) was removed by mining. Like sage-grouse, sharp-tailed grouse numbers have generally declined in the Spring Creek study area since the 1980s. Very low grouse numbers were reported from 1990-1994; numbers increased until 2000 and have since decreased (Table 3-12). Unlike sage-grouse in southeastern Montana, sharp-tailed grouse adapt to reclaimed lands for breeding activities and nesting if reclamation quickly follows mining (Yde and Waage 1996).

No ring-necked pheasants were observed in the Spring Creek study area during 2008 monitoring. Pheasants have occasionally been documented within the SCCC wildlife study area in the past.

A small population of gray partridge has occupied the Spring Creek mine area in the past. Gray partridge were not observed in the Spring Creek study area in 2008.

No turkeys were observed within and adjacent to the Spring Creek permit area although incidental observations of wild turkeys along the Tongue River and associated drainages remained relatively high in 2008 indicating that relatively high numbers of turkeys are occurring region-wide.

Mourning doves were seen regularly throughout the area during spring and summer.

BLM sensitive game bird species that could potentially occur in the area include the greater sage-grouse (Appendix C). There are no documented sage-grouse strutting grounds within the LBM disturbance area. One

Table 3-12. Peak Counts of Sharp-Tailed Grouse from 1980 through 2008 at Leks in the Vicinity of the Spring Creek Mine.

	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
ST-1	--	18	21	12	31	21	10	8	5	10	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST-2	--	12	8	12	16	15	12	7	15	8	10	0	0	0	0	0	1	0	0	5	9	21	19	10	6	9	4	17	15	15
ST-3	--	23	17	7	18	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST-4	--	16	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	---	---	---	---	---
ST-5	--	12	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	---	---	---	---	---	---
ST-6	--	15	15	11	10	5	0	0	5	0	0	0	0	0	0	0	12	29	11	20	26	31	11	4	2	10	6	25	6	10
ST-7	--	28	20	18	26	15	9	15	10	15	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST-8	--	--	11	28	16	14	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
ST-9	--	--	--	--	--	--	--	--	--	--	--	--	--	20	25	25	25	21	17	29	48	52	42	31	10	17	21	33	24	8
ST-10	--	--	--	--	--	--	--	--	--	--	--	--	--	35	35	15	20	25	23	14	14	15	5	0	0	0	0	0	0	0
ST-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12	3	0	0	0	0	0	0	0	0	0	0	0
ST-12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	14	19	14	5	0	0	0	0	0	0	0
PCN																						15	6	3	1	0	0	0	0	0
PCS																						7	0	0	0	0	0	0	0	0
Sec 4																														7
Total	--	124	103	89	117	80	37	30	37	33	20	5	0	55	60	40	58	87	60	82	116	133	82	45	18	36	31	75	45	48

lek (last active with strutting males in 2000) is located in the northern portion of the Spring Creek South RFD (Figure 3-9). Approximately 532 acres within the Spring Creek South RFD have been designated as *Unsuitable for Leasing Without Exception* due to Criterion 15 - wildlife habitat of high interest (sage-grouse wintering area and sharp-tailed and sage-grouse dancing and strutting grounds). These acres would not be available for lease under the current land use designations unless, after consultation with the state, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected (43 CFR 3461.5(o)(1). As shown on Figure 1-3, approximately 99 percent of the disturbance area associated with the LBM tract (811 acres), approximately 19 percent (37 acres – included in the LBM tract disturbance area) of the LUL tracts, and approximately 51 percent (2,873 acres) of the Spring Creek South RFD area are within an area that has been delineated as areas of "crucial importance to maintaining viable populations of sage-grouse within the Montana portion of the PRB" (BLM 2008a).

3.10.5 Other Birds

Waterfowl and shorebird use of the Spring Creek study area has been seasonal with greatest abundance and diversity occurring in the spring and fall. A variety of waterfowl have been observed on impoundments in the Spring Creek study area. Waterfowl tend to use the impoundments for foraging and loafing but broods of geese have been documented on mine impoundments.

BLM sensitive waterfowl/shorebird species that could potentially occur in the area include the black tern, Franklin's gull, marbled godwit, willet, Wilson's phalarope, and long-billed curlew (Appendix C). The Franklin's gull, marbled godwit, willet, Wilson's phalarope, and long-billed curlew have been observed in the area, although habitat for these species is limited to mine impoundments. There is no waterfowl/shorebird habitat within the LBM disturbance area or within the Spring Creek South RFD.

A total of 62 species of passerine birds have been identified within the area around SCCC (BLM/MDSL 2000). Common species include: western meadowlark, vesper sparrow, Brewer's sparrow, chipping sparrow, lark bunting, red-winged blackbird, northern flicker, mountain bluebird, and black-billed magpie (BLM/MDSL 2000).

BLM sensitive passerine bird species that could potentially occur in the area include the blue-gray gnatcatcher, dickcissel, loggerhead shrike, chestnut-collared longspur, McCown's longspur, mountain plover, sage thrasher, Baird's sparrow, Brewer's sparrow, and the red-headed woodpecker (Appendix C). The blue-gray gnatcatcher, loggerhead shrike, sage thrasher, Brewer's sparrow, and the red-headed woodpecker have been observed in the Spring Creek area.

3.10.6 Amphibians and Reptiles, and Aquatic Species

Reptiles and amphibians identified in the Spring Creek area include the Eastern yellowbelly racer, common garter snake, bull snake, prairie rattlesnake, short-horned lizard, common sagebrush lizard, Northern leopard frog, boreal chorus frog, Great Plains toad, Woodhouse toad, plains spadefoot toad, Western painted turtle, and tiger salamander.

Habitats that would support fish populations do not exist within the LBM and LUL tracts or lands immediately adjacent to these areas. Therefore, specific surveys for fish have not been conducted.

BLM sensitive amphibian, reptile, and aquatic species that could potentially occur in the area include the Great Plains toad, short-horned lizard, common sagebrush lizard, milk snake, northern leopard frog, plains spadefoot, snapping turtle, spiny softshell turtle, western hog-nosed snake, and sauger (Appendix C). The greater short-horned lizard, common sagebrush lizard, Great Plains toad, northern leopard frog, and plains spadefoot toad have been observed in the Spring Creek area. The Great Plains toad, northern leopard frog, and plains spadefoot toad are generally associated with mesic habitats, which are lacking within the LBM

disturbance area and Spring Creek South RFD. Habitat (sparsely vegetated areas in a sage-steppe type) for the greater short-horned lizard and the common sagebrush lizard is present within the LBM disturbance area and Spring Creek South RFD.

3.10.7 Threatened or Endangered Species and Other Species of High Federal or State Interest

T&E species that could potentially occur in the area include the black-footed ferret (Appendix C). This species has not been observed in the area.

The bald eagle has been delisted as a threatened species as of August 8, 2007 and as such is no longer subject to federal regulations and guidelines to implement the species recovery. The bald eagle will continue to be protected by the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

BLM sensitive species are discussed in the appropriate wildlife or vegetation sections.

3.11 Ownership and Use of Land

The surface ownership of the LBM and LUL tracts is shown on Figure 3-10. The surface ownership within the LBM tract includes 77.1 acres of federal BLM administered land and 421.0 acres of private land. The surface ownership of the LUL tract (197.1 acres) is entirely federally owned land. BLM, state, and private surface estate are included within the Spring Creek South RFD. The proposed coal removal area is managed by the BLM and SCCC. Figure 1-2 depicts coal ownership and federal coal leases on and adjacent to the LBM tract and Figure 3-11 shows oil and gas ownership and federal oil and gas leases.

There is currently one grazing lease (GR3387) on a portion of the proposed LBM and LUL tracts. Leases GR3319 and GR3387 are in effect on portions of the Spring Creek South RFD. SCCC currently has two BLM issued *2920 Minimum Impact Land Use* permits for environmental monitoring 1) MTM-96659 in the E½, Section 35, T8S, R39E, and 2) MTM-96660 in Lots 3, 4, and 5, Section 6, T9S, R40E, and a 2920 Land Uses Lease MTM-74913 which was issued for stockpiling of topsoil and overburden, construction of a haul road, and for drainage control for their current coal mining operation in the N½NE¼SW¼, N½SE¼NE¼SW¼. Section 22, T8S, R39E. There are no BLM authorized rights-of-way on the affected federal surface. Oil and gas leases within the LBM and LUL tracts are described in Table 3-13. The premining land use of the LBM and LUL tracts is rangeland. Prior to the purchase of the lands surrounding the LBM and LUL tracts by SCCC, the lands were classified as agricultural. The primary land use was for cattle grazing. Once the mine area is fenced off, the ranchers will not be charged for use of the land as this land is of a non-use category.

3.12 Cultural Resources

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

The archaeological site types and elements of nature of potential importance to Native American groups within the study area include: battlefields and raiding sites, burials, cairns, communal animal kills, fasting beds, homesteads, medicine lodges, rock art, settlements, stone rings, spirit homes, water, landscapes, fossils, minerals, paint sources, and plants (BLM 2008a). Historic cultural resources expected in the vicinity of the project area include homesteads, ranches, irrigation related structures, and refuse dumps.

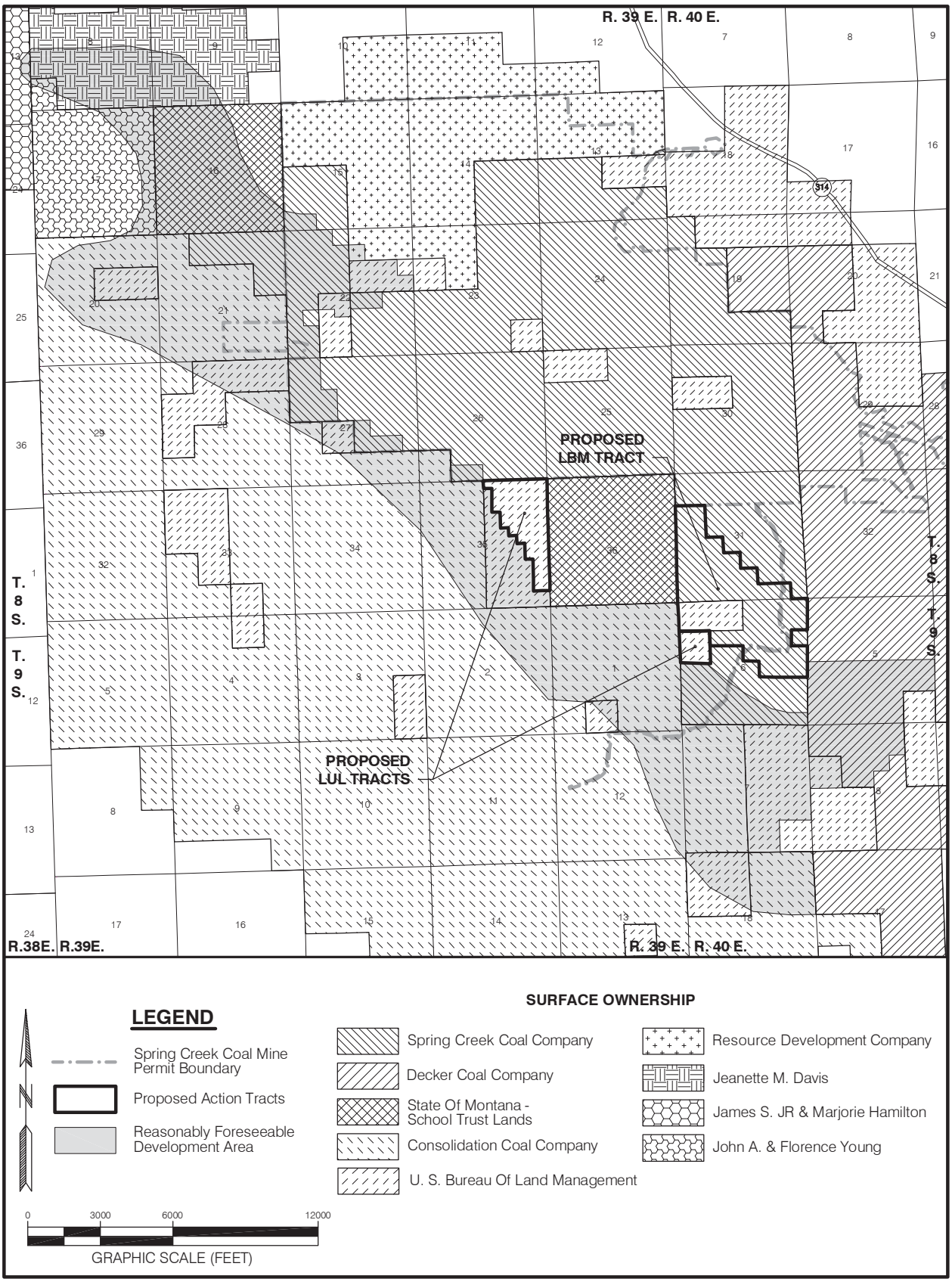


Figure 3-10. Surface Ownership Associated with the Proposed LBM and LUL Tracts.

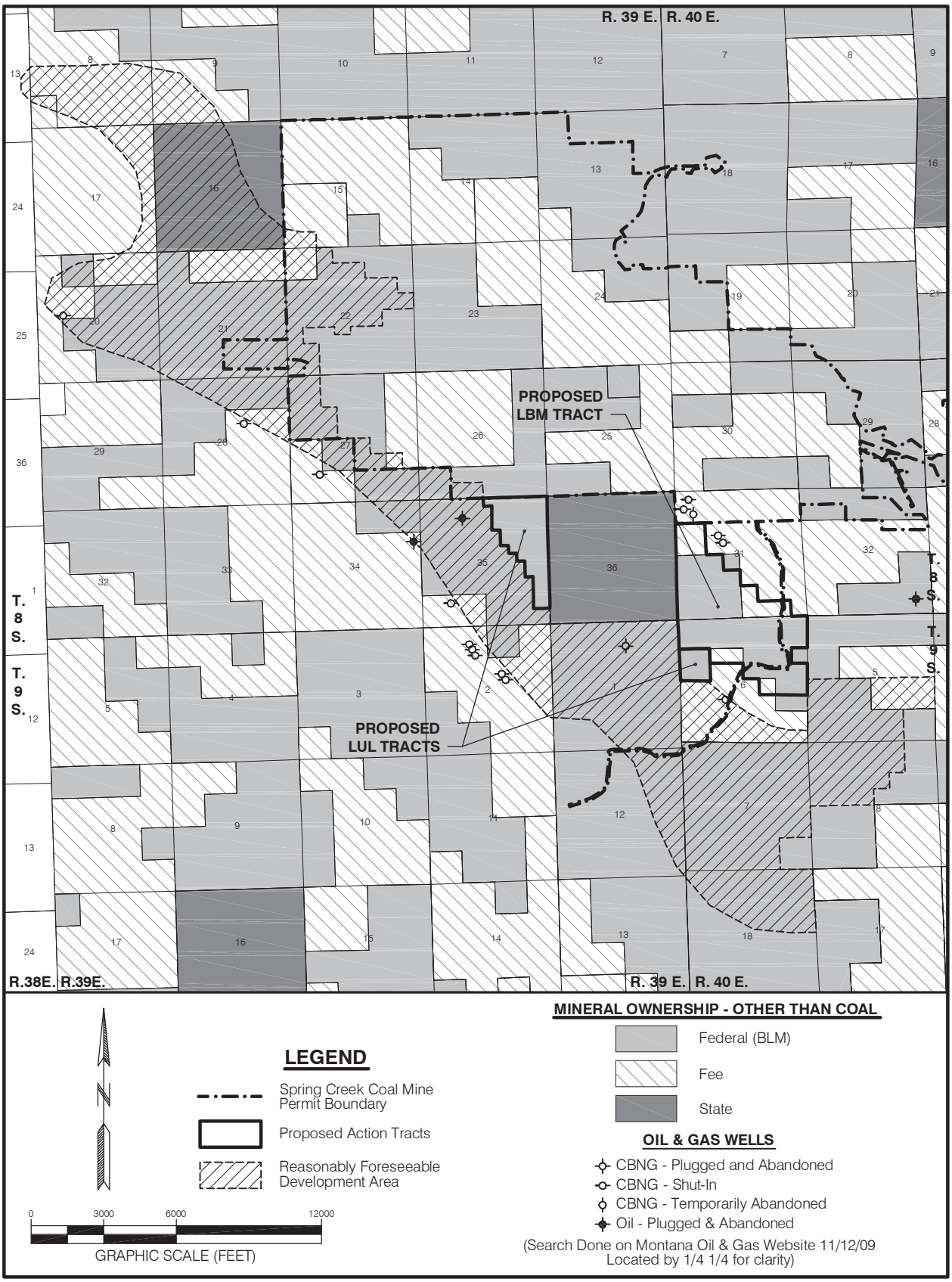


Figure 3-11. Oil and Gas Ownership Associated with the Proposed LBM and LUL Tracts.

Table 3-13. Oil and Gas Leases within the Spring Creek South RFD Area and the LBM and LUL Tracts.

T & R	Sec	Owner	Status/Lessee
Within RFD			
T8S, R39E	8	John A. & Florence Young	Redstone Gas Partners BK42/PG884 (Assignment to Fidelity)
	9	John A. & Florence Young	Redstone Gas Partners BK42/PG884 (Assignment to Fidelity)
	15	Smith, et al.[1]	Leased – Redstone Gas Partners
	16	State	Open
	17	John A. & Florence Young	Redstone Gas Partners (Assignment to Fidelity)
	20	Consolidation Coal Company	Redstone Gas Partners (Assignment to Fidelity)
		Fed (MTM 87476)	Fidelity Exploration and Production Co.
		Fed (MTM 88879)	Yates Petroleum Corp. (Lessee) Fidelity Exploration & Production (Operating)
	21	Smith, et al.[1]	Leased – Redstone Gas Partners (Assignment to Fidelity
		Fed (MTM 87476)	Fidelity Exploration and Production Co.
	22	Smith, et al.[1]	Leased – Redstone Gas Partners
		Fed (MTM 87476)	Fidelity Exploration and Production Co
	26	Fed (MTM 87477)	Fidelity Exploration and Production Co.
	27	Jackson, et al.[2]	Open
		Consolidation Coal Co.	Fidelity Exploration and Production Co. (Under C.A)
		Fed (MTM 87477)	Fidelity Exploration and Production Co.
		Fed (MTM 88879)	Yates Petroleum Corp. (Lessee) Fidelity Exploration & Production (Operating)
	28	Consolidation Coal Co.	Fidelity Exploration and Production Co.
		Fed (MTM 87476)	Fidelity Exploration and Production Co.
	34	Consolidation Coal Co.	Fidelity Exploration and Production Co.
		Fed (MTM 88879)	Yates Petroleum Corp. (Lessee) Fidelity Exploration & Production (Operator)
	35	Consolidation Coal Co.	Fidelity Exploration and Production Co.
		Fed (MTM 86512)	Fidelity Exploration and Production Co,
T9S, R39E	1	Fed (MTM 61666)	Yates Petroleum Corp., Key Production Co., Inc (Lessees), Fidelity Exploration & Production Co. (Operator)
	2	Consolidation Coal Co.	Fidelity Exploration and Production Co.
		Fed (MTM 61666)	Yates Petroleum Corp., Key Production Co., Inc (Lessees), Fidelity Exploration & Production Co. (Operator)
	12	Fed (MTM 86635)	Fidelity Exploration and Production Co.
T9S, R40 E	5	Demple, et al.[3]	Fidelity Exploration and Production Co.
		Fed (MTM 87252)	Fidelity Exploration and Production Co.
	6	Smith, et al.[1]	Fidelity Exploration and Production Co.
		Fed (MTM 87252)	Fidelity Exploration and Production Co.
	7	Fed (MTM 87252)	Fidelity Exploration and Production Co.
		Fed (MTM 83773)	Fidelity Exploration and Production Co.
	8	Fed (MTM 87252)	Fidelity Exploration and Production Co.
	18	Fed (MTM 83773)	Fidelity Exploration and Production Co.
Within LBM Tract			
T8S, R40E	31	Smith, et al.[1]	Leased – Redstone Gas Partners – assigned to Fidelity Exploration and Production
		Fed (MTM 87485)	Fidelity Exploration and Production Co.
T9S, R40E	6	Smith, et al.[1]	Leased – Redstone Gas Partners – assigned to Fidelity Exploration and Production
		Fed (MTM 87252)	Fidelity Exploration and Production Co.
Within LUL			
T8S, R39E	35	Fed (MTM 86512)	Fidelity Exploration and Production Co.
T9S, R40E	6	Fed (MTM 87252)	Fidelity Exploration and Production Co.

[1] Smith, Robby B., Hutton, Gary W., Scrutchfield, Tonya Scrutchfield, David Hutton, Craig E. Hutton, Charles B., Bessette, Russell W.
[2] Jackson, William C., Robert Lewis Cooke, Oscar O., Inc.
[3] Demple, Lori Ann, Demple, Jeanne M. (Estate of) Demple, Robert E., Demple, Florence L. (Estate of), Demple, Harold F. (Trustee), Demple Family Trust dtd 7/2/1984, Gosch, Janice Jeanne

Cultural resource sites are evaluated by criteria set forth by the NRHP. Sites determined to be eligible for listing on the National Register are treated essentially as if they were listed on the National Register. That is, before a federal undertaking can jeopardize their eligibility, the loss of the resource must be mitigated through implementation of an approved mitigation plan. The BLM, MDEQ, Montana State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation review the potential for adverse effects of proposed undertakings on eligible cultural properties as well as plans to mitigate those effects.

The existing baseline cultural resource studies exceed the Data Adequacy Standards, which indicate that a Class I (literature and records search) and a Class II (sample survey) of 10 percent are sufficient for planning purposes (BLM 2002). The LBM and LUL tracts have received a Class III (intensive) survey over all of their areas. Approximately 53 percent of the Spring Creek South RFD area has been covered by Class III cultural resource surveys.

A comprehensive investigation (BLM Class III inventory) of cultural resources within the proposed coal lease modification and land use lease amendment areas and much of the surrounding area has been completed (Table 3-14). These surveys included a review of cultural inventories conducted previously in the area, and a review of pertinent literature and records on the history, prehistory, ethnohistory and current Native American use of the area. Cultural resource sites located within and adjacent to the tracts are shown on Figure 3-12.

Prehistoric Sites

Archaeological investigations near the study area have been comprehensive. This synopsis of the archaeological record is based upon the results of extensive prehistoric documentation from adjacent areas relating to the impacts associated with the Spring Creek Coal mine. Prehistoric site types known to occur in the project area, in approximate order of frequency, include: lithic scatters; campsites; porcellanite quarries; stone (tipi) ring sites; "other" rock structures, including possible eagle trapping pits; vision quests and fortification structures; rock shelters; rock art (petroglyphs); and rock alignments. Many of these site types occur in combination so it is difficult to enumerate them. Previous research consists of intensive inventories and a few site excavations (Ferguson and Meyer 2007).

Radiocarbon dates demonstrate human occupation of the Class I study area as early as 3,700 year B.P. (Munson 1992), and surface projectile point finds suggest that human occupation of the area extends to at least to the Middle Plains archaic Period, ca. 4,500 years B.P. (Fox 1977). The possibility of earlier occupations cannot be ruled out, but as yet, has not been confirmed by radiocarbon dates or diagnostic projectile points.

The Southeastern Montana region is known to contain cultural remains spanning the past 10,000 years. The span of human occupation of the area is divided into five prehistoric periods beginning with the Paleoindian Period and continuing upwards in time through the Early, Middle and Late Plains Archaic to the Late Prehistoric Period. The Protohistoric Period refers to the post-European contact period, marked by the acquisition of iron, guns, and horses among the Plains Indians, some time around A.D. 1700.

Faunal resources used by prehistoric people in the area include all big game species of the region, but principally bison. Evidence of processed bison bone has been found in several sites in the study area (Munson 1992, Fox 1977). Also found in the area are numerous high quality porcellanite sources that drew prehistoric people into the local area. There is a relatively high frequency of porcellanite quarries and extensive lithic reduction sites in the study area. Porcellanite was mined from scoria outcrops and collected from talus slopes below scoria out crops, as well as selected from gravel "float." Although a wide variety of non-local lithic materials are found in the area, most artifact collections are dominated by porcellanite, which usually accounts for 90 percent or more of the material represented.

Table 3-14. Summary of Archaeological Investigations Completed at Spring Creek Coal Mine

Ferguson, David 2007a	An Evaluation of Archeology Sites 24BH545 and 24BH546 on the Spring Creek Coal Mine, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Ferguson, David and Garren Meyer 2007	A Class III Inventory of Spring Creek Coal Company's Pearson Creek Amendment, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Ferguson, David 2007b	Class III Resources Inventory: A Re-examination of Selected Parcels within the Spring Creek Coal Mine Permit Area, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Ferguson, David 2006	An Archaeological Review of a Site of Special Concern to the Northern Cheyenne Tribal Cultural Monitors Located on the Rio Tinto Spring Creek Coal Mine Property, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Walksalong, James, Gilbert Whitedirt, and Floyd Clubfoot, 2006	Rio Tinto Coal Mine Expansion Permit Tribal Cultural Survey, Big Horn County, Montana. Report prepared by the Northern Cheyenne Tribe.
Ferguson, David 2006	A Class III Inventory of Selected Tracts within the Spring Creek Coal Company's Permit Boundary, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Ferguson, David 2005	A Class III Cultural Resources Inventory of the Proposed Decker Coal Mine-to-Spring Creek Coal Mine Dragline Transport Corridor in Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Strait, James D, Jennifer Bales, and Lynelle A. Peterson 2005	Fidelity: Cultural Resource Investigations in the Pond Creek Development Area in Big Horn County, Montana. Report prepared for Fidelity Exploration and Production by Ethnoscience, Billings, MT
Munson, Gene and David Ferguson 1998	A Class III Inventory of the Spring Creek Coal Company's Proposed Carbone Expansion Area, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.
Munson, Gene, et al. 1992	Archaeological Investigations at 24BH514, 24BH1048, 24BH1048, 24BH2518, 24BH2521, and 24BH2529. Report prepared for Spring Creek Coal Mine, South Fork Extension, Big Horn County, Montana by GCM Services, Inc. Butte.
Munson, Gene 1990	Archaeological Investigations in the Spring Creek Coal Mine Area. Report prepared for Spring Creek Coal Company, Decker, Montana.
Taylor, et al. 1984	Data Recovery in the Spring Creek Archaeological District. Mitigation of Sites Within the Mine Area by data Retrieval, Spring Creek Coal Company, Decker, Big Horn County, Montana. Report Prepared by the Department of Anthropology, University of Montana, Missoula.
Carmichael, Alan G., Arlene Ekland and W. Jeffrey Kinney 1979	Archaeological Investigations in the Spring Creek Mine Area, Big Horn County, Montana. Report Prepared by the Department of Anthropology, University of Montana, Missoula.
Fox, Richard Allen 1977	Archaeology of the Spring Creek Mine Area: Survey and Testing Phases. Report prepared for Spring Creek Coal Company by the University of Montana, Department of Anthropology, Missoula.
Larhen, Larry 1977	Identified Cultural Resources, Pacific Power and Light Company Spring Creek Mine in: The Impact of Coal Development on the Cultural Resources in Southeastern Montana by Anthro Research, Inc. for the United States Geological Survey, Northern Powder River EIS, Billings.
Haberman, Thomas 1973	Archaeological Survey in the Decker/Birney Area of Big Horn County, Southeastern Montana. Report Prepared for the Western Interstate Commission for Higher Education (WICHE) Project, sponsored by the Montana Office of the Bureau of Land Management.
Loendorf, Lawrence L, Melvin V. Barnett, and Thomas E. Larson 1972	The Decker/Birney Archaeological Survey, Big Horn County, Montana. Report prepared for Bureau of Land Management by the University of North Dakota.

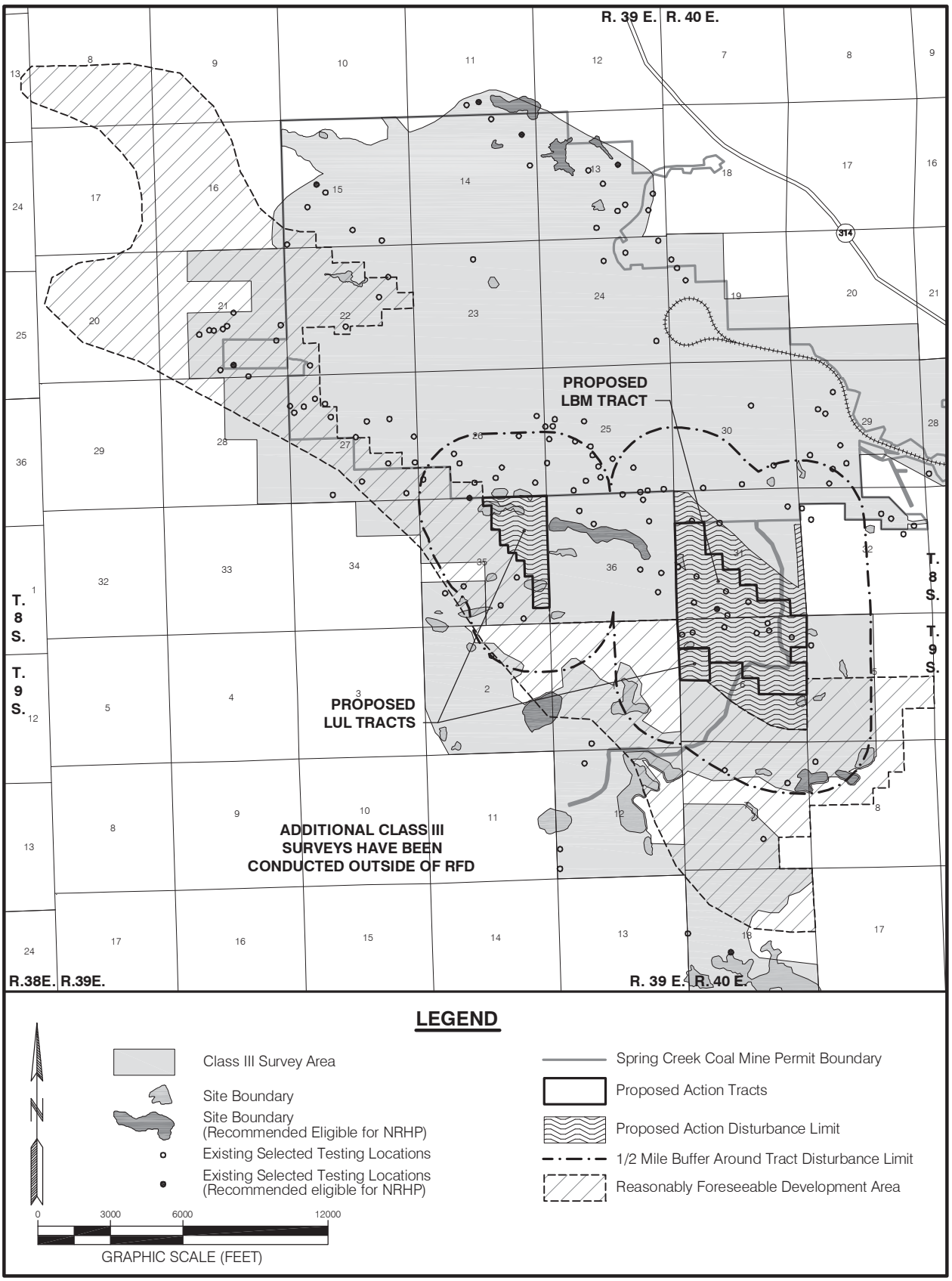


Figure 3-12. Cultural Resources Within and Adjacent to the Proposed LBM and LUL Tracts.

Extensive lithic scatters or porcellanite reduction workshops are found typically on the flat butte tops, where thousands of porcellanite flakes and spalls have accumulated. Typically these site types are not likely to yield a great deal of significant archaeological information because they represent repeated occupations and periods of use with little or no separation of the components. Establishing contextual integrity of lithic processing sites has proven difficult, but some of the quarries are found to be NRHP eligible for their values of embodying the technology of lithic procurement.

Historic Sites

Historic sites known to occur in the area are homesteads and irrigation features. Homestead sites may be found NRHP eligible under a variety of criteria that evaluate their architectural, technological, and historical values.

Area of Primary Impacts

All of the proposed LBM and LUL disturbance areas have been surveyed to a Class III level. A total of 20 cultural resource sites and nine isolated finds have been recorded within the LBM disturbance area and all or portions of four sites were recorded within the LUL tracts (Table 3-15). Of the 24 known sites (one prehistoric, 22 historic, and one combination), one site (24BH3392) within the LBM tract is considered eligible for the NRHP. Site 24BH3392 consists of two juniper cribbed log structures, a variety of lithic artifacts, and bison bone. Preliminary evaluation of the site indicates a Late Prehistoric Period occupation. A detailed discussion of the site is included in Appendix D.

Table 3-15. Cultural Resource Sites Associated with the LBM Tract and Spring Creek South RFD.

	LBM Tract Disturbance	LUL Tracts Disturbance	Spring Creek South RFD[1]
Number of Known Cultural Resource Sites	20	4	53
Number of Sites Not Eligible or Not Fully Evaluated for Eligibility	19	4	45
Number of NRHP Eligible Sites	1	0	8
Number of NRHP Disturbed Sites Currently Mitigated	0	--	3
Number of Sites added by ½-mile Buffer of Proposed Action Tract (Outside of Currently Approved Disturbance)	22	15	--
Number of NRHP Sites added by ½-mile Buffer of Proposed Action Tract (Outside of Currently Approved Disturbance)	2	2	--

[1] Outside of the LBM and LUL Disturbance areas.

A total of 53 cultural resource sites and one isolated find have been recorded within the Spring Creek South RFD area (outside of the LBM and LUL disturbance areas) (Table 3-15). Seven of these sites are within the currently approved SCCC disturbance boundary. Of the 53 known sites within the Spring Creek South RFD, eight sites (24BH1042, 24BH1048, 24BH1068, 24BH2516, 24BH2521, and 24BH2529, 24BH3086, and 24BH3087) are considered eligible for the NRHP - three of these sites (24BH1048, 24BH2521, and 24BH2529) have been mitigated and are not depicted on Figure 3-12. As stated above, only 53 percent of the Spring Creek South RFD has been surveyed at a Class III level. Site density averages 11.3 sites per section within the surveyed portion of the Spring Creek South RFD, and 1.7 NRHP eligible sites per section. These averages could be used to estimate the densities within the entire Spring Creek South RFD, but they may be somewhat misleading since site distribution is not constant. Sites tend to cluster in certain settings, depending on the physical environment. Using the 11.3 sites per section and the 1.7 NRHP eligible sites per section densities, approximately 100 cultural resource sites (15 NRHP eligible) might be encountered within the entire Spring Creek South RFD.

Area of Secondary Impacts

The leasing of coal implies that coal mining will occur and all of the associated disturbances associated with mining will occur on and within the leased areas. Affects of mining, particularly blasting and surface disturbance associated with mining, can also have residual and secondary impacts on sites adjacent to and immediately outside the areas of consideration of this analysis and the areas of primary impacts, the LBM and LUL tracts. These secondary impacts can affect sites within area surrounding the LBM and LUL lease disturbance areas and are appropriately considered part of the Area of Potential Effect (APE) for leasing and mining activities. MDEQ uses a half mile buffer around the mine permit area and primary impact zone when evaluating a mine permit. Within this half mile buffer area, sites containing standing historic structures and rock art sites have been determined to be particularly susceptible to the effects of blasting and that over time few, if any impacts occur outside this half mile buffer area. Therefore, for analysis purposes for this document the same half-mile buffer area will be considered the Area of Secondary Impacts for this action as it pertains to effects of leasing to cultural resource values within the APE.

There are 22 additional cultural resource sites within the half mile buffer area surrounding the disturbance area associated with the LBM tract and 15 additional cultural resource sites within the half mile buffer surrounding the LUL tracts, which are not within SCCC's currently approved disturbance boundary (Table 3-15). Two of the sites within the LBM half mile buffer are NRHP eligible. Approximately 19 percent of the LBM half mile buffer area and 16 percent of the LUL half mile buffer area has not been surveyed at a Class I or III level.

3.12.1 Native American Consultation

Native American consultation and coordination was conducted as required by the Archaeological Resources Protection Act and the American Indian Religious Freedom Act. The BLM mailed out letters to Native American tribes requesting comments on BLM's Proposed Action (LBM) and the findings of the recent cultural resource survey of the LBM tracts in September 2008. One reply was received from the Northern Cheyenne Tribe requesting additional field visits (held on January 22, 2009, June 19 and 29, and July 1, 2009 and January 14, 15, and 19, 2010). The BLM also mailed out letters for the NORA (Notice of Realty Action) regarding the LUL in May, 2009. The LUL tract in Section 6 was visited by the Northern Cheyenne in June and July 2009 and the LUL Tract in Section 35 was visited by the Northern Cheyenne on January 14 and 19, 2010.

3.13 Visual Resources

Scenic quality classes are defined by a system that rates seven key factors: Landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification. Visual sensitivity levels are determined by peoples' concern for what they see and the frequency of travel through the area.

For management purposes, the BLM conducts a visual resource management (VRM) inventory that identifies, sets and meets objectives for the maintenance of scenic values and visual quality and is based on research designed to objectively assess aesthetic qualities of the landscape. The VRM classification ratings range from I to IV as follows:

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

Class II Objective - Change Visible but Does Not Attract Attention - The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low.

Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

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

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

The lands included in the proposed LBM and LUL tracts are classified as visual resource management Class III.

The SCCC Mine facilities and some mining activities are currently visible from Route Federal-Aid Secondary Route (FAS) 314. Under the mine plan for the existing leases, mining has approached this public road and is plainly visible to passers-by. The LBM and LUL tracts are located over 2.5 miles from Route FAS 314. The tracts would not be plainly visible from the transportation corridor. Most of the people traveling this road are commuting to work at the SCCC Mine and the nearby Decker Mine. However, during periods of peak recreational activity this highway generates higher traffic volume. Landscapes found within and adjacent to the Spring Creek Mine area, and visible from Route FAS 314, include gently rolling benches of sagebrush, and mid-short-grass prairie. Major man-made intrusions include ranching, farming, transportation facilities and electrical power lines.

3.14 Noise

An individual's judgment of the loudness of a noise correlates well with the A-weighted sound level system of measurement. The A-weighted sound level, or A-scale, has been used extensively in the US for the measurement of community and transportation noises. Figure 3-13 shows A-weighted decibels (dBA) readings for some typical sounds commonly heard in daily life.

Existing noise sources in the proposed LBM and LUL tracts is coal mining activities, agricultural and recreational activities, traffic on Route FAS 314 and the county road, rail traffic, boat traffic, and birds and animal life. Route FAS 314, which is a continuation of Wyoming Secondary Route 87, is over 2.5 miles from LBM and LUL tracts. This public highway is the primary route to and from work for the Sheridan residents employed at the mines north of Sheridan and is a secondary route for farm-market vehicles including large trucks. Traffic on Route FAS 314 is heaviest during the daylight hours and at shift changes. SCCC has developed internal criteria on noise performance to ensure the protection of local community health and the environment. This internal criterion for maximum off-site noise acceptability is:

> 65 dBA based on the equivalent Housing and Urban Development L*dn* threshold of 65 dBA for a normally acceptable living environment in residential areas, where L*dn* is the Day-Night Average Sound Level rating of community noise exposure to all sources of sound, differentiating between daytime and nighttime noise exposures.

Based on modeling performed by Matheson and McVehil-Monnett for SCCC, the 65dBA limit would be expected to be exceeded at points less than 4,800 feet from the pit boundary. The closest residence is located

HOW IT FEELS	EQUIVALENT SOUNDS	DECIBELS	EQUIVALENT SOUNDS	HOW IT SOUNDS
Near permanent damage level from short exposures	50 hp siren (100 ft)		Jackhammer	
	Jet engine (75 ft)	130	Chainsaw	135 dB(A) Approx. 64 times as loud as 75dB(A)
Pain to ears	Turbo-fan jet at takeoff power (100ft)	120	Fire cracker (15 ft.)	125 dB(A) Approx. 32 times as loud as 75dB(A)
Uncomfortably loud	Scraper-loader	110	Rock and roll band	115 dB(A) Approx. 16 times as loud as 75dB(A)
	Jet fly over (1000 ft)		Unmuffled motor bike (2-3 ft.)	
Discomfort threshold	Noisy newspaper press	100	Car horn	105 dB(A) Approx. 8 times as loud as 75dB(A)
Very loud	Air compressor (20 ft)	90	Unmuffled cycle (25 ft.)	95 dB(A) Approx. 4 times as loud as 75dB(A)
Conversation stops	Power lawnmower Steady flow of freeway trafic	80	Garbage trucks and city buses	85 dB(A) Approx. 2 times as loud as 75dB(A)
Intolerable for phone use	10-HP outboard motor		Diesel truck (25 ft.)	
	Automatic dishwasher	70	Garbage disposal	
Extra auditory physiological effects	Vacuum cleaner		Food blender	
	Window air conditioner outside at 2 ft.	60	Muffled jet ski (50 ft.)	75dB(A)
	Window air conditioner in room		Passenger car 65 mph (25 ft)	
Quiet	Occasional private auto at 100 ft.	50	Busy downtown area	
Sleep interference	Quiet home during evening	40	Normal conversation	55 dB(A) Approx. 1/4 as loud as 75dB(A)
	Bird calls			45 dB(A) Approx. 1/8 as loud as 75dB(A)
	Library	30		
	Soft whisper 5 ft.			35 dB(A) Approx. 1/16 as loud as 75dB(A)
		20	In a quiet house at midnight	
	Leaves rustling	10		

Danger to hearing

Very quiet

Adapted From ABC's of Our Noise Codes published by Citizens Against Noise, Honolulu, Hawaii

Figure 3-13. Relationship Between A-Scale Decibel Readings and Sounds of Daily Life.

approximately 16,000 ft from the closest portions of the LBM and LUL tracts and Route FAS 314 is approximately 13,100 ft from the tracts. The nearest recreationist on the Tongue River Reservoir could be within approximately 13,500 ft from the closets portion of the proposed LBM and LUL tracts.

3.15 Transportation Facilities

There are no primary transportation systems in the LBM and LUL tracts. Nearby transportation facilities include the relocated Route FAS 314 (which is a continuation of Wyoming Secondary Route 87), a railroad spur owned by Spring Creek Coal and used by Burlington Northern-Santa Fe Railroad, and local access roads.

3.16 Hazardous and Solid Waste

Potential sources of hazardous or solid waste on the LBM and LUL tracts would include spilling, leaking, or dumping of hazardous substances, petroleum products, and/or solid waste associated with coal mining activities. No such hazardous or solid wastes are known to be present on the tracts at this time. Wastes produced by the mining and/or disturbance of the tracts would be similar to those produced on the adjacent Spring Creek Mine. These wastes would be handled according to the procedures described in the approved mine permit (SCCC 2001). Non-hazardous waste, which is similar to domestic or municipal solid waste, is currently disposed of on-site. Most of the wastes generated at the Spring Creek Mine that are not recycled are disposed of in a designated solid waste disposal area located on a portion of the Spring Creek Mine area. Disposal of these non-hazardous wastes, which include abandoned mining machinery, scrap iron, scrap lumber, packing material, and other items is permitted under the mine's existing MDEQ permit to mine. No solid wastes will be deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites.

At the Spring Creek Mine materials that may be classified as hazardous or are handled as hazardous include some greases, solvents, paints, flammable liquids, and other combustible materials determined to be hazardous by the EPA under the Resource Conservation and Recovery Act. These types of wastes are disposed of at an off-site EPA-permitted hazardous waste facility. No noteworthy impacts are anticipated as a result of any of the alternatives.

3.17 Socioeconomics

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

3.17.1 Local Economy

Total natural resource tax collection for the state of Montana for the 2008 Fiscal Year was $416,797,280. This income was comprised of local ad valorem and severance taxes ($186,852,358 or 45 percent), and state severance and license taxes ($229,944,922 or 55 percent) (Montana Department of Revenue 2009).

Coal production, as reported by the Montana Department of Labor & Industry, Safety Bureau, showed the State's coal production was 44.9 million tons in 2008. This was an increase of approximately 3.9 percent over the 43.2 million tons produced in 2007. This production was above the previous record of 43.2 million tons produced in 2007 (Montana Coal Council 2009).

Coal production figures for Montana, and Big Horn and Rosebud counties are shown on Table 3-16. In 2008, SCCC coal production reached 17.9 million tons, which is approximately 13 percent more than the previous high that occurred in 2007 (15.8 million tons). Montana's output of coal has been steadily increasing over the

last 5 years. In 2008 the output increased almost 3.9 percent from 2007. Montana was the fifth-largest coal producer among the 50 states in 2007 (Montana Coal Council 2009).

Table 3-16. Historic Coal Production [1] for Montana and Big Horn and Rosebud Counties.

Year	2001	2002	2003	2004	2005	2006	2007	2008
Montana	39.2	37.3	37.0	40.1	40.6	41.8	43.2	44.9
Percent Change	2.4	-5.0	-0.8	8.4	1.2	3.0	3.4	3.9
Big Horn County	25.0	24.1	23.0	26.8	26.7	28.4	30.1	31.3
Percent Change	-4.3	-3.7	-4.5	16.5	-0.4	6.4	6.0	4.1
Rosebud County	13.6	12.9	13.6	12.7	13.4	12.7	12.6	13.1
Percent Change	17.7	-5.5	5.7	-6.6	5.5	-5.2	-0.1	4.0
Big Horn & Rosebud Co.	38.7	37.0	36.6	39.5	40.1	41.1	42.7	44.4
Percent Change	2.5	-4.4	-1.0	7.9	1.5	2.3	3.9	4.0

[1] Production is in million tons
Source: MDEQ 2005 & Montana Coal Council 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009

The average unit value and cost of coal sold in Montana for 2001 to 2008 are shown on Table 3-17. The value of coal sold for the state of Montana was determined by multiplying the total amount of coal produced in Montana by the average unit value of coal sold.

Table 3-17. Historic Values of Coal Sold for Montana.

Year	Average Unit Value ($/ton)	Total Value ($ million)
2001	6.23	244.2
2002	6.62	246.9
2003	6.59	243.8
2004	6.78	271.9
2005	6.99	283.8
2006	6.96	290.9
2007	7.81	337.4
2008	8.06	361.9

Source: Montana Coal Council 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009

As shown on Table 3-18, total cumulative royalties from the Spring Creek Mine amounted to approximately $235.2 million in 2008. SCCC is the third largest surface coal mining royalty payer in the state of Montana (Montana Coal Council 2009). Table 3-18 shows that the state and federal governments are the major beneficiaries of these payments, whereas private owners of pre-mining land leases are minor beneficiaries of these payments. Mineral royalties are collected on the amount of production and the value of that production. The current royalty rate for federal coal leases is 12.5 percent, with half of this revenue returned to the state. Coal severance taxes are collected by the state of Montana. Currently, the state of Montana collects 15 percent of the price of the coal as severance tax.

Table 3-18. Cumulative Royalty Payments[1] from Coal Production at the Spring Creek Mine.

Year	2003	2004	2005	2006	2007	2008
Royalty collections	141.1	153.7	168.5	186.1	208.5	235.2
Federal collections	130.8	139.1	149.5	161.8	177.4	195.1
State collections	3.1	6.2	9.3	13.0	17.8	24.4
Private collections	7.2	8.4	9.8	11.3	13.3	15.7

[1] Collections are in million dollars
Source: Montana Coal Council, 2004, 2005, 2006, 2007, 2008, 2009

3.17.2 Population

According to 2000 census data, Sheridan County had a population of 26,560, with Sheridan, Ranchester, and Dayton accounting for 15,804, 701, and 678 of the county's residents, respectively (U.S. Department of Commerce (USDC) 2001). The 1990 population of Sheridan County, Wyoming was 23,562. Thus there was an increase of 2,998 persons or 12.7 percent over the 10-year period. Sheridan County's population change from 1990 to 2000 ranked 1,158 out of 3,141 counties in the U.S. (U.S. Census Bureau 2006).

Between 2000 and 2008 the population of Sheridan County grew by approximately 7.9 percent to a population of 28,662 (Wyoming Department of Administration & Information 2009).

Sheridan County is an area of relatively low growth (1-2 percent per year), and facilities (hospitals, schools, etc.) are adequate. School enrollment is actually declining due to an aging population. The average age in Sheridan County is 40.6 years, compared to a statewide average of 36.2. The rate of population growth in Sheridan County has increased somewhat since 2000 due to the current CBNG activity. This has contributed to both a low housing vacancy and an overcrowded jail system in Sheridan, although enrollment in schools has not increased due to a relatively young, transient work force (BLM 2003b).

Population in Big Horn County, Montana is sparse, and before mining operations began had not grown for decades. According to the 2000 Montana County Statistical Report (Montana Department of Commerce 2009a), Big Horn County had a population of 12,671 in 2000 with Hardin accounting for 3,384 (26.7 percent) of the county's residents. Between 2000 and 2008, the population of Big Horn County grew by approximately 1.3 percent to a population of 12,841 with Hardin accounting for approximately 3,487 (Montana Department of Commerce 2009b).

3.17.3 Employment

The average total labor force in Sheridan County in July 2009 stood at 16,351 with an unemployment rate of 5.8 percent, compared to 4.0 percent in 2000 (Wyoming Department of Employment 2009a). At the end of 2007, approximately 568 people in Sheridan County were employed in mining (including oil & gas extraction), representing about 4.2 percent of the employed labor force (Wyoming Department of Employment 2009b). Total employment in Sheridan County has generally increased since 1990, when it stood at 11,434. As of July 2009, there were 15,396 employed persons in the county (Wyoming Department of Employment 2009a). Employment in Sheridan County has been affected by the recent downturn in construction and natural resources and mining (including CBNG development), with the July 2009 unemployment rate nearly double the July 2008 rate (5.8 vs. 2.9 percent).

At the end of the first quarter of 2008, the largest employment sector in Sheridan County was the service sector, with 4,236 employees. This was followed by local government (2,238), retail trade (1,742), construction (1,368), and federal government (632). Together, these sectors accounted for 77 percent of the county's 13,247 classified workers (Wyoming Department of Employment 2009c).

In 1998, the largest employment sector in Big Horn County was the service sector, with 30.3 percent of the employees. This was followed by farming (13.2 percent), retail trade (12.6 percent), local government (11.4 percent), mining (8.7 percent), and federal government (7.3 percent). Together, these sectors accounted for nearly 84 percent of the county's employment (BLM/MDEQ 2003).

Decker and Spring Creek Mines are two of the three primary mining employers in Big Horn County. Montana receives the payroll taxes, royalties, and production taxes, but most of the employees from these two mines reside in Sheridan County, Wyoming. In 2008, the Decker and Spring Creek mines employed 160 and 218 people with estimated payrolls of $8,700,000 and $22,067,000, respectively (Montana Coal Council 2009).

Employment in Sheridan County has been affected by the recent downturn in construction and natural resources and mining (including CBNG development), with the July 2009 unemployment rate nearly double the July 2008 rate (5.8 vs. 2.9 percent).

3.17.4 Housing

In 2000, Sheridan County contained 12,577 housing units. Of these, 7,413 were in Sheridan, 304 in Dayton and 290 in Ranchester (U.S. Census Bureau 2006). Of Sheridan County's 12,577 housing units in 2000, 11,167 were occupied and 1,410 were vacant for seasonal use. Of the 11,167 occupied units, 7,689 were owner occupied and 3,478 were renter occupied. Similar low vacancy rates were seen for the City of Sheridan and the towns of Dayton and Ranchester. According to Census 2000 data, rental vacancy rates were 4.7 percent for the entire county, 4.5 percent for the City of Sheridan, 7.9 percent for the town of Dayton and 1.3 percent for the town of Ranchester. Very few residential building permits were issued for Sheridan County in the 1980s, but reached a high of 172 in 1996, then declined to 90 in 1999 (BLM 2003b). Estimates are that housing units in Sheridan County increased by 11.9 percent between 2000 and 2008 (WCDA 2009). The vacancy rate for rentals in Sheridan County was 3.4 percent for the first half of 2009 (WCDA 2009).

Sheridan County had the second highest cost of living index in the state as of January 2003. It ranked highest of all the counties for food, fourth in housing and apparel, tenth in transportation, third in medical, and sixth in recreation/personal care. Housing rental rates are rising much faster than the general consumer price index. Comparing the fourth quarters of 2002 and 2001, rental rates in Sheridan County had risen 5.8 percent for apartments, 28.4 percent for mobile home lots, 6.9 percent for houses, and 41.6 percent for mobile homes. This compares with a statewide overall inflation rate of 3.7 percent (BLM 2008a).

According to the Department of Administration and Information, the population and housing in Sheridan County area grew by 12.7 and 12.8 percent, respectively, between 1990 and 2000 (Wyoming Department of Administration and Information 2009).

In 2000, Big Horn County contained 4,655 housing units. Of Big Horn County's 4,655 housing units in 2000, 3,924 were occupied and 731 were vacant. Of the 3,924 occupied units, 2,535 were owner occupied and 1,389 were renter occupied. According to the Census 2000 data, the homeowner vacancy rate in the county was 2.2 percent and the rental vacancy rates were 6.3 percent for the entire county, suggesting a surplus of vacant houses on the market and for rent (U.S. Census Bureau 2001a).

According to the U.S. Census Bureau, the population in Big Horn County grew by nearly 12 percent from 1990 to 2000, but housing stock only increased by 8.2 percent (U.S. Census Bureau 2001b).

3.17.5 Local Government Facilities and Services

Public services, which are typically provided by local governments (cities, counties, and special service districts), include police and fire protection, emergency medical services, schools, public housing, parks and recreation facilities, water supply, sewage and solid waste disposal, libraries, and roads and other transportation infrastructure. Other important community services include electric and communications utilities. Tax revenues generally fund public services, although there may be other sources of revenue such as user fees or utility franchise fees. The tax base of the county or community where public services are provided is often a key component of the public services. A majority of the 1999 county tax revenues in Big Horn County (44.6 percent) came from sales and use taxes and property taxes. Mineral production provided a minor source of revenues to local governments in Big Horn County (BLM 2003c).

Public facilities in Sheridan County are meeting current needs. School District #2 (Sheridan City) enrollment is declining due to the aging population. Memorial Hospital of Sheridan County, owned by the county, is undergoing a major expansion and city and county infrastructures are being renovated.

In Montana, severance taxes imposed on 2007-2008 coal production amounted to $45,332,000 (Montana Coal Council 2009). This does not include coal severance taxes paid by Westmoreland Resources Inc. on coal owned by the Crow Tribe, which are paid directly to the Tribe and not to the state of Montana or Big Horn County. In July of 1991, the severance tax on coal in Montana was set at a rate of 15 percent of the market value. Other than severance taxes on Crow Tribe coal, severance taxes are paid directly to the state of Montana. The permanent coal trust fund (50.0 percent) and Montana's general fund (26.8 percent) receive the largest shares of the severance taxes, followed by the long-range building program (12.0 percent), the state special revenue fund (5.5 percent) and miscellaneous (5.7 percent) (Montana Coal Council 2009).

Net and gross proceed taxes paid on 2008 coal production in Montana amounted to $14,458,854. Net and gross proceed taxes are paid on the value of the coal to support county governments in counties where mines are located (Montana Coal Council 2009).

Resource indemnity trust taxes paid totaled $1,366,020 for the fiscal year 2007-2008. Resource indemnity trust taxes of 0.4 percent of the contract sales price are paid to the indemnity trust. Federal abandoned mine reclamation and black lung taxes are based on production levels (Montana Coal Council 2009).

Federal royalties of 12.5 percent of the market value of the coal are paid to the federal government for production of coal from federal lands with 50 percent being parceled back to the State. For a sale price of $7.62 per ton on the 37.3 million tons of recoverable coal within the proposed LBM tract, the royalty payments would total approximately $35.4 million over the life of mine (the total amount discounted 4.0 percent to reflect time value of money).

Westmoreland Resources paid approximately $9,327,458 in royalties to the Crow Tribe for coal mined on the Crow Indian Reservation in 2008 (Montana Coal Council 2008 and 2009). These royalties have been primarily distributed to Tribal members as per capita payments. The Tribe also receives production taxes on the coal produced at the mine, at the same rates as the Montana severance and gross proceeds taxes.

Annual rental for the two land use permits is $200 per year for each permit and current rental for the 25 acres of the existing land use lease is $1,700 per year. These receipts are deposited in the General Fund of the U.S. Treasury.

3.17.6 Environmental Justice

Environmental justice issues are concerned with actions that unequally impact a given segment of society either as a result of physical location, perception, design, noise, or other factors. On February 11, 1994, Executive Order 12898, the *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations* was published in the *Federal Register* (FR) - 59 FR 7629. The Executive Order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level). The Executive Order makes it clear that its provisions apply fully to Native American populations and Native American tribes, specifically to effects on tribal lands, treaty rights, trust responsibilities, and the health and environment of Native American communities.

Communities within Sheridan County, Wyoming and Big Horn and Rosebud Counties, Montana, entities with interests in the area, and individuals with ties to the area all may have concerns about the presence of an active coal mine within the area. Communities potentially impacted by the presence or absence of a coal mine have been identified in this EA. Environmental justice concerns are usually directly associated with impacts on the natural and physical environment, but these impacts are likely to be interrelated with social and economic impacts as well. Native American access to cultural and religious sites may fall under the umbrella of environmental justice concerns if the sites are on tribal lands or if treaty rights have granted access to a specific location.

Big Horn and Rosebud Counties include Indian reservations with substantial Native American populations. Based on 2006 population estimates, Big Horn County the population is approximately 61 percent Native American. This county includes most of the Crow Reservation and part of the Northern Cheyenne Reservation. Approximately 34 percent of Rosebud County is Native American. This county is located north of the project area and includes the part of the Northern Cheyenne Reservation not located in Big Horn County. In 2000, over 5,000 Native Americans lived on the Crow Reservation and over 4,000 Native Americans lived on the Northern Cheyenne Reservation.

In 1999, 29 percent of the population living in Big Horn County and 27 percent of the population in Rosebud County had incomes below the poverty level. These figures compare to a statewide figure of 14 percent and reflect the relatively large numbers of persons on the reservations living in poverty.

3.18 Greenhouse Gas Emissions

There has been, and continues to be, considerable scientific investigation and discussion as to the causes of recent historic rise in global mean temperatures (global warming) and whether a warming trend will continue. If the coal on the LBM tract is leased and mined, so-called "greenhouse gases" (GHGs) would be released to the atmosphere as a result of fuels and explosives used in the mining process and fuels used for rail transportation. GHGs are an issue because of global warming and climate change. Global warming is a theory that certain gases in the atmosphere impede the radiation of heat from the earth back into space, trapping heat like the glass in a greenhouse. This raises the average temperature of the surface of the earth and the lower atmosphere, which contributes to climate change. Among these GHGs are carbon dioxide (CO_2), methane (CH_4), water vapor, ozone, and nitrous oxide (N_2O). Greenhouse gases are not regulated, but there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making. A more complete discussion of the global warming and climate change phenomena is included in Section 4.1.17.2.

Ongoing scientific research has identified the potential impacts of anthropogenic (human-made) GHG emissions and changes in biological carbon sequestration due to land management activities on global climate. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused CO_2e concentrations to increase. "As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documented trends." (EPA 2008).

The use of the coal after it is mined is not determined at the time of leasing. However, almost all coal that is currently being mined in the Montana PRB is being used to generate electricity by coal-fired power plants. A discussion of emissions and by-products that are generated by burning coal to produce electricity and a more complete discussion of the current status of global climate change and cumulative considerations is included Section 4.1.17.

As discussed in Chapter 2, under Spring Creek Mine's currently approved mining plan, which represents the No Action Alternative, SCCC anticipates that the mine would produce its remaining estimated 317 million tons of recoverable coal reserves in 17.6 years at an average annual production rate (post-2009) of approximately 18 million tons. Leasing and subsequent mining the LBM tract under the Proposed Action and mining at an average annual production rate of 18 million tons, SCCC estimates that the life of the mine would be extended by about 2.1 additional years.

SCCC has conducted an inventory of expected greenhouse gas emissions that occurred in 2008, based on 17.9 million tons of coal produced that year (Table 3-19). Emissions are measured as CO_2 equivalents, a conversion to put any of the various gases emitted, i.e. CH_4 or N_2O, into the equivalent greenhouse effect as compared to CO_2. Emissions are measured as metric tons (tonnes) of equivalent CO_2 (CO_2e), which is the amount of gas emitted, multiplied by its warming potential relative to CO_2. The inventories included

emissions from all sources, including all types of carbon fuels used in the mining operations, electricity used on site (i.e., lighting for facilities, roads, and operations and electrically powered equipment and conveyors) and mining processes (i.e., blasting, coal fires caused by spontaneous combustion, and methane released [vented] from exposed coal seams).

Table 3-19. Estimated Annual Equivalent CO_2 Emissions[1] at the Spring Creek Mine.

Source	**2008**
Fuel	35,147
Electricity	57,073
Mining Process	10,336
Arranged Rail Transport	11,483
Total of Four Sources	**114,039**

[1] CO_2e in tonnes
Source: CPE 2009

Chapter 4
ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents the potential environmental, social, and economic effects from the actions described in each alternative in Chapter 2. This chapter is organized by action resource in the same sequence they were discussed in Chapter 3. Table 4-1 provides a summary comparison of the impacts of action alternatives on the existing mine disturbance area.

Table 4-1. Summary Comparison of Impacts of Action Alternatives Compared to the Currently Approved Mine Plan.

Item	No Action Alternative	Added by Proposed Action	Added by LUL Amendment
Federal Lease Area (acres)	3,773.0 ac.[1]	498.1 ac.	0
Disturbance Associated Within Tracts	0.0 ac.	498.1 ac.	197.1
Total area to be Disturbed	4,707.9 ac.[2]	819.9 ac.[3]	197.1
Percent Increase in Area to be Disturbed	0.0	17.4	4.2
Insitu Coal (mm tons) (as of 1/1/09)	402.0	50.8	0 mmt
Recoverable Coal (mm tons) (as of 1/1/09)	317.0	37.3	0 mmt
Total Projected State Revenues Added by Alternative (post-2008)[4]	$ 0.0 million	$ 73.6 million	$ 0.0 million[6]
Total Projected Federal Revenues Added by Alternative (post-2008)[5]	$ 0.0 million	$ 21.8 million	$0.5 million

[1] Within current permit boundary.
[2] Currently permitted disturbance. SCCC has submitted a mine plan revision that would add approximately 868 acres of additional disturbance to the currently permitted disturbance area.
[3] Includes acres within tract and acres of associated disturbance outside of the tract.
[4] Revenues to the state of Montana include income from severance tax and Montana's share of federal royalty payments and bonus bids. State revenues are based on royalties: $7.62 per ton price (estimated average contract price over 25 years minus Black Lung fees, AML fees and Montana Severance tax fees) × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share; plus bonus payment on LBM leased coal: $0.183 per ton (based on last LBM upfront bonus payment) × amount of mineable coal minus federal's 50 percent share; plus severance tax: $9.59 per ton price (estimated average value of coal over 25 years) × amount of recoverable coal × state severance tax rate of 12.5 percent. Total income from royalty and severance income was discounted 3.45 percent to reflect time value of money. Rate was derived from 10-year Treasury Note currently yielding 3.45 percent (as of 12/10/09).
[5] Federal revenues are based on royalties: $7.62 per ton price (estimated average contract price over 25 years minus Black Lung fees, AML fees and Montana Severance tax fees) × amount of recoverable coal × federal royalty of 12.5 percent minus Montana's 50 percent share; plus bonus payment on LBM leased coal: $0.183 per ton (based on last LBM upfront bonus payment) × amount of mineable coal minus Montana's 50 percent share. Total income from royalty and severance income was discounted 3.45 percent to reflect time value of money. Rate was derived from 10-year Treasury Note currently yielding 3.45 percent (as of 12/10/09).
[6] The state of Montana would receive approximately 4 percent ($21,500) of the LUL rental payment.

Cumulative effects analysis considers the possible effects from each alternative in combination with other relevant cumulative activities presented in Chapter 2. References to short-term impacts include impacts of 0 to 10 years and long-term impacts refer to impacts of greater than 10 years in duration.

BLM evaluated the potential mining development for the coal lease modification and LUL amendment using a revised RFD scenario developed by BLM and SCCC. This scenario allowed BLM to evaluate potential environmental impacts resulting from the Proposed Action and other potential long range future actions. The revised RFD area is identified as the Spring Creek South RFD. The coal lease modification, LUL amendment, and Spring Creek South RFD areas are shown on Figure 1-1. BLM has not received an application to lease federal coal within the Spring Creek South RFD.

Table 4-1 presents a comparison of the area that would be impacted under the Proposed Action and Alternative 1 (No Action Alternative). The Proposed Action would approve the coal lease modification as

applied for by SCCC and would approve the assignment, renewal and amendment of the land use lease, with a change of the unsuitability designation. Under Alternative 1, the No Action Alternative, SCCC's applications to lease the coal and assign/renew/amend the land use lease would be rejected and the coal included in the LBM tract would not be mined.

The Proposed Action includes one coal lease tract and comprises a total of about 498.1 acres and 50.8 million tons of in-place coal. Of the total, approximately 37.3 million tons would be recovered from the one tract under the proposed mine plan. The Proposed Action would add approximately 1,017 acres of disturbance (498 acres within the LBM tract, 197 acres within the LUL tracts, and 322 acres of associated disturbance outside of the LBM tract).

4.0.1 Mitigation

Implementation of the Proposed Action would result in changes/impacts to sage-grouse habitat, vegetative species of concern, and cultural resource sites. To reduce or minimize these impacts to sage-grouse habitat, SCCC must implement a Habitat Recovery and Replacement Plan as detailed in Appendix B. The reclamation of the sage-grouse habitat within the LBM and LUL tracts outlined in the HRRP would fulfill the reclamation requirements normally in place for the mule deer and pronghorn antelope habitat within the disturbance area associated with the Proposed Action. The HRRP would provide quality habitat for both big game and grouse.

Implementation of the Proposed Action would also result in impacts to cultural resource sites within the LBM and LUL tracts. Any sites eligible for the NRHP would need to be mitigated prior to disturbance. Mitigation of NRHP eligible sites within the LBM and LUL tracts would center around data recovery. An excavation and data recovery plan has been developed to mitigate the impacts to the only known NRHP cultural site (24BH3392) within the areas impacted by the Proposed Action. The plan is attached to this document as Appendix D and would be attached to the coal lease as a special stipulation requiring implementation of the plan prior to site disturbance.

4.0.2 Cumulative Effects Common to Both Alternatives

Cumulative Effects: Disturbance would continue within the existing permit boundary as approved by the currently approved mine plan. The current unsuitability designations on lands within the Spring Creek South RFD that are outside of the disturbance area associated with the Proposed Action lands would remain in place.

At least 108 acres of surface disturbance would occur within the LBM tract (Figure 4-1), regardless of the action taken on the application, if the Pearson Creek mine plan revision that relates to mining the state owned coal in Section 36 (T.8S., R.39E.), is approved. This disturbance would include such things as acquiring additional borrow material, overstripping to allow coal to be removed from the adjacent existing leases, and to tie the reclamation into native ground. The Pearson Creek revision is being reviewed by MDEQ/OSM and has not yet been approved and is mentioned here as a potential for surface disturbance within the LBM tract.

4.1 Effects From Proposed Action

Under the Proposed Action approximately 1,017 acres would be added to the currently approved disturbance acreages within the SCCC permit boundary and approximately 50.8 million tons of in-place coal would be included in the lease (Table 4-1). Approximately 498 acres of the 1,017 acres of new disturbance are within the LBM tract and approximately 197 acres of the new disturbance are within the LUL for coal recovery activities (coal mine layback, a flood control structure, topsoil and overburden stockpiles, and transportation and utility line corridors). The remaining 322 acres of disturbance are for pit regrading and to accomplish reclamation outside of the LBM tract.

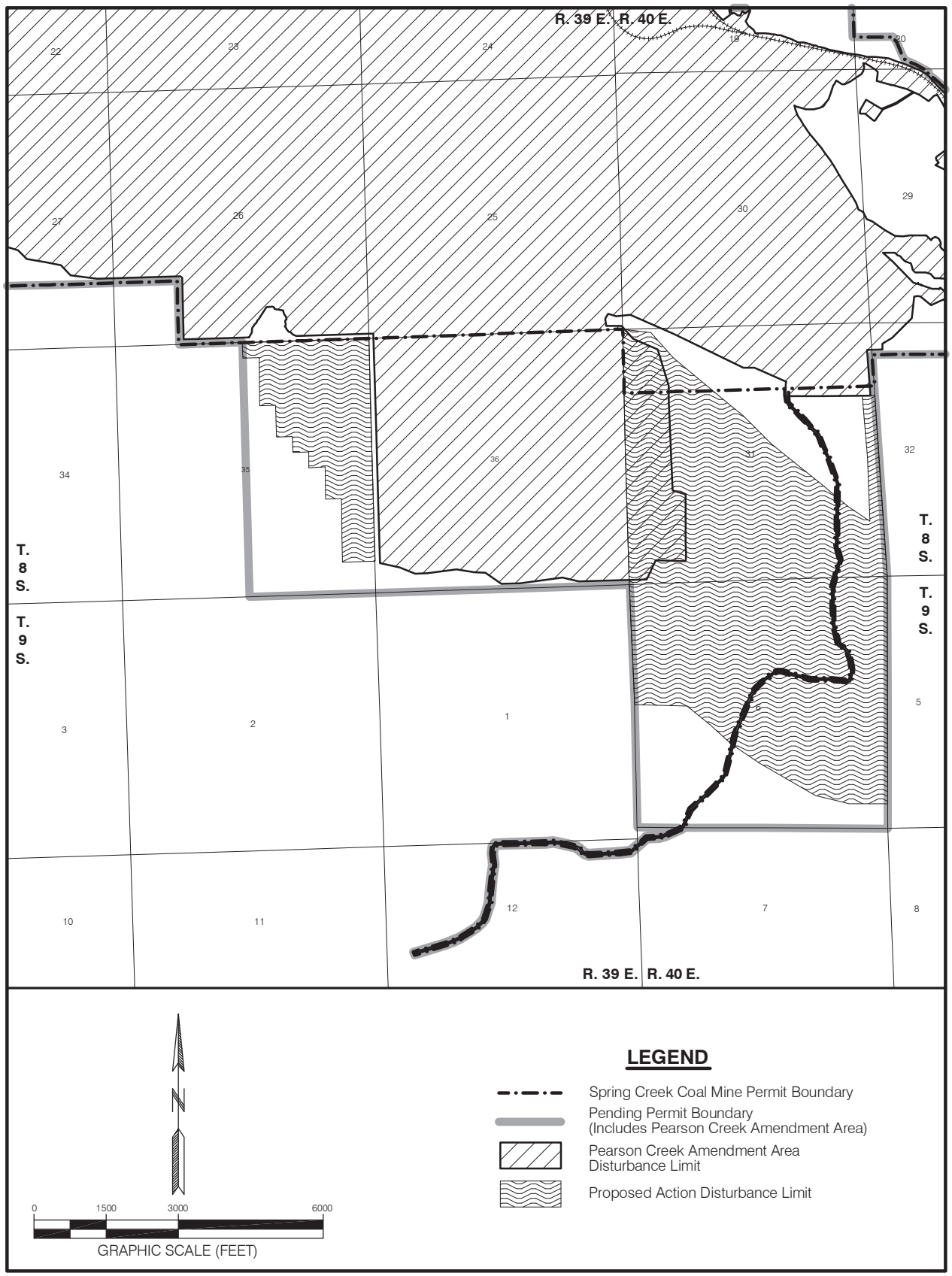


Figure 4-1. Pearson Creek Amendment Area Disturbance Limit and Proposed Action Disturbance Limit.

4.1.1 Topography and Physiography

Direct and Indirect Effects: Surface coal mining would permanently alter the topography of the disturbance area associated with the LBM and LUL tracts. Topsoil would be removed from the land and stockpiled or placed directly on recontoured areas. Overburden would be blasted and stockpiled or directly placed into the already mined pit, and coal would be removed. The existing topography on the tracts would be substantially changed during mining. Highwalls with vertical heights equal to overburden plus coal thickness would exist in the active pits (Figure 2-2).

Typically, a direct permanent impact of coal mining and reclamation is topographic moderation. After reclamation, the restored land surfaces are generally gentler, with more uniform slopes and restored basic drainage networks. Portions of the original topography of the tracts are somewhat rugged. As a result, the expected post-mining topography would be more subdued, but would blend with the undisturbed surroundings. Following reclamation, the average post-mining topography would be slightly lower in elevation than the pre-mining topography due to removal of the coal. The removal of the coal would be partially offset by the swelling that occurs when the overburden and interburden are blasted, excavated, and backfilled. The land surface would be restored to the approximate original contour or to a configuration approved by MDEQ during the mine permitting process.

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

A change in surface runoff and natural erosion rates would be associated with topographic moderation. Where topography would be moderated and elevation lowered, there would be a decrease in surface runoff, peak flows, bank stability, and erosion rates and a change in sediment load. The change in base level would cause accelerated erosion, incisement, and increased runoff upslope from the recontoured areas. The approximate original drainage pattern would be restored. Any topographic changes would not conflict with regional land use, and the post-mining topography would adequately support anticipated land use of the LBM and LUL tracts. These measures are required by state regulations and are therefore considered part of the Proposed Action.

The topography of the tracts will be altered under the Proposed Action. There would be no change to topography of the tracts with the No Action Alternative under the currently approved mine plan. At least 108 acres of surface disturbance would occur within the LBM tract if the Pearson Creek mine plan revision is approved. If the LBM modification and LUL amendment are approved, the revised reclamation and mine plan, including postmine topography, will be subject to MDEQ approval.

Cumulative Effects: Following surface coal mining and reclamation, topography would be modified within the permit boundary of the Spring Creek Mine. The topography in the general vicinity of the surface mine is somewhat diverse, ranging from the relatively flat, rolling terrain found adjacent to the Tongue River Reservoir to the comparatively rugged terrain with steeply sloping ravines found in the uplands. After reclamation, the topography outside of the valley bottoms would be less rugged, more homogeneous and gentler. In general, pre-mining features that were more topographically unique (e.g., steeper hills and ravines, rock outcrops, etc.) would be smoothed with more uniform slopes.

The overall reduction in topographic diversity in the mine permit area may lower the carrying capacity for big game as well as other species in the reclaimed areas; however, big game ranges are generally very large, mining activities are, in general, not located in habitats defined as crucial. The reduced relief and subdued topography would result in a local increase in infiltration rate of surface water, a local decrease in the natural erosion rate, and reduced peak flows from the drainages. The reshaped land surface, being more uniform and subdued, could be less visually attractive to some observers, but the differences between native and reclaimed

lands diminish with time. The construction and operation of CBNG wells and associated production facilities would cause minimal overlapping topographic and/or physiographic changes.

4.1.2 Geology, Mineral Resources, and Paleontology

Direct and Indirect Effects on Geology: The geology from the base of the A/D coal seam to the land surface would be subject to permanent change on the areas of coal removal. Mining would substantially alter the resulting subsurface physical characteristics of these lands. The replaced overburden (backfill) would be a relatively homogeneous (compared to the pre-mining layers of shale, siltstone, and sandstone overburden) and partly recompacted mixture. The replaced backfill would range from 180 to 300 ft thick.

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

Direct and Indirect Effects to Mineral Resources: Over the short term, the coal resource under the LBM area would be mined and lost to any future production. During mining, other minerals present on the LBM tract could not be developed. However, some of these minerals could be developed after mining. No conventional oil and gas wells are present on the tracts. The reservoirs from which the conventional oil and gas wells are produced are below the coal and would not be disturbed by mining or surface disturbance; therefore, the potential exists for conventional oil and gas exploration and production from any subcoal oil and gas reservoirs under the tracts following mining.

As discussed in Section 3.3, CBNG development has rapidly occurred adjacent to the LBM and LUL tracts since 1999. Five of the eight coal seams generally found within the Fort Union Formation are considered economically recoverable for CBNG within the tracts. The Anderson, D1, D2, Canyon, and Carney would be expected to produce CBNG in the area. Of these five, only the Anderson, D1, and D2 (all three are combined into the A/D in the LBM tract seams would be directly affected by mining. CBNG resources that have not been recovered from the A/D within the LBM tract prior to mining would be irretrievably lost when the coal is removed. Dewatering that occurs as a result of mining also lowers the coal seam aquifer's water levels and reduces the hydrostatic pressure, which may allow CBNG to desorb and escape from the seams on lands adjacent to the LBM tract, including coal under the LUL tracts, if it is not recovered prior to mining. CBNG in the Canyon and Carney seams not recovered prior to mining could be recovered after mining. However, those resources could potentially be drained from underneath the tracts during mining by wells completed in the Canyon and D4 seams on lands adjacent to the tracts.

As of November 12, 2009, there were 903 CBNG wells completed within the CX Field, which includes the LBM and LUL tracts and the Spring Creek South RFD area (MBOGC 2009). Three CBNG wells have been completed within the Spring Creek South RFD, although none are within the LBM and LUL tracts (Figure 3-11). There are no producing CBNG wells within the LBM or LUL tracts or within the Spring Creek South RFD area.

One conventional oil/gas well has been completed within the Spring Creek South RFD (Figure 3-11). This hole was dry and has been plugged and abandoned (MBOGC 2009).

The Final Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans (BLM, 2003c) assumed an average well life of 20 years for CBNG wells in the PRB of Montana, based on a review of average production well life for existing

wells east and west of the Tongue River. It is unlikely that any CBNG would be recovered from the D1 within the LBM and LUL tracts due to the absence of existing CBNG wells on the tracts and the relatively fast onset of mining activity scheduled for the tracts if the coal lease modification and LUL amendment are approved. CBNG reserves not recovered from the D1 prior to mining would be vented to the atmosphere. There are no existing facilities or equipment associated with CBNG production and development on the tracts.

Direct and Indirect Effects to Paleontology: No unique or significant paleontological resources have been identified or are suspected to exist on the LBM and LUL tracts. The likelihood of encountering significant paleontological resources is very small. Lease and permit conditions require that should previously unknown, potentially significant paleontological sites be discovered, work in that area shall stop and measures shall be taken to assess and protect the site. The collection of petrified wood is guided by 43 CFR 3622.1-4 and 43 CFR 8365.1-5.

Cumulative Effects: The PRB coalfield encompasses an area of about 12,000 mi^2. Finley and Goolsby (2000) estimate that there are approximately 587 billion tons of coal in beds thicker than 20 ft and deeper than 200 ft in the basin. Most of the current federal coal leases in the PRB include coal with overburden thicknesses of 200 ft or less. These coal reserves represent a small percentage of the total coal reserves but a large percentage of the shallowest (hence the most economical to recover) coal reserves.

Wyoming PRB coal production in 2008 was approximately 451 million tons. The PRB mines located in Campbell and Converse Counties, Wyoming produce around 96 percent of the coal produced in the state each year (Wyoming Department of Employment 2005b). Montana PRB coal production in 2008 was approximately 45 million tons. Mines located in Big Horn and Rosebud Counties, Montana produced around 99 percent of coal produced in Montana each year (Montana Coal Council 2009).

The current total area to be disturbed within the Decker Coal permit boundary is 6,356 acres, while Spring Creek Coal is currently permitted to disturb 4,708 acres. If the coal lease modification and LUL amendment are approved about 5,725 acres would be disturbed associated with the Spring Creek mine. Thus the total area permitted for disturbance by surface coal mining in the Spring Creek/Decker area would be about 12,081 acres. The Pearson Creek Amendment is being reviewed by MDEQ/OSM and has not yet been approved. If approved, 932 additional disturbance acres would be added to the above total, which includes incidental permit boundary revisions and disturbance in the Pearson Creek area. It is possible that SCC may want to lease the coal under the LUL in either the short term or long term. If this is the case, SCC would be required to submit an application to lease this coal and BLM would conduct the proper NEPA analysis prior to making any decisions to lease.

In the areas of coal removal, the geology has been or would be disrupted and the coal has been or would be recovered. When the overburden and topsoil are replaced, the natural stratification of these shallow geologic layers are destroyed in the area of coal removal. The backfill is a more homogenous mixture of shale, siltstone and fine-grained sandstone. The mined lands are restored to approximate pre-mining elevations.

CBNG wells can be drilled on private and state oil and gas leases after approval by the MBOGC. On State minerals, the DNRC's Land Board must grant approval before drilling can occur. On federal oil and gas leases, BLM must grant approval before drilling can occur. The MBOGC, DNRC and the BLM must analyze the direct, indirect and cumulative environmental impacts of proposed development, as required by the Montana Environmental Policy Act (MEPA) and NEPA, before CBNG drilling on the federal leases can be authorized.

Coal and CBNG are non-renewable resources that form as organic matter decays and undergoes chemical changes over geologic time. The CBNG and coal resources that are removed to generate heat and power would not be available for use in the future. No potential damages to the coal resulting from removal of the

CBNG and water prior to mining have been identified. The CBNG operators generally do not completely dewater the coal beds to produce the CBNG because that could lower CBNG production.

Impacts to paleontological resources as a result of the already-approved cumulative energy development occurring in the PRB consist of losses of plant, invertebrate, and vertebrate fossil material for scientific research, public education (interpretive programs), and other values. Losses have and will result from the destruction, disturbance, or removal of fossil materials as a result of surface-disturbing activities, as well as unauthorized collection and vandalism. A beneficial impact of surface mining can be the exposure of fossil materials for scientific examination and collection, which might never occur except as a result of overburden removal, exposure of rock strata, and mineral excavation.

4.1.3 Air Quality

Direct and Indirect Effects: The amount of air increment used by a particular operation is highly dependent upon the type of operation, the types of equipment, and the mining sequence. Under the Proposed Action the air quality impacts would not be greatly different from those expected from mining the existing leases. Acquisition of new lease acreages under the Proposed Action would increase the length of time (2.1 years) during which full mine production occurs. No changes in mining methods are proposed. There would not be additional sources of fugitive dust. The relative locations of emission sources such as topsoil removal areas, haul roads, and active pit areas would change but the numbers and types of sources would not. Reclamation, which would reduce areas contributing to air quality impacts, would continue at a pace equal to the No Action Alternative but would be extended to reclaim areas disturbed under the Proposed Action.

SCCC's air quality permit was amended in 2007 to change the Best Available Control Technology (BACT) to include ADS and PEC for the overland conveyors/in-pit crusher (SCCC 2007b). While the amount of additional air quality resource that is available for future mining cannot be quantified without a rigorous technical evaluation, the analysis of emissions for the MDEQ permit modification would be similar to previous analyses since there are no proposed changes in mining methods or rates from the existing approved mine plan.

The net short-term effect to air quality would be determined ultimately through monitoring. Blasting is not a major source of emissions at the Spring Creek Mine. The fugitive dust emissions estimates for the Spring Creek Mine area indicate that overburden and coal blasting comprise less than 1 percent of the total emissions at the mine. The major emission sources are coal haul roads, wind erosion, and topsoil and overburden removal, which comprise less that 80 percent of the total emissions at the mine (SCCC 2006b).

Existing mining has not violated air quality standards. Since the mining practices will not change and the geologic conditions are similar, no additional impact to air quality are expected under the Proposed Action. The current acceptable (permitted) impacts would continue for an additional 2.1 years.

Blasting and mining operations within the LBM and LUL tracts would not be near Route FAS 314 and the dust plumes from operations would not be more visible to the public than current operations. There is a potential for highway traffic to be affected on occasion by winds blowing dust plumes as a result of the proximity of the pit to the highway and road, with or without the LBM or LUL leases. As documented in Section 3.13, most of the traffic on Route FAS 314 consists of employees of the mines north of Sheridan or recreationists going to Tongue River Reservoir.

The impacts to visibility are considered in relation to PSD Class I and Class II areas. The nearest Class I area is located approximately 16 miles north of the proposed LBM and LUL tracts, at the Northern Cheyenne Indian Reservation. The prevailing wind would generally protect this Class I area from mining related visibility impacts. Should surface inversion conditions occur in the northern portion of the Powder River Basin, impacts on air quality could be higher in the short term in this area due to coal mining activities. This

would be temporary, lasting only during the inversion. Air quality impacts would cease to occur after mining and reclamation are complete.

In summary, the Spring Creek Mine, including the LBM and LUL tracts, will be within the requirements of their current air quality permit. SCCC proposes to mine the existing leases and the proposed lease modification area using similar equipment and similar emission control methods. The overburden and coal thicknesses on the proposed LBM and LUL tracts are similar to parts of the existing Spring Creek coal leases. SCCC does not propose to increase production above the currently permitted maximum rate with or without the proposed LBM tract, but acquisition of the LBM tract proposed for mine disturbance would increase total production over the life of the mine. As a result, the air quality impacts of mining/disturbing the proposed LBM and LUL tracts would not be expected to be greatly different from those predicted for mining the existing Spring Creek lease at the maximum permitted rate of 24 mmtpy. Mining/disturbing the proposed LBM and LUL tracts would extend the period of maximum production and result in relocation of some emission sources over time.

Cumulative Effects: Surface coal mining activities generate fugitive dust and particulate and gaseous tailpipe emissions from large mining equipment. As described in Section 3.4, the original federal health standard for dust, the TSP standard, was based on measuring the concentration of all dust particulates in the air. The current federal health standard for dust, the PM_{10} standard, is based on measuring the concentration of air-borne dust particulates that are less than 10 micrometers in diameter (PM_{10}).

Since most surface coal mining dust consists of relatively large particulates, the more recent PM_{10} federal dust standard may have less impact on surface coal mining activities than did the older TSP standard. This is because monitoring at operating coal mines has indicated that, at the same distance from an active pit, the PM_{10} concentration is typically about one-third the TSP concentration.

Particulate emissions are controlled by the amount of regulation imposed as well as by coal production. Actual emission rates are less than the projected emission rates since regulations have become stricter during this time period. In particular, treatment of haul roads and stockpiles, covering of conveyors, and more rapid revegetation of disturbed areas have become the norm rather than just being used in special cases.

The nearest Class I area is located approximately 16 miles north of the proposed LBM and LUL tracts at the Northern Cheyenne Indian Reservation. Should surface inversion conditions occur in the northern portion of the Powder River Basin, cumulative impacts on air quality could be high in the short term in this area due to coal mining activities. This would be temporary, lasting only during the inversion. Air quality impacts would cease to occur after mining and reclamation are complete.

Air quality impacts related to oil and gas development would occur during construction (due to potential surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBNG well production equipment, booster and pipeline compression engine exhausts). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Maximum construction impacts from fugitive dust (24 hour PM_{10}) are estimated to be 55 $\mu g/m^3$, about one third of the applicable MAAQS. Actual air quality impacts depend on the amount, duration, location, and emission characteristics of potential emissions sources, as well as meteorological conditions (wind speed and direction, precipitation, relative humidity, etc.). For additional information about the cumulative impact analyses and assumptions used in the cumulative air quality impact assessment, refer to the Powder River Oil and Gas Project EIS (BLM 2003a), the Montana Final Statewide Oil and Gas EIS (BLM 2003c) and the Air Quality Impact Assessment Technical Support Document (Argonne 2002).

4.1.4 Water Resources

It is generally recognized that surface coal mining impacts local hydrology, including both the surface and groundwater systems. As a result, the analysis and mitigation of hydrologic impacts is carefully planned during the preparation of mining permit application documents and is reviewed during the mining permit process.

4.1.4.1 Groundwater

Direct and Indirect Effects: The general impacts to groundwater as a result of surface coal mining include the following:

- Removal of the coal aquifer and any overburden and alluvial aquifers within the areas that are mined, and replacement of these aquifers with backfilled overburden material. Should any overburden or alluvial aquifer be critical to the area's hydrologic balance, and restoration of the essential hydrologic functions can only be achieved by reestablishment of the aquifer, these materials may be selectively salvaged and replaced.
- A lowering of static water levels in the coal and overburden aquifers around the mine due to dewatering associated with removal of these aquifers within the mine boundaries. This reduction in static water levels would not be permanent, and recharge to the backfill and adjacent undisturbed aquifers would occur as the mined area is reclaimed.
- Other groundwater impacts, which may or may not occur, or which may occur only at specific locations, include changes in water quality (usually deterioration) within and outside the area that is mined and reclaimed as a result of communication between the reclaimed aquifer and the unmined aquifer, and changes in recharge-discharge conditions and/or groundwater flow patterns.

The overburden and the A/D coal aquifer would be removed from the proposed LBM tract during the mining process. These aquifers would be replaced with backfilled overburden and interburden materials. The physical characteristics of the reclaimed backfill material are dependent upon mining methods and premining overburden lithology. Overall, the permeability and porosity of the spoils at the proposed LBM tract is expected to be greater than the original material. The reclaimed spoil aquifer might provide adequate water quantity for stock wells. The reclaimed spoil aquifer may be sufficient to support groundwater flow patterns that are similar to premining patterns, allowing for the fact that one aquifer (the reclaimed backfill aquifer) would replace the original aquifer systems in the areas that are mined and reclaimed.

After mining and reclamation, groundwater discharges from the backfill aquifer would alter the water quality of the down gradient aquifers. The overburden is highly fractured by blasting and dragline removal, and the newly exposed particle surfaces contain quantities of leachable minerals and salts that dissolve in the invading groundwater as the mine backfill resaturates. Trace amounts of arsenic and slightly elevated levels of aluminum have been detected in overburden monitoring wells, which have been attributed to pit plumage and trap and pond water impoundment infiltration (SCCC 2008c). According to a previous study (Clark 1995), the groundwater is moving from an upgradient coal aquifer to the backfill aquifer in the Spring Creek Mine area. As water moves from the coal aquifer to the recently backfilled overburden, dissolved concentrations of sulfate, sodium, and bicarbonate ions have increased, and thus the groundwater from the backfill aquifer has a higher TDS concentration than the water in the coal. The increased concentrations of sodium, sulfate and bicarbonate in the backfill aquifer most likely results from the dissolution of calcite or dolomite and gypsum, followed by the ionic exchange of calcium and magnesium ions for sodium ions on the smectite clays in the backfill aquifer. Studies have shown that the soluble salts (calcite, dolomite, gypsum) are mostly flushed from the flow path after approximately one pore volume has passed through the previously unsaturated material. After the first pore volume, TDS concentrations in the spoils water are anticipated to be less than 20% of the maximum increase over background concentrations that had occurred (Van Voast and Reiten 1988). Under typical conditions at the Spring Creek Mine area, groundwater from the backfill will move downgradient to the adjacent, unmined coal aquifer. Anaerobic conditions in the coal allows for sulfate

reduction, which decreases the sulfate concentration. Sulfate reduction also releases bicarbonate, resulting in precipitation of calcium and magnesium as calcite and dolomite. As a result, a reduction in the TDS concentration would occur and the SAR would increase. The coal crops beneath the Tongue River Reservoir. The water in reservoir would dilute those constituents which remain in solution. As such, there is expected to be no discernable change in the beneficial uses of the reservoir or its water. The reservoir has recently been enlarged, which would further dilute salts mobilized from the backfilled aquifer.

If the coal lease modification and LUL amendment are approved, the revised reclamation and mine plan, including restoration of the essential hydrologic function, will be subject to MDEQ approval.

Cumulative Effects: The cumulative impacts to groundwater as a result of surface coal mining and CBNG production are discussed as follows:

- The effect of the removal of the coal aquifer and any overburden aquifers within the mine area, and replacement of these aquifers with backfill material.
- The extent of the temporary lowering of static water levels in the aquifers around the mine due to dewatering associated with removal of these aquifers within the mine boundaries and CBNG production around the area.
- Changes in water quality as a result of mining.

The effects of replacing the coal and overburden aquifers with backfilled overburden are the foremost groundwater concern. Mining/disturbing the LBM and LUL tracts would increase the cumulative size of the backfill area in the Tongue River drainage basin.

Recharge to the backfill aquifer in the Spring Creek Mine is primarily by infiltration of direct precipitation on nearby scoria outcrops. Not all scoria is saturated, however. Some of the clinker is mined for road surfacing and railroad ballast, but saturated clinker is not generally mined since abundant clinker exists above the water table and does not present the mining problems that would result from mining saturated clinker. Therefore, no cumulative impacts to groundwater recharge areas would occur as a result of mining/disturbing the LBM and LUL tracts.

The second major groundwater issue is the extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines. The groundwater impacts that would be expected as a result of CBNG production and mining/disturbing the LBM and LUL tracts would be the simultaneous pumping to release CBNG and dewater the active mine pits. Where the effects of pumping from mines (e.g., Spring Creek, North, West and East Decker mines) and CBNG production overlap, additional water level declines result from concurrent operations. The deeper coal aquifers are aerially more continuous, and a possibility exists that the areas influenced by pumping related to CBNG production and pumping at the Spring Creek and Decker mines could locally overlap. Should this overlap occur, the decline in water levels in wells adversely affected would be the sum of the declines caused by dewatering in the nearby mines and pumping in the local CBNG fields. Domestic and stock wells that are completed in a coal seam near a producing CBNG field or located near active mines are therefore within the potential drawdown area and anticipated to have decreased yields as a result of CBNG and mining related drawdown. Springs that emit from the developed coal seam and are located within the potential drawdown area would also be anticipated to have decreased yields as a result of CBNG and mining related drawdown. The greater the magnitude of drawdown (such as that within producing fields and near active mine pits), the greater the decreases in yield would be. Only those wells completed within the dewatered coal seam would be affected by the CBNG pumping since the coal seams are confined aquifers. Wells completed within or above the mined coals would be affected by mine dewatering. Similarly, only the springs that emit from the developed coal seam would be affected by CBNG, and those that emit from the mined coal or units above it could be affected by mine dewatering.

Shallow coal aquifers located in the Tongue River Member of the Fort Union Formation stratigraphically above the A/D coal seam should not experience cumulative declines because these aquifers lack hydraulic continuity between the existing mines and CBNG does not typically tap these shallow coal aquifers.

Fidelity Exploration & Production estimates the extent of the 20-year, 20-foot drawdown zone from the edge of the nearest proposed CBNG well field, which is adjacent to the LBM and LUL tracts, would be approximately 2.7 miles. Based on the three-dimensional groundwater modeling conducted for the MT FEIS, it was estimated that after 20 years of pumping, the 20-foot drawdown contour would likely extend 2.5 to 4.2 miles from well fields, unless limited by faulting or other hydrogeologic boundaries (BLM 2003c). The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. After more than 5 years of CBNG production, drawdown of up to 20 feet has been measured in the coal seams at a distance of roughly 1 mile outside the production areas, close to, but slightly less than, the drawdown predicted (MBMG 2005).

The third issue of concern with groundwater is the effect of CBNG production and mining on the water quality. Since all surface coal mines within the regional study area reclaim the active pits with backfill material, the concentration of dissolved solids and sulfates are expected to be higher in water from backfill aquifers than in water from undisturbed overburden or coal aquifers. This is expected because blasting and movement of overburden materials places previously unsaturated material into the groundwater flow path, increasing the availability of soluble materials. The spread of the dissolved solutes discharging from reclaimed areas would be difficult to predict. However, Montana State regulations require surface coal mine permitees to replace any groundwater supply for domestic, agricultural, industrial, or any other legitimate use if such a supply is diminished, interrupted, or contaminated, to the extent of precluding use of the water, as a result of mining.

Changes have occurred in the quality of water in shallow (i.e. alluvial) aquifers, in response to infiltrated CBNG produced water. TDS concentrations increased initially and are now being observed to decrease as the available salts are flushed from the systems. The trend of decreasing TDS concentration is expected to continue.

4.1.4.2 Surface Water

Direct and Indirect Effects: General impacts to surface water resulting from surface coal mining include the following:

- Disruption of the surface drainage system (stream channels and their watershed areas) and the connectivity with groundwater during mining and replacement of these systems during reclamation.
- Changes in streamflow patterns during mining caused by the regulatory requirement to store runoff and settle out solids; by construction of flood control reservoirs or diversion systems needed to prevent unacceptable levels of runoff from entering the pit; and by permitted discharges of pit inflows to streams or other sources of water not needed by the mine. Changes in runoff rates due to changes in precipitation infiltration rates on restored land.
- Changes in erosion and sedimentation rates due to hydromodification, topographic moderation, and changes in runoff rates.
- Changes in surface water quality.

The incremental impacts to the surface drainage system caused by mining/disturbing the proposed LBM and LUL tracts would be minimal. Flow in Spring Creek is currently stored in reservoirs within the existing Spring Creek Mine and upstream of the nearby Decker Mine. Additional reservoirs upstream of the Spring Creek Mine on North and South Forks Spring Creek and on Pearson Creek also reduce the volume of water reaching these lower reservoirs. These drainages have been diverted to prevent floodwaters from entering the

pits and to store runoff and settle out solids. Loss of this water from the annual flow volume in the Tongue River and Tongue River Reservoir should have no noticeable effect on downstream water resources.

A change in surface runoff and natural erosion rates would be associated with topographic moderation. Where topography would be moderated and elevation lowered, there would be a decrease in surface runoff, peak flows, bank stability, and erosion rates and a change in sediment load. The change in base level would cause accelerated erosion, incisement, and increased runoff upslope from the recontoured areas. Postmining, Pearson Creek streamflow would be reduced from premining flows due to the reclaimed topography being more subdued and a lower elevation than the premining topography. As a result, more precipitation may be absorbed by the soil, sedimentation would increase, and postmining runoff volumes and peak flows may be slightly lower than premining values. While impossible to quantify with accuracy, mine permit documents indicate that pre- and postmining peak discharges in stream channels that would be disturbed by mining are comparable. The reduction in postmining runoff quantities due to topographic moderation may be offset somewhat by the fact that infiltration rates are initially smaller on reclaimed lands (for the first few years) than on unmined lands. Over time however, the postmining infiltration rates recover to premining levels (Martin, et al. 1988).

Surface water quality should not be greatly affected as a result of mining/disturbing the proposed LBM and LUL tracts. There would be an increase in sedimentation rates associated with reduced flow volumes and water velocity. A reduction in peak flow would change stream and floodplain morphology. There would be an increase in the near-surface bulk density of the soil resources on the LBM and LUL tracts after reclamation. As a result, the average soil infiltration rates would generally decrease, which would increase the potential for runoff and soil erosion. Topographic moderation following reclamation would potentially decrease runoff. The change in soil infiltration rates would not be permanent because revegetation and natural weathering action would form a new soil structure in the reclaimed soils, and infiltration rates would gradually return to premining levels. Sediment yields to the Tongue River Reservoir would have minimal impact during the life of the mine because impoundments placed on streams and utilized for flood and sediment control must be permitted with MDEQ and must meet effluent standards or store the design event, in which case they are dewatered following major runoff events to provide storage space for the subsequent event. Once vegetation growth and density on reclaimed areas becomes sufficiently reestablished, many of the erosion sediment controls would no longer be necessary and would then be removed and reclaimed.

The mined coal seams contain some groundwater which seeps into the pit; however, due to the low volume, this water is not discharged to surface waters, but rather is beneficially used for dust suppression.

Surface water resources will be affected under the Proposed Action as discussed above. The disturbance to the land surface, and consequently to the surface water regime would continue within the existing permit boundary as approved under the No Action Alternative. The Pearson Creek Amendment is being reviewed by MDEQ/OSM and has not yet been approved. Should the amendment be approved, disturbance would occur on and directly upstream of the LBM and LUL tracts. If the coal lease modification and LUL amendment are approved, the revised reclamation and mine plan, including restoration of the essential hydrologic function, will be subject to MDEQ approval.

Cumulative Effects: There are three potential issues relating to cumulative surface water impacts:

- Possible changes in surface runoff rates due to changes in precipitation infiltration rates.
- Possible changes in surface water quality and quantity.
- Possible changes in water quality of the Tongue River Reservoir.

There would be an increase in the near-surface bulk density of the soil resources on the LBM and LUL tracts after reclamation. As a result, the average soil infiltration rates would generally decrease, which would increase the potential for runoff and soil erosion. Topographic moderation following reclamation would potentially decrease runoff. The change in soil infiltration rates would not be permanent because revegetation

and natural weathering action would form a new soil structure in the reclaimed soils, and infiltration rates would gradually return to premining levels.

Sediment yield should not increase in streams as a result of mining. Although reclaimed soils may be more erosive for a few years after reclamation, the larger sediment production would not be delivered to streams due to sediment deposition as a result of flatter slopes on restored lands and sediment trapping by mandated sedimentation ponds. Sediment yield associated with CBNG production may increase due to runoff from the disturbance related to access roads and utility corridors. Surface disturbance is proving to be less than projected in the MT FEIS as a result of increased well spacing (reducing the number of wells drilled in a area) and the consolidation of roads and utility corridors (BLM 2003c).

Pearson Creek is currently being impacted by ongoing mining activities at the Spring Creek and Decker Mines. Following reclamation this ephemeral stream will be restored according to a reclamation plan approved by MDEQ.

Cumulative impacts on the Tongue River Reservoir are anticipated to be negligible. Average flow of the Tongue River at the Tongue River Reservoir is approximately 428 cfs (1940-2007: USGS Station 06307500). The addition of approximately 9 to 24 cfs of water from the CBNG recovery system to the Tongue River would have negligible effect on flow conditions in the river and/or stage conditions in the reservoir during moderate to high flows (BLM 2000). However, during low flow conditions in the Tongue River, discharge of water from the methane recovery system may have a moderate effect on discharge in the Tongue River (BLM 2000).

Projections of water quality conditions related to CBNG production at various points within the Tongue River watershed, under various produced water management scenarios, indicate no exceedances of Montana water quality standards for EC and SAR (BLM 2005c). Beneficial use and treatment of produced water for agricultural and industrial purposes will reduce the volume of produced water discharged to surface water bodies, further reducing the impacts from CBNG produced water.

4.1.5 Alluvial Valley Floors

Direct and Indirect Effects: No AVFs have been delineated within the LBM and LUL tracts or within the Spring Creek South RFD.

Cumulative Effects: AVFs in the area should not be significantly affected as a result of mining/disturbing the proposed tracts. One AVF has been delineated along the South Fork Spring Creek within the SCCC permit boundary but it has been designated as insignificant to agriculture and is therefore not prohibited from mining. Much of this AVF has already been disturbed, as approved in the current permit document. No other AVFs have been delineated along the Spring Creek drainage system, above or below the Spring Creek Mine. A Hydrologic Restoration Plan has been developed that provides relatively erosionally stable channels and floodplains following reclamation with sediment yields that approximate pre-mine levels. The valley floor restoration plan calls for the restoration of the essential hydrologic functions, prevention of material damage, and re-establishment of the premining land usage of the hydrologic system of the South Fork Spring Creek.

4.1.6 Wetlands

Direct and Indirect Effects: No jurisdictional wetlands have been delineated within the LBM and LUL tracts. The entire Spring Creek RFD has not been surveyed for wetlands but NWI mapping does indicate potential wetlands within the area (Figure 3-4). Wetlands would not be significantly directly impacted as a result of mining and/or disturbance within the LBM and LUL tracts. According to wetlands surveys and NWI mapping, there are not wetlands or potential wetlands downstream of the LBM or LUL tracts so it is unlikely that the proposed action would impact offsite wetlands.

Cumulative Effects: Two delineated jurisdictional wetlands occur within the SCCC permit boundary. No jurisdictional wetlands would be disturbed if the LBM lease modification and LUL amendment areas are approved and mined. Mitigation measures for wetlands disturbed within the SCCC permit boundary are specified by the COE.

4.1.7 Soils

Direct and Indirect Effects: Topsoil, like the overburden, is removed and replaced during mining and reclamation process. This process results in differences between premining and postmining soils. Premining soils occur as soil series and are often combined into mappable units, which are distinguishable, by their physical and chemical characteristics, depths, locations in the landscape, and other factors. The postmining topsoil is a composite of premining soils resulting in more uniform soil chemistry and nutrient distribution. Prior to mining, the operator is required to map the soils, test them for physical and chemical suitability to support plant growth, and provide a plan for their salvage and replacement. Soil material determined to be unsuitable due to physical or chemical characteristics is not salvaged or replaced.

Impacts to soil resources as a result of mining include potential changes in soil structure, texture, organic matter content, infiltration rate, permeability, water-holding capacity, soil plant nutrient level, soil microbial composition and activity, and soil fertility. Mining exposes lower soils or overburden material that could contain chemical constituents at levels which could be harmful to plants and animals. Stockpiling soil material for several years before it is redistributed potentially degrades biological, chemical, and physical properties. Stockpiling could lower the organic matter content, microbial activity and viability of plant seeds, disrupt nutrient cycles, upset the carbon-nitrogen ratio, and increase near-surface bulk density. The exposure, compaction, and stockpiling of salvaged soil material can increase potential for soil loss from both wind erosion and water erosion until the soil is revegetated. Reclamation measures currently implemented during mining would reduce the effects of increased erosion potential. Currently approved and proposed disturbance would be progressively reclaimed, according to contemporaneous reclamation requirements, by planting appropriate vegetation species to restore soil productivity and prevent soil erosion.

Postmining soils are a more homogenous mixture than the premining soils and are replaced at a more uniform depth. With proper soil handling and reclamation techniques, postmining productivity on the reclaimed soils would probably remain about the same as premining productivity, although productivity may change locally because:

- Replaced topsoil depths would be more uniform than premining soils.
- Shallow soils and poor soils (such as those with clayey texture or high alkalinity) would not be salvaged or would be mixed with other topsoil materials to a more uniform physical and chemical composition.
- Uniformity of soil texture would be increased after mining: clayey or sandy soils and those developed with well-developed topsoil-subsoil substratum horizons would inevitably become mixed with other materials during handling. Once these soils were redistributed across disturbed areas, soil productivity and soil erodibility would be more uniform.
- Degradation of biological, chemical, and physical properties including lowered organic matter content, microbial activity and viability of plant seeds, disruption of nutrient cycles, changes in the carbon-nitrogen ratio, and increased near-surface bulk density would occur due to stockpiling.
- Disturbed areas would be progressively reclaimed in time by planting appropriate vegetation species to restore soil productivity and prevent soil erosion.

Replaced topsoil in the proposed LBM and LUL tracts should support a stable and productive vegetative cover capable of sustaining planned postmining land uses, which include livestock grazing, and wildlife habitat. As the vegetation cover becomes reestablished, erosion would not significantly affect productivity.

It is concluded that potential impacts to the topsoil resources on the proposed tracts would be moderate, and equivalent to existing topsoil impacts within the Spring Creek mine area. Vegetative productivity would be restored at the end of mining as a condition of bond release.

No "prime" or "unique" farmland exists within the proposed LBM and LUL tracts, and therefore none would be disturbed. Drainage features would be reconstructed on the area similar to reclamation techniques used at the Spring Creek Mine. As discussed in Section 3.8, one soil mapping unit within the proposed disturbance areas of the LBM and LUL tracts and two soil units within the Spring Creek South RFD have been specified as potential "farmland of statewide importance if managed according to acceptable farming methods" (USDA 2009). The LBM, LUL, and RFD areas have not been historically treated and managed according to acceptable farming methods and no reasonable sources of irrigation water are currently available. Therefore, special handling techniques would not be required for these soils.

Sediment control structures would be built to trap eroded soil, revegetation would reduce wind erosion, and soil or overburden materials containing potentially harmful levels of chemical constituents (such as selenium) would be specially handled. These measures are required by state regulations and are therefore considered part of the Proposed Action.

Soils of the LBM and LUL tracts will be altered under the Proposed Action as discussed above. The disturbance to the soils would continue within the existing permit boundary as approved under the No Action Alternative. The Pearson Creek Amendment is being reviewed by MDEQ/OSM and has not yet been approved. Should the amendment be approved, disturbance would occur to the soils within the LBM and LUL tracts. If the coal lease modification and LUL amendment are approved, the revised reclamation and mine plan, including soil stripping and placement discussions, will be subject to MDEQ approval.

Cumulative Effects: Following reclamation, the replaced topsoil should support a stable and productive native vegetation community adequate in quantity and quality to support planned post-mining land uses (i.e., rangeland and wildlife habitat). Areas within active mines are progressively disturbed. Likewise, these areas would be progressively reclaimed in time by planting appropriate vegetation species to restore soil productivity and prevent soil erosion.

Additional, although less extensive, soil disturbance would be associated with the on-going and proposed CBNG development predominantly west and south of the mine.

4.1.8 Vegetation

Direct and Indirect Effects: As proposed, mining operations for the Spring Creek Mine would progressively remove the native vegetation on 5,575 acres at Spring Creek. Short-term impacts associated with this vegetation removal would include increased soil erosion and habitat (forage) loss for wildlife and livestock. Potential long-term impacts include loss of habitat for some wildlife species as a result of reduced species diversity, particularly big sagebrush, on reclaimed lands. However, grassland-dependent wildlife species and livestock would benefit from the increased grass cover and production.

Reclamation, including revegetation of these lands, would occur contemporaneously with mining on adjacent lands, i.e., reclamation would begin once an area is mined. Estimates of the time elapsed from topsoil stripping through reseeding of any given area range from 2 to 4 years. This would be longer for areas occupied by stockpiles, haulroads, sediment-control structures, and other mine facilities. Some roads and facilities would not be reclaimed until the end of mining. Grazing restrictions prior to mining and during reclamation would remove up to 100 percent of the proposed LBM and LUL tracts from livestock grazing. This reduction in vegetative production would not seriously affect livestock production in the region, and long-term productivity on the reclaimed land would return to pre-mining levels within several years following seeding with the approved final seed mixture. Wildlife use of the area would not be restricted throughout the

operations. However, most species would avoid areas directly impacted by mining or areas adjacent to mining.

Re-established vegetation would be dominated by species authorized in the reclamation seed mixtures (to be approved by MDEQ). The majority of the approved species are native to the LBM and LUL tracts. Initially, the reclaimed land would be dominated by grassland vegetation that would be less diverse than the pre-mining vegetation. Shrub density standards are proposed for the Spring Creek Mine reclamation that defines shrub re-establishment according to postmine land use. Trees removed by mining operations would be re-established according to the approved postmine land use plan. Estimates for the time it would take to restore trees and shrubs to pre-mining density levels range from 20 to 100 years. An indirect impact of this vegetative change could be decreased big game habitat carrying capacity. Following completion of reclamation (seeding with the final seed mixture) and before release of the reclamation bond (a minimum of ten years), a diverse, productive, and permanent vegetative cover would be established on the LBM and LUL tracts. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas, and the proposed post-mining land use (wildlife habitat and rangeland) should be achieved even with the changes in vegetation composition and diversity. Private landowners (Figures 3-7 and 3-8) would have the right to manipulate the vegetation on their lands as they desire once the reclamation bond is released.

The HRRP (Appendix B) outlines techniques to increasing the quantity and quality of forage available to wildlife species. The techniques for improving revegetation efforts on existing and future disturbed lands within the SCC permit boundary include:

- Prior to mining the baseline studies identified 626 acres of pastureland at SCCC. SCCC's Mining Permit #79012 includes a revegetation plan which establishes only 440 acres of pastureland in the postmine. As a result SCCC voluntarily replaced 186 acres of pastureland with other land use types which contain all native species seed mixes (South Fork Amendment, Application 174 approved 01/08).

- Additionally, SCCC commits to revising their revegetation plan by removing the pastureland seed mix. This revision eliminates seeding future reclamation as pastureland on lands owned by SCCC. As a result, this revision will seed roughly 440 acres currently identified as pastureland with all native seed mixes such as sagebrush grassland, for example. SCCC will continue to confer with the MDEQ to obtain their approval to further revise the reclamation plan as part of permitting Application 183, the Pearson Creek Permit Amendment. This collaborative approach will assure the design addresses the diverse needs of all wildlife.

The reclamation plan for the proposed tracts would include steps to control invasion by weedy (invasive nonnative) plant species. Native vegetation from surrounding areas would gradually invade and become established on the reclaimed land.

The climatic record of the western U.S. suggests that droughts could occur periodically during the life of the mine. Such droughts would severely hamper revegetation efforts, since lack of sufficient moisture would reduce germination and could damage newly established plants. Same-aged vegetation would be more susceptible to disease than would plants of various ages. Severe thunderstorms could also adversely affect newly seeded areas. Once a stable vegetative cover is established, however, these events would have similar impacts as would occur on native vegetation.

Changes expected in the postmine topography and surface water network as a result of mining and reclamation would affect the reestablishment of vegetation patterns on the reclaimed areas to some extent. As an example, relatively steep slopes provide distinctive vegetative habitats. Approximately 9 percent of the LBM and LUL areas have slopes greater than 30%. Reclaimed slopes greater than 33 percent must be approved by MDEQ. The reclaimed slopes within the proposed disturbance areas of the LBM and LUL would not be known until MDEQ's technical review of the permit application is complete. If mined, no substantial changes in average slope of these area are predicted.

Following reclamation, the LBM and LUL tracts would be primarily mixed prairie grassland with graminoid/forb-dominated areas, and the overall species diversity would be reduced, especially for the shrub component. As indicated previously, following reclamation bond release, management of the privately owned surface would revert to the private surface owner, who would have the right to manipulate the reclaimed vegetation.

The decrease in plant diversity would not seriously affect productivity of the reclaimed areas, regardless of the alternative selected, and the proposed post-mining land use (wildlife habitat and rangeland) would be achieved even with the changes in vegetative species composition and diversity.

Two species of BLM designated sensitive plants (as identified in the 2008 list of MNHP Plant Species of Concern [MNHP 2008]) are listed on the SCCC plant species list. Barr's milkvetch and woolly twinpod have been identified as occurring in the general SCCC area but only the Barr's milkvetch has been identified within the Pearson Creek Amendment Area, which includes the LBM or LUL tracts. Barr's milkvetch has an S3 State rank (potentially at risk because of limited range, population and/or habitat). SCCC vegetation specialists have conducted surveys for Barr's milkvetch and have identified nine sites within (four sites) and adjacent to (five sites) the permit area. These sites consist of 20-1000 plants each. As a result of these surveys, SCCC believes that Barr's milkvetch is underreported rather than rare (Appendix C-2, SCCC 2001). SCCC may voluntarily collect and conserve seeds from the existing populations of Barr's milkvetch (if encountered on LBM or LUL disturbed areas) for use in a test plot to re-establish this species.

Vegetation of the tracts will be altered under the Proposed Action as discussed above. The disturbance to the vegetation would continue within the existing permit boundary as approved under the No Action Alternative. The Pearson Creek Amendment is being reviewed by MDEQ/OSM and has not yet been approved. Should the amendment be approved, disturbance would occur to the vegetation within the LBM and LUL tracts. If the coal lease modification and LUL amendment are approved, the revised reclamation and mine plan, including restoration of vegetation, will be subject to MDEQ approval.

Cumulative Effects: Most of the land that would be disturbed is grassland and sagebrush shrubland that is used for grazing and wildlife habitat. Livestock grazing on native rangeland is, by far, the predominant economically based land use in the PRB. At the completion of mining, it is anticipated that all disturbed land would be reclaimed for grazing and wildlife habitat, mostly in the form of mixed native grass prairie, sagebrush shrubland and, where appropriate, bottomland grassland. Some of the minor community types, such as those occurring on breaks, would not be restored to pre-mining conditions but may be replaced to a level producing greater vegetative biomass due to use of better quality soils.

Based on annual reports prepared by Spring Creek Coal and Decker Coal Companies and submitted to MDEQ, in any given year, approximately 1,500 acres of land disturbed by mining activities at these two existing surface coal mines would not be reclaimed to the point of planting with permanent seed mixtures. Over the life of these two mines, a total of about 11,931 acres would be disturbed. This disturbed area includes all leases existing including federal, state, and private coal. Almost all of this acreage is native rangeland and would be returned to a native rangeland state through planting of approved revegetation seed mixtures as required.

Several impacts to vegetation would occur as a result of operations at the existing and proposed mines. Most of the surface disturbance on the tracts would occur in the sagebrush-grassland type. The Decker and Spring Creek Mines are currently restoring the native mixed grass and big sagebrush as required by law. It is estimated that it would take from 20 to 100 years for big sagebrush density to reach pre-mining levels. The big sagebrush component provides important wildlife habitat (particularly for mule deer, pronghorn, and sage-grouse). The reduction in acreage of big sagebrush vegetation type would, therefore, reduce the carrying capacity of the reclaimed lands for pronghorn and sage-grouse populations until sagebrush density reaches premining levels.

Although some of the less extensive native vegetation types (e.g., graminoid/forb ephemeral drainages) would be restored during reclamation, the treated grazing lands would not. Following reclamation and release of the reclamation bond, however, privately owned surface lands would be returned to private management and the areas with reestablished native vegetation could again be subject to sagebrush management practices.

Community and species diversities would initially be lower on reclaimed lands. The shrub and tree components would take the longest to be restored to pre-mining conditions. Shrub cover and forage values would gradually increase in the years following reclamation. Over longer periods of time, species re-invasion and shrub and tree establishment on reclaimed lands should largely restore the species and community diversity on these lands to pre-mining levels.

Over the long term, the net effect of the cumulative mine reclamation plans may be the restoration, at least in part, of all vegetation types originally found in the area. However, the shrub component may be substantially reduced in areal extent. Shrubs and trees are relatively unproductive for livestock but very important for wildlife. All of the vegetation types found in the cumulative analysis area, as on the LBM and LUL tracts, are fairly typical for this region of southeastern Montana.

Energy development in the PRB could allow the spread of weedy (invasive nonnative) plant species. The reclamation plan for the Spring Creek Mine includes steps to control invasion by these plant species.

Impacts to vegetation related to disturbance from CBNG development would be added to the impact of mining. Generally, disturbances related to mining are intense but concentrated in a discrete area, while disturbances related to CBNG development are scattered over a large area.

Large-scale modification of habitat as a result of extensive physical removal and damage are activities that have the potential to negatively affect the long-term viability of Barr's milkvetch (MNHP 2002). Mining and CBNG development have the potential to alter and degrade habitats for both species. Results of surveys conducted by SCCC indicate that Barr's milkvetch is underreported rather than rare (Appendix B-2, SCCC 2001). Mitigation measures (re-establishing Barr's milkvetch on reclamation) would be required if this species are encountered within the LBM and LUL disturbance areas. SCCC may voluntarily collect and conserve seeds from the existing populations of Barr's milkvetch (if encountered on disturbed areas) for use in a test plot to re-establish this species.

4.1.9 Wildlife

Direct and Indirect Effects: Local wildlife populations are directly and indirectly impacted by mining. These impacts are both relatively short term (until successful reclamation is achieved) and longer term (persisting beyond successful completion of reclamation). The direct impacts of surface coal mining on wildlife occur during mining and are therefore short-term. They include road kills by mine-related traffic, restrictions on wildlife movement created by noise, human activity, fences, spoil piles and pits, and displacement of wildlife from active mining areas. Displaced animals may find equally suitable habitat that is not occupied by other animals, occupy suitable habitat that is already being used by other individuals, occupy poorer quality habitat than that from which they were displaced or the animals may perish due to lack of suitable habitat in which they can inhabit. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. The indirect impacts are longer term and may include a reduction in wildlife carrying capacity and microhabitats on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in sagebrush density. Wildlife monitoring has provided data showing that big game, raptors, small mammals, and passerine birds are utilizing SCCC reclamation.

Under the Proposed Action, big game would be displaced from portions of the LBM and LUL tracts to adjacent ranges during mining. Mule deer would be most affected as the tracts contains good quality habitat. Pronghorn would not be substantially impacted, given that they are scattered throughout the Spring Creek

area and based on results from annual wildlife monitoring for the SCC Mine, there is suitable habitat available in adjacent areas. White-tailed deer would not be affected, as they have not been observed on the tracts. Big game displacement would be incremental, occurring over several years and allowing for gradual changes in distribution patterns. Big game residing in the adjacent areas could be impacted by increased competition with displaced animals. Noise, dust, and associated human presence would cause some localized avoidance of foraging areas adjacent to mining activities. On existing surface mines, however, big game have continued to occupy areas adjacent to and within active mine operations, suggesting that some animals may become habituated to such disturbances.

Big game animals are highly mobile and can move to undisturbed areas. There may be more restrictions on big game movement on or through the LBM and LUL tracts, however, due to additional fences, spoil piles, and pits related to mining. During winter storms, pronghorn may not be able to negotiate these barriers. SMCRA requires that fences, overland conveyors, and other potential barriers be designed to permit passage for large animals [30 CFR 816.97(e)(3)]. MDEQ guidelines require fencing to be designed to permit large mammal passage to the extent possible.

The MDEQ has reviewed monitoring data which has been collected on the Spring Creek mine for big game species and the monitoring requirements for big game species on those mine sites. Monitoring data indicate a lack of impacts to big game on existing mine sites. No severe direct mine-caused mortalities have occurred and no long-lasting impacts on big game have been noted on the existing SCCC mine site.

Approximately 872 acres within the disturbance area associated with the Proposed Action are designated as *Suitable for Leasing With Stipulations* (high value year-long mule deer habitat and winter range). SCCC will be required to reclaim disturbed habitats within the area currently designated as *Suitable for Leasing With Stipulations* back to wildlife habitat as outlined in the HRRP (Appendix B). It should be noted that the habitat recovery outlined in the HRRP includes changes to the revegetation techniques utilized for existing disturbed areas as well as on proposed disturbance within the LBM and LUL areas, which will improve overall sagebrush reclamation attempts. After mining and reclamation, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density and loss of trees, would cause a decrease in carrying capacity and diversity on the tracts. Sagebrush and trees would gradually become re-established on the reclaimed land, but the topographic changes would be permanent. Approximately 1,738 acres of additional lands within the Spring Creek South RFD have been designated as *Suitable for Leasing With Stipulations* (high value year-long mule deer habitat and mule deer and pronghorn antelope winter range).

Medium-sized mammals (such as coyotes, foxes, skunks, and raccoons) would be displaced to other habitats by mining, potentially resulting in increased competition and mortality. However, these animals may rebound on reclaimed areas, as forage developed and small mammal prey species recolonized. Direct losses of small mammals would be higher than for other wildlife, since the mobility of small mammals is limited and many retreat into burrows when disturbed. Therefore, populations of such prey animals such as voles, mice, chipmunks, prairie dogs, and rabbits would decline during mining. However, these animals have a high reproductive potential and tend to re-invade and adapt to reclaimed areas quickly. A research project on habitat reclamation on mined lands within the PRB for small mammals and birds concluded that reclamation objectives to encourage the recolonization of small mammal communities are being achieved (Shelley 1992). The study evaluated sites at five mines in Campbell County, Wyoming. A recent study involving six Montana mines indicated that small mammals are recolonizing reclaimed areas and species richness is similar to native habitats (Clayton, et al. 2006).

Mining/disturbing the LBM and LUL tracts is not anticipated to significantly impact regional raptor populations. Local populations including individual birds or pairs may be impacted.

Raptor species have been observed on or adjacent to the tracts and, as noted in Section 3.10.3, a total of seven raptor species (red-tailed hawk, golden eagle, turkey vulture, osprey, burrowing owl, prairie falcon, and great horned owl) have been identified as nesting within 1 mile of the proposed tracts. One intact turkey vulture

nest is located within the disturbance associated with proposed LBM tract and no nests were within the LUL boundaries. Five intact raptor nests are located within the Spring Creek South RFD. Spring Creek Coal monitors territorial occupancy and nest productivity within 2 miles of the permit boundary, or about 45.4 mi^2. Physical destruction of most inactive migratory bird nests/nest sites is not, in and of itself, a violation of the Migratory Bird Treaty Act (MBTA). However, any activity that results in the destruction of eggs or death of birds (including nestlings) constitutes a 'take', and is a violation of MBTA. The Bald and Golden Eagle Protection Act (BGEPA) prohibits "knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing." Permits for nest manipulation, including removal or relocation may, under certain circumstances, be issued only for inactive golden nests. The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over issuing golden eagle nest take/relocation permits. No intact golden or bald eagle nests are located within the LBM and LUL tracts or within the Spring Creek South RFD area.

Mining near raptor territories would minimally impact availability of raptor forage species. During mining, nesting habitat would be created by the excavation process (highwalls), as well as through enhancement efforts (nest platforms and boxes). However, due to the proximity to mining activity and nest site preference, some species of raptors are not likely to relocate to artificial nesting habitat. SMCRA requires use of the best technology currently available for protection of fish, wildlife, and related environmental values, including ensuring that electric powerlines and other transmission facilities are designed and constructed to minimize electrocution hazards to raptors [ARM 17.24.751(2)(a)]. After mining, the reclamation plan would reestablish the ground cover necessary for the return of a suitable prey base. Although there is no Criterion 13 *Unsuitable for Leasing Without Exception* designation (falcon cliff nesting site) currently in effect on the LBM or LUL tracts, one active prairie falcon nest site (PF2) is located within the Spring Creek South RFD.

As discussed in Section 3.10.4, sage-grouse are yearlong residents and may be found on the LBM and LUL tracts and adjacent lands. No historic sage-grouse grouse strutting grounds were located within 1 mile of the LBM tract and two strutting grounds were located within 1mile of the LUL tracts (Figure 3-9). One strutting ground was located within the Spring Creek South RFD and it was last active in 2007. Eight strutting grounds were located on or within 1 mile of the Spring Creek South RFD area.

Approximately 1,057 acres within the Spring Creek South RFD area are designated *Unsuitable for Leasing Without Exception* (532 acres Criterion 15 - sage-grouse wintering area and sharp-tailed grouse and sage-grouse leks, 276 acres Criterion 15 – crucial mule deer winter range, and 249 acres Criterion 11 – golden eagle nest buffer). Under the current designation, this unsuitable area could not be leased unless, after consultation with the state, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected. Another 1,738 acres have been designated as *Suitable for Leasing With Stipulations* (sage-grouse and high value year-long mule deer habitat).

The CX Ranch sage-grouse habitat area (Subareas A, B, and C) encompasses the entire LBM tract (498 acres), approximately 19 percent (37 acres) of the LUL tracts, and approximately 51 percent (2,873 acres) of the Spring Creek South RFD area are within polygons identified by BLM as crucial sage-grouse habitat (Figure 1-3). Since the sage-grouse habitat data are relatively new, the coal unsuitability screen for wildlife will be applied to the disturbance area associated with the Proposed Action during this environmental review process. As part of the evaluation of the lease of federal coal within the LBM tract, BLM has required SCCC to develop a HRRP for inclusion in this analysis. The plan has been reviewed and approved by both the BLM and the MDFWP. A decision approving the Proposed Action would result in approximately 848 acres of the important habitat lands within the disturbance area associated with the Proposed Action being designated as *Unsuitable for Leasing With Exceptions Applied* and a stipulation would be placed on the coal lease making the HRRP a mitigation requirement of the lease.

Wildlife monitoring studies in Wyoming concluded the impacts of oil and gas related disturbance on sage-grouse would be the temporary loss of nesting habitat, disturbance to breeding activities when the oil and gas

related operations approach to within close proximity of the birds' strutting ground and temporary loss of wintering habitat (Holloran 2005). Although the studies are not specific to mining, impacts to sage-grouse from mining activity could be similar. Due to the general lack of these important habitats associated with the LBM and LUL tracts, the overall impacts to grouse population in Montana are expected to be minimal. SCCC will be required to follow mitigation measures outlined in the HRRP. During reclamation, shrubs, including big sagebrush, would be reestablished on reclaimed lands using method refined as a result of the HRRP; reclaimed lands would be graded to create swales and depressions; and monitoring of sage-grouse activity would continue in the area before, during, and after mining.

As discussed in Section 3.10.4, sharp-tailed grouse are yearlong residents and may be found on the LBM and LUL tracts and adjacent lands. Three historic sharp-tailed grouse dancing locations (two distinct dancing grounds) were located within 1 mile of the LBM tract (Figure 3-9). None of these locations were active in 2008. Two sharp-tailed grouse leks were located within 1 mile of the LUL tracts. Neither of these locations were active in 2008. Fourteen sharp-tailed dancing grounds were located within 1 mile of the Spring Creek South RFD. Three of the 14 were active in 2008. There are no sharp-tailed grouse leks within the LBM and LUL tracts or the Spring Creek South RFD area, although there are two sharp-tailed grouse leks within the LBM disturbance area. The impacts of mining/disturbing the LBM and LUL tracts on sharp-tailed grouse would be the temporary loss of nesting habitat and disturbance to breeding activities when the mining operations approach to within close proximity of the birds' dancing grounds. Sharp-tailed grouse dancing grounds have been documented within 0.4 mile of active mining (DCC Unpublished Data). Monitoring of sharp-tailed grouse activities has documented that the birds can change breeding sites. It is reasonable that sharp-tailed grouse may use an alternate dancing ground site for breeding activities if mining activities disturb a dancing ground. Some disruption in breeding and nesting activity may be anticipated if breeding and nesting areas impacted until the birds move to new breeding and nesting locations. Mining activity impacts to the overall sharp-tailed grouse population in the area are expected to be minimal. During reclamation, shrubs, including big sagebrush, would be reestablished on reclaimed lands; reclaimed lands would be graded to create swales and depressions; and monitoring of sharp-tailed grouse activity would continue in the area before, during, and after mining.

Other upland game bird species (i.e., mourning doves, wild turkey, pheasants, and gray partridge) that could potentially occur on the LBM and LUL tracts could be displaced to adjacent habitats during mining. These birds are highly mobile and can move to undisturbed areas (Lowe and Flake 1988, Hewitt 1967, Kuck 1968, Allen 1984). Their populations are relatively low in the Spring Creek area; therefore, this displacement should not increase competition and mortality.

Displaced songbirds including those Migratory Bird Species of Management Concern (discussed in Section 3.10.5) would have to compete for available adjacent territories and resources when their habitats are disturbed by mining operations. This competition would result in some mortality where adjacent habitat is at carrying capacity. Losses would also occur when habitat disturbance coincides with egg incubation and rearing of young. Impacts of habitat loss would be short-term for grassland species but would last longer for tree- and shrub-dependent species. Concurrent reclamation would minimize these impacts. A diverse seed mixture planted in a mosaic with a shrubland phase would provide food, cover, and edge effect. Other habitat enhancement practices include the restoration of diverse land forms, direct topsoil replacement, and the construction of brush piles, snags and rock piles. A research project on habitat reclamation on mined lands within Campbell County, Wyoming, for small mammals and birds concluded that the diversity of song birds on reclaimed areas was slightly less than on adjacent undisturbed areas, although their overall numbers were greater (Shelley 1992).

The blue-gray gnatcatcher, loggerhead shrike, sage thrasher, Brewer's sparrow, and the red-headed woodpecker (BLM sensitive passerine bird species) have been observed in the Spring Creek area. Nesting and foraging habitat for these species would be impacted if the LBM and LUL tracts were leased and mined.

Waterfowl and shorebird habitat on the LBM and LUL tracts is minimal and production of these species is very limited. Mining/disturbing the tracts would have a negligible effect on migrating and breeding waterfowl. Sedimentation ponds created during mining would provide interim habitat for these fauna. No delineated wetlands occur on the LBM and LUL tracts or within the Spring Creek South RFD or down gradient of these areas so no wetlands mitigation would be required.

No fisheries habitat would be impacted within the LBM and LUL tracts. A hydrologic control plan would be designed to prevent adverse impacts to the hydrologic balance outside the permit area, thus maintaining the quantity and quality of surface waters and the existing fish habitat downstream of the disturbance.

T&E species that could potentially occur in the area include the black-footed ferret. This species has not been observed in the area. The bald eagle was recently delisted and is no longer a T&E species but will continue to be protected by the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. The least tern is listed as endangered and may migrate through the area but the bird has not been observed in the area and nesting habitat (unvegetated sand-pebble beaches and islands of large reservoirs and rivers) is not present within the Proposed Action disturbance areas so the potential for impacts is low.

Various wildlife species listed by the BLM as sensitive species are listed in section 3.10 and in Appendix C. Most of these species will be temporarily displaced but current reclamation practices in-place at SCCC (vegetation and topography) will promote the return of these species once reclamation has been completed. Species requiring special consideration are discussed above.

Wildlife and habitats will be affected within the disturbance area associated with the Proposed Action. The disturbance to wildlife and wildlife habitats would continue within the existing permit boundary as approved under the No Action Alternative (Alternative 1). The Pearson Creek Amendment is being reviewed by MDEQ/OSM and has not yet been approved. Should the amendment be approved, disturbance would occur within the LBM tract If the coal lease modification and LUL amendment are approved, the revised reclamation and mine plan, including restoration of habitats, will be subject to MDEQ approval. BLM would maintain the *unsuitability designations* currently in place within the Spring Creek South RFD area under the No Action Alternative.

Cumulative Effects: Cumulative impacts to most wildlife species would increase as additional habitat is disturbed by mining and other activities, including CBNG development. These impacts would moderate as land is reclaimed. Raptor and grouse breeding areas have been diminishing statewide due, in part, to land use changes. Coal mining and gas exploration and development have been identified as potential contributors to the decline in this breeding habitat. Therefore, surface occupancy and disturbance restrictions, as well as seasonal restriction stipulations, have been applied to operations occurring on or near these important areas. These restrictions have helped protect important raptor and grouse habitat, but the success of yearlong restrictions on activities near areas critical to grouse has been limited because much of the minerals in the PRB is privately owned.

The placement of artificial nesting structures and planting of trees on land reclaimed by surface coal mines would gradually replace some raptor nesting and perching sites that are affected by development in areas affected by mining. There is no important habitat for waterfowl or fish on the mine sites, so mining would not substantially contribute to impacts to those species. Small- and medium-sized animals would move back into the areas once reclamation is completed.

Numerous grazing management projects (fencing, water development, vegetative treatments, and grazing treatments) have also impacted wildlife habitat in the area. The impacts of these developments have proven beneficial to some species and detrimental to others. Fencing has aided in segregation and distribution of livestock grazing, but sheep-tight woven wire fence has restricted pronghorn movement. Water developments are used by wildlife; however, without proper livestock management, many adjacent areas can become overgrazed. The developed reservoirs provide waterfowl, fish, and amphibian habitat. Vegetation

manipulations have included the removal or reduction of native grass-shrublands and replacement with cultivated crops (mainly alfalfa/grass hay), as well as a general reduction of shrubs (mainly sagebrush) in favor of grass. These changes have increased spring and summer habitat for grazing animals but have also reduced the important shrub component that is critical for winter range, thus reducing overwinter survival for big game and sage-grouse. The reduction in sagebrush has been directly blamed for the downward trend in the sage-grouse populations.

The regional EIS that covered the northern PRB (BLM 1984b) predicted that large-scale surface coal mining could potentially result in significant cumulative impacts to big game due to habitat loss; restrictions in seasonal and daily movement caused by railroads, access roads, and mining operations; poaching; urban development; range overuse; possible lack of water sources; increased road kills; and crop depredation. No severe direct mine-caused mortalities have occurred and no long-lasting impacts on big game have been noted on existing mine sites. Approximately 872 acres of the disturbance area associated with the Proposed Action areas (675 acres associated with the LBM tract and 197 acres in the LUL tracts) and approximately 1,995 acres of the Spring Creek South RFD area are within areas that have been designated as suitable for further consideration for leasing with stipulations due to mule deer and antelope winter range or high value mule deer yearlong habitat (Figure 1-3).

The LBM and LUL tracts and the Spring Creek South RFD are within the Montana MDFWP Powder Pine Hills pronghorn and deer hunting district, which includes about 3,465,000 acres. The Spring Creek Mine is one of two active surface coal mining operations within this district. No additional disturbance to the hunting areas would occur as a result of the coal lease modification and LUL amendment.

Mining/disturbing the LBM and LUL tracts is not anticipated to significantly impact regional raptor populations. The area in the general vicinity of the tracts contains significant numbers of raptor nests with the largest concentration of nesting activity in the area is associated with the rough breaks country, stream valleys with trees, and upland areas where trees are established. Alternate nest sites are available for all raptor species using nests within the proposed disturbance area; however, the regional reproductive capacity of nesting pairs of raptors could decline as a result of the Proposed Action if raptors do not adapt to the loss of existing nests. The creation of artificial raptor nest sites and raptor perches may ultimately enhance some raptor populations in the mined area. SMCRA requires surface coal mine operators ensure that electric power lines and other transmission facilities are designed and constructed to minimize electrocution hazards to raptors [ARM 17.24.751(2)(a)]. However, where power poles border roads, perched raptors may continue to be illegally shot and continued road kills of scavenging eagles may occur. Any influx of people into previously undisturbed land may also result in increased disturbance of nesting and fledgling raptors.

Cumulative habitat disturbance from already-approved and proposed mining could affect regional sharp-tailed grouse and sage-grouse populations because grouse wintering areas and leks have been, and additional wintering areas are planned to be, disturbed. Also, noise related to the mining activity could influence grouse reproductive success by impacting occupancy of certain areas where noise is a factor. Grouse breeding grounds close to active mining could be abandoned if mining-related noise elevates the existing ambient noise levels. Surface coal mining activity is known to contribute to a drop in male sage-grouse attendance at leks close to active mining, and over time this can alter the distribution of breeding grouse (Remington and Braun 1991). Because sage-grouse populations throughout Wyoming and Montana have been declining over the past several years, this impact could be significant to the local population when evaluated with the cumulative impacts of all energy-related development occurring in the area.

Cumulative impacts to waterfowl would be minor because most of these birds are transient and most of the ponds are ephemeral. In addition, impoundments and reservoirs that are impacted by mining would be restored. Sedimentation ponds and wetland mitigation sites would provide areas for waterfowl during mining. The Tongue River Reservoir provides significant waterfowl habitat in the immediate vicinity of the Spring Creek/Spring Creek mines.

The existing mines in the Spring Creek area would cumulatively cause a reduction in habitat for other mammal and bird species not specifically addressed above. Many of these species are highly mobile, have access to adjacent habitats, and possess a high reproductive potential. Habitats adjacent to existing and proposed mine areas include sagebrush shrublands, upland grasslands, bottomland grasslands, improved pastures, wetlands, riparian areas, and ponderosa pine woodlands. As a result, these species should respond quickly and invade suitable reclaimed lands as reclamation proceeds. A research project on habitat reclamation on mined lands within the PRB for small mammals and birds concluded that the diversity of song birds on reclaimed areas in the eastern PRB was slightly less than on adjacent undisturbed areas, although their overall numbers were greater (Shelley 1992). A recent study involving Montana six mines indicated that small mammals are recolonizing reclamation and species richness is similar to native habitats (Clayton, et al. 2006).

Cumulative impacts on fish habitat and populations would be minimal because local drainages generally have limited value due to intermittent or ephemeral flows. Some of the permanent pools along area drainages support minnows and other nongame fish, and the larger impoundments and streams in the area that have fish populations would be restored following mining.

The cumulative impacts to threatened and endangered species would be minimal if the LBM and LUL tracts are mined/disturbed or if any portions of the Spring Creek South RFD were developed in the future.

Impacts to wildlife related to disturbance from CBNG development would be added to the impact of mining. Generally, disturbances related to mining are intense but concentrated in a discrete area, while disturbances related to CBNG development are less intense but spread out over a large area.

The additional discussions of cumulative impacts to wildlife from coal development and industrialization of the PRB that are discussed in the BLM regional EIS covering this area (BLM 1984a).

The cumulative impacts of mining the LBM and LUL tracts will be assessed within the MDEQ's review of the mine permit amendment process if the coal lease modification and LUL amendment are approved and Spring Creek submits a detailed permit amendment package to MDEQ.

4.1.10 Land Use

Direct and Indirect Effects The major adverse environmental consequences of mining the proposed LBM and LUL tracts on land use would be reduction of livestock grazing, loss of wildlife habitat, and curtailment of other mineral development, particularly CBNG development, on about 1,017 additional acres during active mining (820 acres associated with the LBM tract and 197 acres within the west LUL tract). Livestock grazing would be suspended on 160 acres and 24 animal unit months (AUMs) of public surface in Section 35 of T. 8 S., R. 39 E. This is within the CX Ranch Allotment No. 10022. Livestock grazing would also be suspended on 37.12 acres and 9 AUMs in Lot 5 of T. 9 S., R. 40 E. This is within the Scrutchfield Allotment No. 10091. Both these areas are associated with the LUL. Livestock grazing would be suspended on 77.11 acres and 18 AUMs of public surface in Lots 3 and 4 in Section 6 of T9S, R40E. These parcels are part of the LBM lands. Wildlife use would be displaced while the tracts are being mined/disturbed and reclaimed. As stated in Chapter 2, SCCC would no longer need land use permit MTM-96660, which was issued for Lots 3, 4, and 5, of Section 6, T9S, R40E. This permit could be relinquished or allowed to expire if the LUL is amended and the coal lease modification is approved.

Sections 3.3 of this document address the existing CBNG wells within and adjacent to the federal coal land being considered for lease. Federal oil and gas ownership, and federal oil and gas lessee information are presented in Table 3-13. CBNG is not currently being produced on or adjacent to the LBM and LUL tracts. Any well facilities associated with drilling and producing CBNG would have to be removed prior to mining. Royalties, income, and taxes would be lost if the CBNG is not recovered prior to mining or if coal is not recovered due to conflicts. CBNG that is not recovered prior to mining is vented to the atmosphere. The costs

of agreements between the CBNG and the coal operators would be factored into the fair market value determination.

Hunting on the LBM and LUL tracts is restricted because of the proximity to the mine permit boundary and isolation from public access. Following reclamation, the land would be suitable for grazing and wildlife uses, which are the historic land uses.

Cumulative Effects: Surface coal mining reduces livestock grazing and wildlife habitat, limits access to public lands that are included in the mining area, and could disrupt oil and gas development. In addition, when oil and gas development facilities are present on coal leases, all associated facilities and equipment must be removed prior to mining. Mining the coal prior to the recovery of all of the CBNG resources from the coal bed being mined releases CBNG into the atmosphere. The potential impacts of conflicts between CBNG and coal development are discussed in Section 4.1.2.

Cumulative land use and recreation impacts resulting from energy extraction in the PRB include a reduction of livestock grazing and subsequent revenues, a reduction in habitat for some species of wildlife (particularly pronghorn, sage-grouse, and mule deer), and loss of recreational access to public lands (particularly for hunters). Mining/disturbing the LBM and LUL tracts would minimally affect access to approximately 274 acres of public lands (77 acres within the LBM tract and 197 acres within the LUL tracts). Direct access to the tracts by the public is very limited due to the proximity to private land and the location of the tracts adjacent to the mine permit boundary. A large area of land along the Tongue River Reservoir is available for public use and the lease of the LBM and LUL tracts will not affect this access.

The increased human presence associated with the cumulative energy development in the PRB has increased the potential for legal and illegal hunting. Conversely, surface coal mines tend to become refuges for big game animals during hunting seasons since they are often closed to hunting. Reclaimed areas are attractive forage areas for big game. As an example, reclaimed lands at the Jacobs Ranch Mine in the eastern PRB have been declared crucial elk winter habitat by WGFD (Oedekoven 1994). CPE (owner of the Spring Creek and Jacobs Ranch Mines) and the Rocky Mountain Elk Foundation (RMEF) recently finalized a formal agreement that created the Rochelle Hills Conservation Easement. The easement contains nearly 1,000 acres, with 75 percent of that total comprised of reclaimed mining lands on RTEA's Jacobs Ranch Mine. The easement acreage was donated to RMEF by RTEA to ensure that the reclaimed land continues to be used as grazing land and wildlife habitat for the extended future (RMEF 2007).

Energy development-related indirect impacts to wildlife have and will continue to result from human population growth. Energy development has been the primary cause of human influx into the PRB and has increased employment opportunities. Mining/disturbing the LBM and LUL tracts under the Proposed Action would have little impact on area employment.

The demand for outdoor recreational activities, including hunting and fishing, generally increases proportionately as the population increases. However, at the same time these demands are increasing, wildlife habitat and populations are being reduced. This conflict between decreased habitat availability and increased recreational demand has had (or may have) several impacts: access to private lands for hunting and fishing may become more limited; poaching may increase; and increased off-road activities have and will continue to result in disturbance of wildlife during sensitive wintering or reproductive periods. There would be little cumulative impacts on recreational activities within the Spring Creek area since access to mine areas is already limited and mining activities do not typically occur in recreational areas.

4.1.11 Cultural Resources

Direct and Indirect Effects: The LBM and LUL tracts and the associated disturbance areas have been subjected to a Class III cultural resource inventory. Twenty cultural resource sites have been identified within disturbance area associated with the LBM tract and four sites are within the LUL tracts (Figure 3-12). One

site (24BH3392) within the LBM disturbance area is recommended as NRHP eligible and would require mitigation prior to disturbance. Refer to Section 2.3 for a discussion of the infeasibility of avoiding this site.

Only about 53 percent of the Spring Creek South RFD has been covered by a Class III cultural resources inventory. Surveys conducted within the Spring Creek South RFD have located 53 cultural resource sites. Eight of these sites are considered eligible for the NRHP. Using site densities observed within the surveyed portion of the Spring Creek South RFD, approximately 100 cultural resource sites (15 NRHP eligible) might be encountered within the entire Spring Creek South RFD.

Because there is at least one cultural resource site considered eligible for the National Register of Historic Places on the tracts that will be impacted by mining activities, cultural resource values would be impacted or affected by the Proposed Action and there would be affects to properties that may be considered eligible for listing on, the National Register of Historic Places.

In order to provide more precise spatial data, BLM cultural resource staff is recommending the information for the following site be updated prior to surface disturbance: 24BH3401, 24BH3388, 24BH2530 and 24BH2531 in Section 35 of the LUL amendment area. This recommendation will be added as a lease stipulation included in Appendix A.

Cumulative Effects: If the lease modification area is approved and mined and the LUL is amended and the area disturbed, the disturbance in the Spring Creek area would increase by about 1,017 acres (820 acres associated with the LBM disturbance and 197 acres within the LUL tract).

Coal mining activity in the study area could result in long-term unavoidable adverse impacts to at least six NRHP-eligible cultural resource sites within the LBM boundary and Spring Creek South RFD area (Table 3-15). However, all adverse impacts the NRHP-eligible sites would be mitigated to a no-adverse impact condition, with current environmental planning practices. Impacts to sites may occur as the result of earth moving activity, increased access and traffic as a result of mine development, or effects of blasting (particularly to rock art). Sites may also be lost as a result of natural weathering and erosion. Impacts to cultural resources can also be visual. The loss of the values of setting, place, feeling, or association can be considered an adverse effect to NRHP eligibility (36 CFR 800.5(3)(b)).

Data recovery plans are designed to offset cumulative loss of archaeological resources in the mine operations area by expanding archaeological knowledge about this region. The accumulation of information is used by researches and the public to better understand the prehistory and history of the area. Mitigating the loss of some site types, such as rock art or vision quest sites, is not achieved through data recovery alone. Site avoidance (taking into account extended or secondary effects, such as blasting, or increased accessibility) may be required if such sites are determined to be unsuitable for other types of mitigation.

The cumulative effect of coal mining on the archaeological resources in the Class I study area has been minimized by the process of mitigation through data recovery of NRHP eligible sites that have been excavated in anticipation of coal mining disturbance. Through this data recovery, there has been an evolving understanding of the area prehistory, as well as the methods used to sample and manage that resource. The destruction of any undocumented sites could have a negative cumulative affect on the resource.

Management approaches implemented in the late 1970s and early 1980s may have contributed to the loss of valuable cultural resources information. At that time, some sites were sampled, but others were allowed to be destroyed without full evaluation. Under current management practices, all sites are evaluated for the NRHP at the time of inventory. Those sites found to be not eligible for the NRHP exhaust their contribution to the archaeological record through recordation. All NRHP eligible sites are afforded protection from disturbance unless and until the various agencies and the Advisory Council on Historic Preservation approve a suitable mitigation plan.

An evaluation of the cumulative effects to cultural resources must consider that the number of sites destroyed versus number of sites extant does not correlate to a threshold at which there is an unacceptable loss of cultural resources. Evaluation of the cultural resources of the area must consider individual site type and quality (NRHP eligibility).

Important cultural resources are those that have the potential to yield information adding to our understanding of history or prehistory. Only these resources are crucial to evaluating cumulative effects. While non-NRHP eligible resources do not typically contribute to the archaeological record beyond their recordation, they are still useful when viewed in a broader perspective of regional activities. Typically these non-eligible sites are in advanced stages of erosion, and their loss to natural processes is well under way. The loss of NRHP eligible resources is offset, from an academic standpoint, by mitigation through data recovery. These sites present an opportunity to expand our understanding of local and regional prehistory through excavation and analysis. While avoidance of NRHP eligible sites is generally preferred, it is inaccurate to say that the loss of some NRHP eligible sites to data recovery efforts has a negative effect to cultural resources.

Site types of particular vulnerability to cumulative loss are rock art sites and rock structure sites. Cumulative loss of these site types exceeds the loss of mere archaeological data, as these site types uniquely represent, in a highly visual way, examples of prehistoric occupations that can be appreciated by the public as well as the archaeological and academic community. These are also relatively fragile site types subject to erosion, and vandalism. Avoidance of these fragile site types is preferred although not required if impacts are mitigated. No known rock art sites exist within the LBM and LUL tracts or the Spring Creek South RFD.

Because the total number of sites found during a Class III survey is also a measure of the exposure of sites due to erosion (and there is no consideration for sites not found because they are deeply buried) the number is only a sample of the actual number of sites present. Individual site type and quality determines their archaeological value. Therefore, a management assessment that focuses primarily on total site numbers will not accurately measure the cumulative effects to the resource. In summary, the individual evaluation of known cultural resource sites in the Spring Creek Coal area suggests that through avoidance of sensitive site types, and mitigation through data recovery of all disturbed NRHP eligible sites, the cumulative effects to cultural resources have been minimal.

4.1.11.1 Native American Consultation

Direct and Indirect Effects: There would be impacts and effect to sites of Native American concern and one site (24BH3392) within the LBM disturbance area is recommended as NRHP eligible. This site is discussed in Sections 2.3, 3.12, and 4.1.11. Only the Northern Cheyenne Tribe replied to BLM's request for consultation, which resulted in seven field visits. Based on the results of the site visits, no outstanding Native American issues remain. Additional consultation may take place with the Northern Cheyenne or other Native American groups prior to mining.

Cumulative Effects: No outstanding Native American issues have been identified on the LBM and LUL tracts. General lease and permit condition requirements are currently in effect that provide assurance that Native American issues are resolved and that any unrecorded sites encountered during mining shall cause mining to stop until corrective measures are taken. These lease and permit condition requirements would be extended to any future leases and permit amendments.

4.1.12 Visual Resources

Direct and Indirect Effects: Mining/disturbance activities on the LBM and LUL tracts would be partially visible from the major travel route in the area (Route FAS 314), and to adjacent landowners. The mining operation would be largely concealed by the surrounding rugged terrain, but may adversely impact the viewshed of adjacent and nearby landowners.

No visual resources have been identified on or near the tracts that are unique as compared to the surrounding area. The mining operations would affect landscapes classified as VRM Class III by BLM. There are approximately 77.1 acres of BLM owned surface included in the LBM tract and 197.1 acres of BLM owned surface in the LUL tracts.

Reclaimed terrain would be almost indistinguishable from the surrounding undisturbed terrain. Slopes might appear smoother (less intricately dissected) than the surrounding undisturbed terrain, and sagebrush and trees would not be as abundant for several years; however, within a few years after reclamation, the mined land would not be distinguishable from the surrounding undisturbed terrain except by someone very familiar with landforms and vegetation.

Cumulative Effects: A principal visual impact in this area is the visibility of mine pits and facility areas. People most likely to see these facilities would either be local residents, those passing through the area, those visiting it on mine related business, and recreationists on the Tongue River Reservoir. Pits and mine support facilities are generally not visible from more than a few miles away, but coal loading facilities and draglines can be seen from farther away. Due to the proximity of mining operations, cumulative overlap of mining-related visual impacts may occur. One relocated highway, a railroad, powerline, and the Tongue River Reservoir enlargement also affect visual classification of the proposed tracts.

After mining, the reclaimed slopes might appear somewhat smoother than pre-mining slopes and there would be fewer gullies, bluffs, and rock outcrops than at present. Even so, the landscape of the reclaimed mine would look very much like undisturbed landscape in the area and, in this area, the reclaimed mine areas would be separated by areas where the topography is not disturbed.

The additional cumulative increment of mining on the areas proposed for disturbance, when compared to the current visual classification, is minimal.

4.1.13 Noise

Direct and Indirect Effects: Potential onsite noise impacts to workers are regulated by Mine Safety and Health Administration (MSHA). The work-related hearing conservation programs of MSHA are designed to ensure that impacts to workers on the proposed lease area are minimized. No workers would be housed at the mine site.

CPE has developed internal criteria on off-site noise acceptable for the protection of the local community and has established a 65dBA threshold for noise. Modeling conducted for SCCC indicates that this threshold would be exceeded at points less than 4,800 feet from the pit boundary.

The nearest residence is approximately 15,000 ft from the LBM and LUL tracts and Route FAS 314 is within 13,500 ft of the tracts. Noise impacts would likely not occur on the Tongue River Reservoir. The nearest recreationist on the Tongue River Reservoir would be within approximately 14,000 ft from the proposed tracts. Recreationists on the Tongue River Reservoir should not experience higher ambient noise levels than the occupants of the nearest residence. SCCC will establish a 4,800-foot monitoring buffer around nearby residences. SCCC will internally re-model the noise acceptability when mining activity encroaches on this 4,800-foot buffer.

Cumulative Effects: Existing land uses within the Spring Creek area (e.g., mining, livestock grazing, oil and gas production, transportation, and recreation) contribute to noise levels, but wind is generally the primary noise source. Mining in the area increases the number of noise-producing facilities within the area and may augment the level of impacts to other resources (e.g., increased exposure of wildlife to noise impact, increased noise impacts to local residents and recreational users). Mining-related noise is generally masked by the wind at short distances, so cumulative overlap of noise impacts between mines is not likely.

Recreational users, local residents and grazing lessees utilizing lands surrounding active mining areas do hear mining-related noise; but this has not been reported to cause a substantial impact. As stated above, wildlife in the immediate vicinity of mining may be adversely affected by noise; however, observations at other surface coal mines in the PRB indicate that wildlife generally adapt to noise conditions associated with active coal mining.

Cumulative increases in noise from trains serving the PRB mines have caused substantial increases (more than five dBA) in noise levels along segments of the rail lines over which the coal is transported to markets. However, no substantial adverse impacts have been reported as a result.

4.1.14 Transportation Facilities

Direct and Indirect Effects: Mining/disturbing the proposed LBM and LUL tracts would not increase the current level of impact on Route FAS 314 other than the potential for increased dust, as discussed above under Section 3.4, Air Quality.

Most of the coal mined at the Spring Creek Mine is transported by rail. A relatively small amount of coal is transported by truck, as a result of retail coal sales. The addition of the proposed tracts will extend the time period over which SCCC would produce coal, which would extend the period of time coal would be transported from the mine.

One active pipeline crosses the LBM tract under the Proposed Action. The line is a water supply line that is owned by Fidelity Exploration and Production Company and provides additional water needed for mining operations. No other transportation facilities are located on the LBM or LUL tracts.

Cumulative Effects: Cumulative impacts to transportation are related to coal production levels. If coal production levels increase, cumulative impacts to transportation will increase. Highway traffic accidents and delays at grade crossings could result from train traffic. Livestock accidents at grade crossings that are not adequately protected could also increase as train traffic increases. However, no new cumulative impacts to transportation facilities are expected to occur as a result of mining/disturbing the proposed LBM and LUL tracts. The transportation facilities at the Decker and Spring Creek mines are already in place, and coal production and employment levels will not change with the proposed action, although it would extend the duration of mining by about ten years at the Spring Creek Mine, and thus the length of employment and associated transportation utilization would be extended.

4.1.15 Hazardous and Solid Waste

Direct and Indirect Effects: Waste is generated during mining operations at the Spring Creek Mine, as at all mines. Non-hazardous waste, which is similar to domestic or municipal solid waste, is currently disposed of on-site. Most of the wastes generated at the Spring Creek Mine that are not recycled are disposed of in a designated sanitary landfill located on a portion of the Spring Creek Mine area. Disposal of these non-hazardous wastes, which include abandoned mining machinery, scrap iron, scrap lumber, packing material, and other items is permitted under the mine's existing MDEQ permit to mine. No solid wastes will be deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites (SCCC 2001).

The Spring Creek Mine utilizes some non-hazardous liquids, some materials that may be classified as hazardous, or are handled as hazardous (some greases, solvents, paints, flammable liquids, and other combustible materials determined to be hazardous by the EPA under the Resource Conservation and Recovery Act). These types of wastes are disposed of at an off-site EPA-permitted hazardous waste facility. No significant impacts are anticipated as a result of the Proposed Action.

Cumulative Effects: No cumulative hazardous or solid waste impacts are expected.

4.1.16 Socioeconomics

Direct and Indirect Effects to General Socioeconomics: Statewide, severance taxes imposed on 2007-2008 coal production amounted to $45,332,000 (Montana Coal Council 2009). This does not include coal severance taxes paid by Westmoreland Resources Inc. on coal owned by the Crow Tribe, which is paid directly to the Tribe and not to the state of Montana or Big Horn County. In July of 1991, the severance tax on coal in Montana was set at a rate of 15 percent of the market value. Severance taxes are paid directly to the state of Montana. The permanent coal trust fund (50.0 percent) and Montana's general fund (26.2 percent) receive the largest shares of the severance taxes, followed by long-range building program (12.0 percent) State special revenue fund (5.5 percent), and miscellaneous (5.7 percent) (Montana Department of Revenue 2009).

Net and gross proceed taxes paid on 2008 coal production in Montana amounted to $14,458,854. Net and gross proceed taxes are paid on the value of the coal to support county governments in counties where mines are located (Montana Coal Council 2009).

Resource indemnity trust taxes paid totaled $1,366,020 for the fiscal year 2007-2008. Resource indemnity trust taxes of 0.4 percent of the contract sales price are paid to the indemnity trust. Federal abandoned mine reclamation and black lung taxes are based on production levels (Montana Coal Council 2009).

Under the Proposed Action, Montana revenues could total $73.6 million and federal revenues could total $21.8 million over the life of the mine (Table 4-1). Although no coal would be removed from the LUL tracts, SCCC would be assessed an annual rental payment for the land use lease according to a formula that considers the number of acres within the LUL and the percent of disturbance within those acres. It is estimated that SCCC would pay approximately $539,000 to the federal government over the course of the 20-year lease lands with 4 percent being parceled back to the state of Montana.

The LBM and LUL tracts would not directly create new jobs and therefore the availability of housing units would not be impacted. No additional employees are anticipated as a result of the tracts being mined, although the additional lease will prolong the duration of employment for current employees. No additional changes in the current socioeconomic situation as described in Section 3.3.14 are anticipated.

Direct and Indirect Effects to Environmental Justice: No new employees would be added as a result of sale of the coal leased and there would be no direct or indirect effects on the local work force. Mine employees would travel north from Sheridan and would not have to travel across either the Crow or Northern Cheyenne Reservations. SCCC proposes to use emergency services from Sheridan, if necessary. The Proposed Action would not require employees to move into the area near the project. Therefore, no adverse human health or environmental effects would be expected to fall disproportionately on minority or low income populations as a result of the Proposed Action.

Cumulative Effects: Essentially all employees at the Spring Creek Mine live in Sheridan County, Wyoming. Cumulative socioeconomic impacts on the town of Sheridan are not anticipated as a result of mining the proposed LBM and LUL tracts because the area would be used to extend the duration of current annual production. No new employees would be added as a result of the lease modification and LUL amendment. The following discussion of the Sheridan area, which includes Sheridan, Dayton, Ranchester and Clearmont, is provided to demonstrate that the communities could accommodate a small amount of growth without experiencing problems. Baseline data concerning socioeconomics of the Sheridan area and the counties of Sheridan, Wyoming and Big Horn, Montana are presented in Section 3.17.

The population of Sheridan declined from 17,496 in the 1980 Census to 15,291 in the 1990 Census, a drop of about 12.6 percent. However, in 1995 the population of the Sheridan area grew to an estimated level of 16,362, which is an increase of 7.0 percent when compared to the 1990 Census. The population of Sheridan County declined from 25,048 in the 1980's to 23,562 in the 1990's, which is a drop of approximately 5.9

percent. From 1990 to 2000 the county grew approximately 12.7 percent to a population level estimated at 26,560. These figures indicate that the small amount of population growth is accommodated with existing facilities (BLM 1998).

The average total labor force in Sheridan County in July 2009 stood at 16,351 with an unemployment rate of 5.8 percent, compared to 4.0 percent in 2000 (Wyoming Department of Employment 2009a). At the end of 2007, approximately 568 people in Sheridan County were employed in mining (including oil & gas extraction), representing about 4.2 percent of the employed labor force (Wyoming Department of Employment 2009b). Total employment in Sheridan County has generally increased since 1990, when it stood at 11,434. As of July 2009, there were 15,396 employed persons in the county (Wyoming Department of Employment 2009a). Employment in Sheridan County has been affected by the recent downturn in construction and natural resources and mining (including CBNG development), with the July 2009 unemployment rate nearly double the July 2008 rate (5.8 vs. 2.9 percent).

This information indicates that the town of Sheridan and Sheridan County can handle an influx of new people without experiencing problems associated with growth. With the proposed LBM and LUL tracts, there should be little if any resultant cumulative socioeconomic impact on the Sheridan area.

4.1.17 Global Climate Change

4.1.17.1 Greenhouse Gas Emissions

Direct and Indirect Effects: SCCC estimated emissions for combined operations based on 18 mmtpy for 2008 and a typical year for the 2013-2023 time period (Table 4-2). CO_2e emissions are projected to increase at the Spring Creek Mine over time. The increase is expected to result from the additional fuels (especially diesel) that would be used in consideration of the increased coal and overburden haul distances throughout the mine, as well as increased use of electricity and explosives related to increasing overburden thicknesses. The Proposed Action would not increase annual production, but would extend the life of the mine by approximately 2.1 years.

Table 4-2. Estimated Annual Equivalent CO_2 Emissions[1] at the Spring Creek Mine (2008 and 2013-2023 Average).

Source	2008	2013-2023 Average
Fuel	35,147	50,342
Electricity	57,073	63,334
Mining Process	10,336	11,806
Arranged Rail Transport	11,483	11,483
Total of Four Sources	**114,039**	**136,965**

[1] CO_2e in tonnes
Source: CPE 2009

Estimates of greenhouse gas emissions resulting from the combined mine operations at the Spring Creek Mine are presented in Table 4-2. Based on estimated average annual CO_2e emissions of 0.137 million metric tons (tonnes) from mining coal from the mine from 2013 through 2023 and 2.1 years of additional coal production, the total estimated CO_2e emissions at the Spring Creek Mine resulting from the Proposed Action would be 0.274 million tonnes.

Cumulative Effects: At this time, there is no national policy or law in place that regulates GHG emissions. As discussed in Chapter 2, under the currently approved mining plan, which represents the No Action Alternative, SCCC anticipates that the Spring Creek Mine would mine its remaining estimated 317 million tons of recoverable coal reserves in nearly 18 years at an average annual production rate of approximately 18 million tons. Under the Proposed Action, SCCC estimates that the life of the mine would be extended by

about 2.1 additional years at an average annual coal production rate of approximately 18 million tons for a total of 356 million tons of recoverable coal.

Estimates are that activities in the U.S. will account for approximately 7,405 million tonnes of gross CO_2e emissions in 2010 and 8,275 million tonnes in 2020 (BLM 2008a). Using those projections, the total 2008 CO_2e emissions from the Spring Creek Mine (Table 4-2) represent 0.0015 percent of the 2010 U.S. emissions. The estimated average 2013-2023 CO_2e emissions at the Spring Creek mine would represent 0.0017 percent of the projected 2020 U.S. emissions.

As mentioned in Section 3.18, the CO_2e estimates for the LBM tract in Table 4-2 include projected methane emissions vented from exposed unmined coal. The estimated annual amount of CO_2e emissions from vented methane from the SCCC mining process was approximately 6,829 metric tons (0.0068 million tonnes). The total methane emissions from anthropogenic sources in the U.S. in 2008 were 737.4 million tonnes (USDOE 2009). Based on 2008 production from the Spring Creek Mine, the estimated annual methane emissions vented from exposed unmined coal was about 0.001 percent of the total 2008 U.S. methane emissions from anthropogenic sources.

CBNG is composed primarily of methane. CBNG is released into the atmosphere when coal is mined. CBNG is currently being commercially produced by oil and gas operators from wells near the LBM tract. CBNG that is not recovered prior to mining would be vented to the atmosphere during the mining process. Selection of the No Action Alternative would potentially allow more complete recovery of the CBNG from the LBM tract in the short term (ten years) during the time that the mine's currently leased coal is being recovered.

4.1.17.2 Global Warming/Climate Change

The following discussion includes an assessment of cumulative impacts related to GHGs, and how the Proposed Action considered in this EA contributes.

Though the terms "global warming" and "climate change" are often used interchangeably, they are two distinct concepts:

Global Warming

The term "global warming" refers to the observed increase in the *average global* temperature of the atmosphere near the Earth's surface and in the troposphere (U.S. Climate Change Science Program 2009). Through complex interactions on a global scale, the emission of GHGs, along with other climate-influencing environmental factors, cause a net warming of the atmosphere (IPCC 2007). GHGs include CO_2, CH_4, N_2O, water vapor, and several other gasses (IPCC 2007). These are called "greenhouse gasses" because, when released into the atmosphere, they prevent the escape of reflected solar radiation and heat from the Earth's surface back into space (IPCC 2007). In this way, the accumulation of GHGs in the atmosphere exerts a "greenhouse effect" on the earth's temperature (IPCC 2007). GHG emissions can be anthropogenic (i.e., human-made) or naturally occurring (e.g., volcanic activity) (IPCC 2007). Other than GHG emissions, factors that contribute to global warming include aerosols, changes in land use, and variations in cloud cover and solar radiation which affect the absorption, scattering, and emissions of radiation within the atmosphere and at the Earth's surface (IPCC 2007). Though the *average global* temperature has increased almost 2˚F over the past century, temperatures have not changed evenly from region to region (IPCC 2007). Because temperature is a part of climate, the phenomenon of global warming is both an element of and a driving force behind climate change (U.S. Climate Change Science Program 2009).

Climate Change

Climate is defined as the average weather or the regular variations in weather in a region over a period of years as exhibited by temperature, precipitation, and wind velocity (Merriam-Webster 2009). The term "climate change" refers to a substantial and persistent change in the mean state of global and/or regional climate or its variability, usually occurring over decades or longer (U.S. Climate Change Science Program

2009). Climate change occurs in response to changes in various aspects of Earth's environment, including, but not limited to, global warming, regular changes in earth's orbit around the sun, and plate tectonics (IPCC 2007). These climatic changes, while impacts in and of themselves, can affect other aspects of the environment including desert distribution, sea level, species distribution, species survivability, ocean salinity, availability of fresh water, and disease vectors (IPCC 2007). These effects can vary from region to region over time; some agricultural regions may become more arid while others become wetter; some mountainous areas may experience greater summer precipitation, yet have their snowpack disappear in the future (IPCC 2007).

Thus, the causes and effects of climate change can be depicted as a four step chain of events:

GHG emissions/climate drivers → global warming → climate change → environmental effects.

GHGs are emitted and other events occur which contribute to global warming; global warming, in combination with other environmental factors, induces the climate to change; and finally climate change contributes to environmental effects around the globe.

According to the IPCC's synthesis report (Bernstein, et al. 2007):

- "Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would be very likely to be larger than those observed during the 20th century."
- "There is high confidence that by mid-century, annual river runoff and water availability are projected to increase at high latitudes and in some tropical wet areas and decrease in some dry regions in the mid-latitudes and tropics. There is also high confidence that many semi-arid areas (e.g., Mediterranean Basin, western United States, southern Africa and northeast Brazil) will suffer a decrease in water resources due to climate change."
- "Anthropogenic warming and sea level rise would continue for centuries due to the time scales associated with climate processes and feedbacks, even if greenhouse gas concentrations were to be stabilized."
- "Anthropogenic warming and sea level rise could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change."
- "There is high agreement and much evidence that all stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades, assuming appropriate and effective incentives are in place for their development, acquisition, deployment and diffusion and addressing related barriers."

The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

4.1.17.3 Climate Change Cause and Effect

Although the effects of GHG emissions and other contributions to climate change *in the global aggregate* are estimable, it is currently impossible to determine what effect *any given* amount of GHG emissions (or other contribution to climate change) resulting from an activity might have on the phenomena of global warming, climate change, or the environmental effects stemming there from (U.S. Climate Change Science Program 2009). It is therefore not currently possible to associate any *particular* action with the creation or mitigation of any *specific* climate-related environmental effects. However, it is known that certain actions may

contribute *in some way* to the phenomenon (and therefore the effects of) climate change, even though specific climate-related environmental effects cannot be directly attributed to them.

Historically, the coal mined in the PRB has been used as one of the sources of fuel to generate electricity in power plants located throughout the United States. Coal-fired power plant emissions include CO_2, which has been identified as a principal anthropogenic greenhouse gas. According to the Energy Information Administration (USDOE 2007a, 2007b):

- CO_2 emissions represent about 83 percent of the total 2008 U.S. anthropogenic greenhouse gas emissions.
- Estimated anthropogenic CO_2 emissions in the U.S. totaled 5,839.3 million tonnes in 2008, which was a 3.0 percent decrease from 2007.
- Estimated CO_2 emissions from energy-related consumption in the U.S. totaled 5,814.4 million tonnes in 2008.
- Estimated CO_2 emissions from the electric power sector totaled 2,359.1 million tonnes, or about 41 percent of total U.S. energy-related CO_2 emissions in 2008.
- Estimated CO_2 emissions from coal electric power generation 1,945.9 million tonnes or about 33 percent of total U.S. energy-related CO_2 emissions in 2008.
- Coal production from the Montana PRB represented approximately 3.8 percent of the coal used for power generation in 2008, which means that Montana PRB surface coal mines were responsible for about 1.3 percent of the estimated U.S. anthropogenic CO_2 emissions in 2008.
- The Spring Creek Mine produced 17.9 million tons of coal in 2008, which represents about 40.0 percent of the coal produced in the Montana PRB in 2008, or about 0.5 percent of the estimated 2008 U.S. CO_2 emissions from power generation.
- CO_2 emissions from the 17.9 million tons of coal produced in 2008 represent about 0.1 percent of the estimated 2008 world CO_2 emissions from energy related sources.

Under the Proposed Action, the Spring Creek Mine anticipates producing the coal included in the LBM tract at 18 mmtpy levels using existing production and transportation facilities. This would extend CO_2 emissions related to burning coal from Spring Creek Mine for up to 2.1 additional years beyond 2028. It is not likely that selection of the No Action Alternative would result in a decrease of U.S. CO_2 emissions attributable to coal-burning power plants in the long term. There are multiple other sources of coal that, while not having the cost, environmental, or safety advantages, could supply the demand for coal beyond the time that the Spring Creek Mine completes recovery of the coal in its existing leases.

4.2 Effects From Alternative 1 – No Action

The No Action Alternative would involve rejecting SCCC's lease modification application, the associated LUL amendment, and the land use designation changes on the disturbance area related to the Proposed Action would be changed to *Unsuitable for Lease Without Exception*. Mining would continue at the Spring Creek Mine under the currently approved mine plan, but would end nearly 2.1 years sooner.

Direct and Indirect Effects: Under the No Action Alternative the LBM and LUL applications would be rejected, which would preclude coal removal from within the LBM tract and disturbance within the LUL tracts at this time. Currently approved mining operations at the Spring Creek Mine would continue on the existing Spring Creek leases. Impacts to the various resources would not be extended onto the portions of the LBM and LUL tracts that will not be affected under the current mine and reclamation plan and pending mine plan revisions.

Resource specific implications resulting from the selection of the No Action Alternative are listed below.

Topography and Physiography: Mining operations and the associated impacts to topography and physiography would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Geology, Mineral Resources, and Paleontology: Mining operations and the associated impacts to overburden and paleontological resources would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Mineral development limitations related to mining operations at the Spring Creek Mine would not be extended onto portions of the LBM and LUL tracts that will not be affected under the current mining and reclamation plan.

Air Quality: Mining operations and the associated impacts to air quality would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Water Resources: Mining operations and the associated impacts to the surface water drainage system, including Pearson Creek, groundwater resources, and water rights associated with existing approved mining and CBNG development would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Alluvial Valley Floors: Mining operations and the associated impacts to AVFs would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Wetlands: Mining operations and the associated impacts to wetlands and other waters of the U.S. would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Soils: Mining operations and the associated impacts to soils would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Vegetation: Mining operations and the associated impacts to vegetation would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Wildlife: Mining operations and the associated impacts to wildlife would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases. Selection of the No Action Alternative would preserve sage-grouse and big game habitat within the disturbance area associated with the Proposed Action. Approximately 848 acres of within the LBM/LUL disturbance area are within an area that has been delineated as areas of "crucial importance to maintaining viable populations of sage-grouse within the Montana portion of the PRB" (BLM 2008a).

The 1,057 acres *Unsuitable for Leasing Without Exception* designation (532 acres of sage-grouse wintering area, 276 acres of mule deer winter range, and 249 acres of golden eagle nest buffer) within the Spring Creek South RFD area would remain in place. The additional sage-grouse habitat inside the Spring Creek South RFD (2,063 acres) would be subject to further evaluation in the event development of federal minerals is proposed within the sage-grouse habitat area, with the goal of avoiding the displacement of sage-grouse from important habitat areas. Adaptive management could be applied to both areas that would allow mineral recovery while protecting/mitigating the loss of sage-grouse habitat.

Approximately 811 acres of wildlife habitat with the LBM lease area and approximately 37 acres within the LUL tract would be redesignated from *Suitable for Leasing with Stipulations* to *Unsuitable for Leasing*

Without Exception. Impacts to wildlife associated with the Propose Action described in Section 4.1 would be precluded under this alternative.

Ownership and Use of Land: Mining operations and the associated impacts to land use would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Cultural Resources: Mining related disturbance to 20 cultural resources sites (one NRHP site) within the disturbance area associated with the LBM tract and two sites (no NRHP sites) within the LUL tracts would not occur under this alternative.

Visual Resources: Mining operations and the associated impacts to visual resources would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Noise: Noise impact related to mining operations would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Transportation Facilities: Mining operations and the associated impacts to transportation facilities would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Hazardous and Solid Wastes: Hazardous and solid waste impacts related to mining operations would continue as permitted on the existing Spring Creek Mine leases. Portions of the LBM tract that are contiguous to operating mines would be disturbed to recover the coal in the existing leases.

Socioeconomics: Mining operations and the benefits associated with employment levels and economic benefits would continue as permitted on the existing Spring Creek Mine leases. Direct jobs provided by the mines and those supported indirectly by those operations and the consumer expenditures of the mines' workforces would be lost sooner than if leasing were to occur. This could trigger population out-migration from the area and adversely affecting housing markets.

Under the No Action Alternative, estimated potential Montana revenues would be reduced by $73.6 million and potential federal revenues would be reduced by $21.8 million over the life of the mine, when comparing the Proposed Action to the currently approved mine plan (Table 4-1).

State owned coal in T.8S., R.39E., Section 36 has been leased to SCCC (Figure 1-3). SCCC recently submitted a mine plan revision to MDEQ/OSM to recover the state coal within this section. The revision is in review and has not yet been approved. The Proposed Action would extend the proposed coal removal cuts within this section (Figure 2-2). Based on the proposed revision, the No Action Alternative would mean that coal within this current state coal lease area would not be recovered as a result of the reduced pit configuration. As such, additional state revenues from this coal would not be realized at this time under the No Action Alternative, when compared to the proposed Pearson Creek revision.

Greenhouse Gasses: Selection of the No Action Alternative would not likely directly decrease U.S. methane emissions attributable to coal mining in the long term because there are multiple other sources of coal that could supply the coal demand beyond the time that Spring Creek Mine recovers the coal in its existing leases.

Cumulative Effects: Refer to Section 4.0.2.

Chapter 5
CONSULTATION AND COORDINATION

5.0 CONSULTATION AND COORDINATION

The following persons, firms, and agencies contributed data, analysis, review or guidance to this environmental assessment.

Bureau of Land Management	
Dan Benoit	Project Coordinator/Geologist
Kathy Bockness	NEPA Coordinator
Andy Bobst, Julie Cymore, & Mike Philbins	Hydrologists
Doug Melton	Archaeologist
Joan Trent	Sociologist
John Thompson	NEPA/Land Use Planner
Pam Wall	Realty Specialist
Dawn Doran	Rangeland Management Specialist
Ed Hughes	Economist
Dale Tribby	Lead Wildlife Biologist
Mike Montgomery	Dam Safety
Office of Surface Mining Reclamation and Enforcement	
Foster Kirby	Project Reviewer
Montana Department of Environmental Quality	
Chris Yde	Supervisor, Coal and Uranium Program
Angela McDannel	Groundwater Hydrologist
Tom Golnar	Surface Water Hydrologist
Eric Urban	Wildlife Biologist
Montana Department of Fish, Wildlife& Parks	
Allison Puchniak-Begley	Biologist
Windy Davis	Wildlife Biologist
Spring Creek Coal Company/Cloud Peak Energy	
Gabe Johnson	Environmental Engineer
Brad Clark	Manager – Project Development
Western Water Consultants, Inc. (Technical Consultants)	
Doyl Fritz	Project Coordinator
John Berry	Biologist/Project Manager
Mal McGill	CADD
Heidi Robinson	Clerical

Chapter 6
REFERENCES

6.0 REFERENCES

Allen, A.W., 1984, Habitat Suitability Index Models: Gray Partridge. U.S. Fish Wildl. Serv. Biol. Rep. 82(10.75). 23 pp.

Argone, 2002, Technical Support Document – Air Quality Impact Assessment for the Montana Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans and the Final Environmental Impact Statement and Draft Planning Amendment for the Powder River Basin Oil and Gas Project. Prepared for the U.S. Department of the Interior (DOI), Bureau of Land Management, Montana and Wyoming State Offices, by the Environmental Assessment Division, Argonne National Laboratory, Argonne, Illinois.

Ayers, W.B. Jr., 1986, Coal Resources of the Tongue River member of the Fort Union Formation (Paleocene), Powder River Basin, Wyoming and Montana, Geologic Survey of Wyoming: Report of Investigations No. 35.

Bernstein, L., P. Bosch, O. Canziani, Z. Chen, R. Christ, O. Davidson, W. Hare, S. Huq, D. Karoly, V. Kattsov, Z. Kundzewicz, J. Liu, U. Lohmann, M. Manning, T. Matsuno, B. Menne, B. Metz, M. Mirza, N. Nicholls, L. Nurse, R. Pachauri, J. Palutikof, M. Parry, D. Qin, N. Ravindranath, A. Reisinger, J. Ren, K. Riahi, C. Rosenzweig, M. Rusticucci, S. Schneider, Y. Sokona, S. Solomon, P. Stott, R. Stouffer, T. Sugiyama, R. Swart, D. Tirpak, C. Vogel, and G. Yohe, 2007, Climate Change 2007: Synthesis Report, Summary for Policymakers. Intergovernmental Panel on Climate Change Fourth Assessment Report November 17, 2007.

Bureau of Indian Affairs/Montana Department of Environmental Quality (MDEQ), 2008a. Draft Environmental Impact Statement for the Absaloka Mine Crow Reservation South Extension Coal Lease Approval, Proposed Mine Development Plan, and Related Federal and State Permitting Actions. Information acquired from website on the Internet: <http://www.deq.state.mt.us/eis/Absaloka/Draft%20EIS%20Complete.pdf>.

_____, 2008b. Final Environmental Impact Statement for the Absaloka Mine Crow Reservation South Extension Coal Lease Approval, Proposed Mine Development Plan, and Related Federal and State Permitting Actions. Information acquired from website on the Internet: <http://www.deq.state.mt.us/eis/Absaloka/FEIS.pdf>.

Bureau of Land Management (BLM), July 5, 1979, *Technical Examination and Environmental Assessment.* Final Spring Creek North Extension Coal Lease Application M-35736, Spring Creek, MT. US Department of Interior, Bureau of Land Management, Miles City District Office, Miles City, MT.

_____, 1981a, Draft Powder River Regional Coal Environmental Impact Statement. USDI, BLM.

_____, 1981b, Final Powder River Regional Coal Environmental Impact Statement. USDI, BLM.

_____, 1984a, Draft Environmental Impact Statement for Round II Coal Lease Sale in the Powder River Region. USDI, BLM.

_____, 1984b, Final Resource Management Plan/Environmental Impact Statement, Powder River Resource Area, December 1984. USDI, BLM.

_____, 1990, Final Economic, Social and Cultural Supplement to the Powder River I Regional EIS. Miles City Field Office, June 1990. USDI, BLM.

_____, 1998, Environmental Assessment for Modifying Decker Coal Leases, MTM 057934A and MTM 061685, EA# MT-020-78-7-44, U.S. Department of the Interior, Bureau of Land Management, Billings, MT.

_____, 2000, Environmental Assessment and Powder River Resource Area, Resource Management Plan Amendment for Spring Coal Company's Lease modification MTM 88405 and State of Montana Coal Lease Applications C-1099-XX, C-1100-XX, and C-1101-XX, EA No. MT-020-99-20. Miles City Field Office, July 2000. USDI, BLM.

_____, 2002, Guidelines for Identifying Cultural Resources. BLM Montana/Dakotas Cultural Resources Handbook H-8110-1.

_____, 2003a, Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project. Buffalo Field Office, January 2003. USDI, BLM.

_____, 2003b, Final Environmental Impact Statement for the Pittsburg and Midway Coal Mining Company Coal Exchange Proposal. Casper Field Office, July 2003. USDI, BLM.

_____, 2003c, Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plan. Montana State Office, Billings, Montana. USDI, BLM.

_____, 2005a, Task 2 Report for the Powder River Basin Coal Review – Past and Present and Reasonably Foreseeable Development Activities. Prepared for the BLM Wyoming State Office, BLM Wyoming Casper Field Office, and BLM Montana Miles City Field Office by ENSR Corporation, Fort Collins, Colorado, December 2005.

_____, 2005b, Task 1A Report for the Powder River Basin Coal Review – Current Air Quality Conditions. Prepared for the BLM Wyoming State Office, BLM Wyoming Casper Field Office, and BLM Montana Miles City Field Office by ENSR Corporation, Fort Collins, Colorado, September 2005.

_____, 2005c, Environmental Assessment (MT-020-2005-0155) for Fidelity Exploration & Production Co. Tongue River - Deer Creek North Project and Tongue River - Pond Creek Project Plans of Development, Big Horn County, Montana. Information acquired from website on the Internet: <http://bogc.dnrc.state.mt.us/deer_pond_creek_ea.htm>.

_____, 2006a, Environmental Assessment for Spring Creek Coal Company's Lease by Application MTM 94378 – EA# MT-020-2007-34, November. Miles City Field Office. March 2006. USDI, BLM.

_____, 2006b, Environmental Assessment for Decker Coal Lease Modifications MTM37604 and MTM57934 EA# MT-020-2006-097. Miles City Field Office. March 2006. USDI, BLM.

_____, 2008a, Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans, Miles City Field Office. Information acquired from website on the Internet: <http://www.blm.gov/eis/mt/milescity_seis/fseis/contents.htm>.

_____, 2008b, NEPA Handbook H-1790-1. U.S. Department of the Interior, Bureau of Land Management, Washington, D.C.

Bureau of Land Management (BLM)/Montana Department Natural Resources and Conservation (MDNRC), 2000, Environmental Assessment and Powder River Resource Area, Resource Management Plan Amendment for Spring Coal Company's Lease modification MTM 88405 and State of Montana Coal Lease Applications C-1099-XX, C-1100-XX, and C-1101-XX, EA No. MT-020-99-20. Miles City Field Office, July 2000.

Bureau of Land Management (BLM)/Montana Department of State Lands (MDSL), 1979, Draft Environmental Statement Regional Analysis – Northern Powder River Basin, Coal, Montana. US Department of Interior, Bureau of Land Management, Miles City District Office, Miles City, MT.

Carmichael, A.G., A.G. Ekland and W.J. Kinney, 1979, Archaeological Investigations in the Spring Creek Mine Area, Big Horn County, Montana. Report prepared by the Department of Anthropology, University of Montana, Missoula.

Casper Star Tribune, 2007, "Railroad Gets OK From Feds", October 11, 2007. Information acquired from website on the Internet: <http://trib.com/news/state-and-regional/article_1e562532-513f-557a-8416-ad796b60d9f6.html>.

Chancellor, Rick, 2003, WDEQ, personal communication.

Clark, D.W., 1995, Geotechnical processes in ground water resulting from surface mining of coal at the Big Sky and Spring Creek Mine area, southeastern Montana: U.S. Geological Survey Water-Resources Investigations Report 95-4097, 80 p.

Clayton, Kort M., J.D. Berry, P. Farmer, B. Waage, C. Yde, and J. M. Gregory, 2006, Small Mammal Reoccupancy Of Reclaimed Habitat: A Potential Indicator Of Reclamation Success. Presented at the 2006 Billings Land Reclamation Symposium, June 5-8, 2006, Billings, MT and jointly published by BLRS and ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

Cloud Peak Energy (CPE), 2009, CO_2e Emissions Calculations for the Spring Creek Mine. Unpublished Data.

Cole, G.A., and Sholes, M.A., 1980, Geology of the Anderson and Dietz coal beds, Big Horn county, Montana: Montana Bureau of Mines and Geology, Geologic Map 14, 23 p. with plates.

DeBruin, R.H., and R.M. Lyman, 1999, Coalbed Methane in Wyoming. Pages 61-72 in W. R. Miller, editor. Coalbed Methane and Tertiary Geology of the Powder River Basin Wyoming and Montana. Wyoming Geological Association 50th Field Conference Guidebook. Decker Coal Company, March 15, 1996, 1995 Consolidated Annual Progress Report, West, North and East Pits, Spring Creek, MT.

DeBruin, R.H., R.M. Lyman, R.W. Jones, and L.W. Cook, 2001, Coalbed methane in Wyoming. Wyoming State Geological Survey information pamphlet No. 7 (revised). 19 pages.

Decker Coal Company, Unpublished data from wildlife monitoring – 1980-2008.

Denson, N.M., and Pierson, C.T., 1991, Geologic map showing thickness and structure of the Anderson-Wyodak coal bed in the north half of the Powder River Basin, southeastern Montana and northeastern Wyoming: U.S. Geological Survey Miscellaneous Investigations Map I-2094A, scale 1:200,000.

Emme, Doug, 2003, WDEQ, personal communication, May 7.

Eustace, C., 1995, Sage grouse – they used to darken the sky. Montana Outdoors. Vol. 26, No. 5. Helena, Montana.

Ferguson, D., 2005, A Class III Cultural Resources Inventory of the Proposed Decker Coal Mine-to-Spring Creek Coal Mine Dragline Transport Corridor in Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.

_____, 2006a, An Archaeological Review of a Site of Special Concern to the Northern Cheyenne Tribal Cultural Monitors Located on the Rio Tinto Spring Creek Coal Mine Property, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.

_____, 2006b, A Class III Inventory of Selected Tract within the Spring Creek Coal Company's Permit Boundary, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.

_____, 2007a, An Evaluation of Archeology Sites 24BH545 and 24BH546 on the Spring Creek Coal Mine, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.

_____, 2007b, Class III Resources Inventory: A Re-examination of Selected Parcels within the Spring Creek Coal Mine Permit Area, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.

Ferguson, David and Garren Meyer, 2007, A Class III Inventory of Spring Creek Coal Company's Pearson Creek Amendment, Big Horn County, Montana. Report prepared by GCM Services, Inc. Butte.

Finley, A.K., and J.E. Goolsby, 2000, Estimates of Coal Volumes and Coalbed Methane in Place, Powder River Basin, Wyoming. Wyoming State Geological Survey, Wyoming Geo-Notes No. 68, Laramie, Wyoming.

Flores, R., G. Stricker, J. Meyer, T. Doll, P. Norton, R. Livingston, and M. Jennings, 2001, A Field Conference on Impacts of Coal Bed Methane Development in the Powder River Basin, Wyoming, USGS Open-File Report 01-126.

Fox, R.A., 1977, Archaeological Investigations in the Spring Creek Mine Area: Survey and Testing Phases. Report prepared for Spring Coal Company by the University of Montana, Department of Anthropology, Missoula, Montana.

Glass, G.B., 1976, Update on the Powder River Coal Basin: in *Wyoming Geological Association Guidebook,* 28th Anniversary Field Conference, Geology and Energy Resources of the Powder River Basin, pp. 209-220.

Haberman, T., 1973, 1972 Archaeological Survey in the Decker/Birney Area of Big Horn County, Montana. Report prepared for the West Interstate Commission for Higher Education (WICHE) Project, sponsored by the Montana Office of the Bureau of Land Management.

Heffern, E.L., D.A.Coates, Jason Whiteman, and M.S. Ellis, 1993, Geologic map showing the distribution of clinker in the Tertiary Fort Union and Wasatch Formations, northern Powder River Basin, Montana: U.S. Geological Survey Coal Investigations Map C-142, scale 1:175,000.

Hewitt, O.H., Editor, 1967, The Wild Turkey and Its management. The Wildlife Society.

Holloran, M. J. 2005. Sage-grouse population response to natural gas field development in western Wyoming. PhD Dissertation. University of Wyoming, Laramie.

IMPROVE, 2002, Visibility report from March 1996 to February 1999, acquired from the Colorado State University/ Cooperative Institute for Research in the Atmosphere. Information acquired from website on the Internet: <http://vista.cira.colostate.edu/improve/Publications/Reports/2000/PDF/Executivesumfinal00.pdf>.

Intergovernmental Panel on Climate Change (IPCC), 2007, Fourth Assessment Synthesis Report, *Climate Change 2007: Synthesis Report*, 37-41. Information acquired from website on the Internet: <http://www.ipcc.ch/ipccreports/ar4-syr.htm>.

Kuck, T.L., 1968, Movements and Behavior of Pheasants During the Breeding Cycle as Determined by Radio-Tracking. South Dakota State University Library. 73 pp.

Larhen, L., 1977, Identified Cultural Resources, Pacific Power and Light Company Spring Creek Mine in: The Impacts of Coal Development on the Cultural Resources of Southeastern Montana, by Anthro Research, Inc. for the United States Geological Survey, Northern Powder River EIS, Billings.

Law, B.E., B.E. Barnum, and T.P. Wollenzien, 1979, Coal Bed Correlations in the Tongue River Member of the Fort Union Formation, Monarch, Wyoming, and Decker, Montana: U.S. Geological Survey Miscellaneous Investigations Series, Map I-1128.

Lowe, F.P. and L.D. Flake, 1988, Mourning Dove Movements During the Reproductive Season in Southeastern Idaho. J. Wildl. Manage. 53(3):477-480.

Martin, L.J., D.L. Naftz,, H.W. Lowham,, and J.G. Rankl, 1988, Cumulative potential hydrologic impacts of surface coal mining in the Eastern Powder River Structural basin-Northeastern, Wyoming. US Geological Survey Water-Resources Investigations Report 88-4046, Prepared in cooperation with Wyoming Department of Environmental Quality and US Office of Surface Mining.

Merriam-Webster's Online Dictionary, 2009, Information acquired from website on the Internet: <http://www.merriam-webster.com/dictionary/climate>.

Meshnick, J. C., Smith, J. H., and Gray, L. G., 1977, Soil Survey of Big Horn County Area, Montana - United States Department of Agriculture, Soil Conservation Service and United States Department of the Interior, Bureau of Indian Affairs in cooperation with Montana Agricultural Experiment Station. 223 p., [122] fold. leaves of plates.

Montana Bureau of Mines and Geology (MBMG), 1963, Mineral and Water Resources of Montana, Montana Bureau of Mines and Geology Special Publication No. 28 May, 1963. Information acquired from website on the Internet: <http://www.mbmg.mtech.edu/sp28/contents.htm#min3>.

_____, 2005, 2005 Annual Coalbed Methane Regional Ground-water Monitoring Report: Northern Portion of the Powder River Basin. Information acquired from website on the Internet: <http://www.mbmg.mtech.edu/pdf-open-files/mbmg538-CBM-2005-Annual_Report.pdf>.

Montana Bureau of Oil and Gas Conservation (MBOGC), 2009, Montana Online Oil & Gas Information System – Searched on November 12, 2009. Information required from website on the Internet: <http://bogc.dnrc.state.mt.us/JDPloginWeb.htm.>.

Montana Coal Council, 2002, Montana Coal 2002 Brochure.

_____, 2003, Montana Coal 2003 Brochure.

_____, 2004, Montana Coal 2004 Brochure.

_____, 2005, Montana Coal 2005 Brochure.

_____, 2006, Montana Coal 2006 Brochure.

_____, 2007, Montana Coal 2006 Brochure.

_____, 2008, Montana Coal 2006 Brochure.

_____, 2009, Montana Coal 2006 Brochure.

Montana Department of Commerce, 2009a, *Annual Estimates of the Population for Counties of Montana: April 1, 2000 to July 1, 2008*. Information acquired from website on the Internet:< http://ceic.mt.gov/Demog/estimate/pop/County/CO-EST2008-01-30.pdf >.

_____, 2009b, Profile of General Demographic Characteristics: 2000 - Geographic Area: Big Horn County, Montana. Information acquired from website on the Internet: <http://www.ceic.mt.gov/C2000/sf32000/SF3counties/SFData/05030003.pdf>.

Montana Department of Environmental Quality (MDEQ), 2005, Table C2. Montana Coal Production and Average Mine Price by Rank of Coal, 1950-2002http. Information acquired from website on the Internet: <//deq.mt.gov/energy/HistoricalEnergy/index.asp>

_____, 2008, Montana 2008 Draft Water Quality Integrated Report - Prepared in accordance with the requirements of Sections 303(d) and 305(b) of the federal Clean Water Act. Information acquired from website on the Internet: <http://cwaic.mt.gov/wqrep/2008/Appendix_A_ImpairedWater_withSub_basin_Maps.pdf>.

Montana Department of Environmental Quality/Air Resources Management (MDEQ/ARM), 2009a, Air Quality Nonattainment Information. Information acquired from website on the Internet: <http://deq.mt.gov/AirQuality/Planning/AirNonattainment.asp>.

_____, 2009b, Prevention of Significant Deterioration of Air Quality. Information acquired from website on the Internet: <http://www.deq.state.mt.us/dir/legal/Chapters/CH08-08.PDF>.

Montana Department of Natural Resources and Conservation (MDNRC), The Northern Cheyenne Tribe, and the US Bureau of Reclamation, 1996, Tongue River Basin Project, Final EIS: Southeastern Montana.

Montana Department of Revenue, 2009, Biennial Report July 1, 2006 to June 30, 2008. Information acquired from website on the Internet: <http://mt.gov/revenue/publicationsreports/biennialreports/Corrected_2007-2008_Biennial_Report.pdf>.

Montana Natural Heritage Program, (MNHP), 2002, Baseline Survey for Astragulus barrii Barneby (Barr's Milkvetch) and Physaria dicymocarpa var. lanata A. Nels (Woolly Twinpod) in eastern Big Horn and Southwestern Rosebud Counties, Montana. Information acquired from website on the Internet: <http://mtnhp.org>.

_____, 2008, Plant Species of Concern, June 2008. Information acquired from website on the Internet: http://nhp.nris.state.mt.us/plants/reports/PlantSOC_2006.pdf.

Munson, G, 1990, Archaeological Investigations in the Spring Creek Coal Mine Area. Report prepared for Spring Creek Coal Company, Decker, Montana by GCM Services, Inc., Butte.

_____, 1992, Archeological Investigations at 24BH514, 24BH1048, 24BH2518, 24BH2521 and 24BH2529 for Spring Creek Coal Mine, South Fork Extension, Big Horn County, Montana. With contributions by David Ferguson, Steve Aaberg, John Rittel, Fran Amendola, Linda Scott Cummings, Edwin Burke and Richard Hughes. Prepared for Spring Creek Coal Company by GCM Services, Inc., Butte.

Munson, G. and D. Ferguson, 1998, A Class III Cultural Resource Inventory of the Spring Creek Coal Company's Proposed Carbone Expansion Area, Big Horn County, Montana. Prepared for Spring Creek Coal Company, Decker, Montana.

Naugle, D.E., C.L. Aldridge, B.L. Walker, T.E. Cornish, B.J. Moynahan, M.J. Holloran, K. Brown, G.D. Johnson, E.T. Schmidtmann, R.T. Mayer, C.Y. Kato, M.R. Matchett, T.J. Christiansen, W.E. Cook, T. Creekmore, R.D. Falise, E.T. Rinkes, and M.S. Boyce, 2004, West Nile virus: pending crisis for greater sage-grouse. Ecology Letters 7:704-713.

Oedekoven, O., 1994, Distribution, Habitat Use, and Population Dynamics of the Rochelle Hills Elk Head, Final Report, Wyoming Game and Fish Department, Gillette, Wyoming.

Pitchford, M.L., and W.C. Malm, 1994, Development and Applications of a Standard Visual Index. Atmospheric Environment 28(5): 1,049-1,054.

Remington, T.E. and C.E. Braun, 1991, How Surface Coal Mining Affects Sage-grouse, North Park, Colorado. Pages 128-132 in R.D. Comer, P.R. Davis, S.Q. Foster, C.V. Grant, S. Rush, O. Thorne, II, and J. Todd (eds.), Proceedings V: Issues and Technology in the Management of Impacted Wildlife. Thorne Ecological Institute, Boulder, Colorado.

Rocky Mountain Elk Foundation (RMEF), 2007, Rocky Mountain Elk Foundation News Release, *RTEA and Jacobs Ranch Mine Donate Conservation Easement to Rocky Mountain Elk Foundation*, June 25, 2007. Available from website on the Internet as of July 2007: <http://www.rmef.org/NewsandMedia/NewsReleases/2007/JacobsRanch.htm>.

Shelley, K., 1992, Habitat Reclamation for Birds and Small Mammals on Surface Mined Lands in the Powder River Basin, Wyoming. M.S. Thesis Department of Zoology and Physiology, University of Wyoming.

Spring Creek Coal Company (SCCC), 2001, Spring Creek Mine 5-Year Permit Application, Permit #79012, Approved by Montana Department of Environmental Quality.

_____, 2003, 2003 Annual Water Quality Report. Submitted to MDEQ, Helena, Montana.

_____, 2005, Spring Creek Coal Company Ambient Air Quality Monitoring Network – 4th Quarter and Annual Report. Submitted to MDEQ, Helena, Montana.

_____, 2006a, Spring Creek Mine 2005 Wildlife Monitoring Report. Submitted to MDEQ, Helena, Montana.

_____, 2006b, Spring Creek Mine Air Quality Permit #1120-07. Issued by MDEQ, Helena, Montana.

_____, 2006c, Personal Communications with John Lucas.

_____, 2007a, Spring Creek Mine 2006 Wildlife Monitoring Report. Submitted to MDEQ, Helena, Montana.

_____, 2007b, Spring Creek Mine Air Quality Permit #1120-08. Issued by MDEQ, Helena, Montana.

_____, 2008a, Revised Pearson Creek Permit Amendment (#00183) - Appendix B-3. Submitted to MDEQ, Helena, Montana November 20, 2008.

_____, 2008b, Spring Creek Mine 2007 Wildlife Monitoring Report. Submitted to MDEQ, Helena, Montana.

_____, 2008c, 2008 Annual Water Quality Report. Submitted to MDEQ, Helena, Montana.

_____, 2009, Spring Creek Mine 2008 Wildlife Monitoring Report. Submitted to MDEQ, Helena, Montana.

Strait, James D, Jennifer Bales, and Lynelle A. Peterson 2005, Fidelity: Cultural Resource Investigations in the Pond Creek Development Area in Big Horn County, Montana. Report prepared for Fidelity Exploration and Production by Ethnoscience, Billings, MT

Taylor, Dee, M. Timmons, C.G. Sheldon, and A. Carmichael, 1984, Data Recovery in the Spring Creek Archaeological District. Mitigation of Sites within the Mine Area by Data Retrival, Big Horn County, Montana. University of Montana. Contract #70178058, Northern Energy Resources Company, Portland, Oregon.

U.S. Census Bureau, 2001a (Internet release date), Profiles of General Demographic Characteristics - 2000 Census of Population and Housing Montana 2000 - Table DP-1. Profile of General Demographic Characteristics: 2000. Information acquired from website on the Internet: <http://www.census.gov/prod/cen2000/dp1/2kh30.pdf>.

_____, 2001b (Internet release date), Census 2000 PHC-T-4. Ranking Tables for Counties: 1990 and 2000. Table 4: Counties Ranked by Percent Change in Population: 1990 to 2000.

_____, 2006, DP-4. Profile of Selected Housing Characteristics: 2000. Information acquired from website on the Internet: <http://factfinder.census.gov/servlet/QTTable?_bm=y_qr_name=DE>.

U.S. Climate Change Science Program, 2009, *Climate Literacy – The Essential Principles of Climate Sciences*, March, 2009; U.S. Environmental Protection Agency, Climate Change Website. Information acquired from website on the Internet: <http://www.epa.gov/climatechange/basicinfo.html>.

U.S. Department of Agriculture (USDA), 2009. Natural Resources Conservation Service (NRCS). Soil Data Mart. Information acquired from wesite on the Internet: < <http://soildatamart.nrcs.usda.gov/Report.aspx?Survey=MT607&UseState=MT>.

U.S. Department of Commerce (USDC), 2001, Profiles of General Demographic Characteristics, 2000 Census of Population and Housing, Wyoming, May 2001.

U.S. Department of Energy (USDOE), 2007a, 2006 Annual Coal Report, DOE/EIA-0584 (2006), November 2007.

_____, 2007b, Emissions of Greenhouse Gases in the United States 2006, DOE/EIA-0573 (2006), November 2007.

_____, 2009, "Emissions of Greenhouse Gases in the United States 2008." Information acquired from website on the Internet: <http://www.eia.doe.gov/oiaf/1605/ggrpt/methane.html>.

U.S. Environmental Protection Agency (EPA), 2008. "Climate Change – Science – State of Knowledge" webpage. Information acquired from website on the Internet: <http://www.epa.gov/climatechange/science/stateofknowledge.html>.

U.S. Federal Facilities Environmental Stewardship and Compliance Assistance Center (FedCenter), 2009, Council On Environmental Quality Part 1502--Environmental Impact Statement. Information acquired from website on the Internet: <http://ceq.hss.doe.gov/NEPA/regs/ceq/1502.htm#1502.14>.

U.S. Geological Survey (USGS)/Montana Department of State Lands (MT DSL), 1979, Final Environmental Statement - Proposed Mining and Reclamation Plan, Spring Creek Mine, Big Horn County, Montana, On Federal Lease M-069782.

Van Voast, W.A., and J.C. Reiten, 1988, Hydrogeologic responses: Twenty years of surface coal mining in southeastern Montana, Montana Bureau of Mines and Geology: Memoir 62, 30 p., 2 sheet(s).

VTN, 1977, Baseline wildlife studies for Spring Creek Mine. Portland Oregon.

Walksalong, J., G. Whitedirt, and F. Clubfoot, 2006, Rio Tinto Coal Mine Expansion Permit Tribal Cultural Survey, Big Horn County, Montana. Report prepared by the Northern Cheyenne Tribe.

Wyoming Department of Administration and Information, 2009, Economic Analysis Division, Wyoming Incorporated Place Population Estimates: April 1, 2000 to July 1, 2008. Information acquired from website on the Internet: <http://eadiv.state.wy.us/pop/CO-08EST.htm>.

Wyoming Community Development Authority (WCDA), 2009, Wyoming Housing Database Partnership – Sheridan County. Information acquired from website on the Internet: <http://www.wyomingcda.com/files/Sheridan09.pdf>.

Wyoming Department of Employment, 2009a, News Release – *Wyoming Job Losses Continue in July and Unemployment Reaches 6.5 %* acquired from website on the Internet September 2009: <http://doe.state.wy.us/lmi/news.htm>.

_____, 2009b, *Employing Units, Employment, & Wages by NAICS Subsector for Sheridan County - Northeast Region - Fourth Quarter 2007* acquired from website on the Internet September 2009: <http://doe.state.wy.us/lmi/07Q4QCEW/07q4t74.htm>.

_____, 2009c, Employing Units, Employment, & Wages by NAICS Subsector for Sheridan County - Northeast Region - First Quarter 2008acquired from website on the Internet September 2009: <http://doe.state.wy.us/lmi/08Q1QCEW/08q1t74.htm>.

Wyoming Oil and Gas Conservation Commission (WOGCC), 2009, Coalbed Methane Production by Month (PRB Only). Information acquired from website on the Internet: <http://wogcc.state.wy.us/coalbedchart.cfm>.

_____, 2004, Wyoming Geo-notes, No. 81, 38 pp.

Yde, C. and B.C. Waage, 1996, The response of Sharp-tailed grouse to coal mining in Montana. Twentieth Western States Sharp-Tailed Grouse Workshop Transactions. Gillette, WY, July 15-18, 1996.

APPENDIX A

STANDARD AND SPECIAL LEASE STIPULATIONS
DEVELOPED FOR LEASE BY MODIFICATION MTM-069782
AND
LAND USE LEASE MTM-74913

APPENDIX A

STANDARD AND SPECIAL LEASE STIPULATIONS DEVELOPED FOR THE LEASE BY MODIFICATION TRACT

SPECIAL STIPULATIONS - In addition to observing the general obligations and standards of performance set out in the current regulations, the lessee shall comply with and be bound by the following stipulations. These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require his agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

(a) CULTURAL RESOURCES -

(1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the Authorized Officer of the Bureau of Land Management (BLM[1]) (hereinafter referred to as the Authorized Officer) on portions of the mine plan area, or exploration plan area, that may be adversely affected by lease-related activities and which were not previously inventoried at such a level of intensity. Cultural resources are defined as a broad, general term meaning any cultural property or any traditional lifeway value, as defined below:

> Cultural property: a definite location of past human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structure, or places with important public and scientific uses, and may include traditional cultural or religious importance to specified social and/or cultural groups. Cultural properties are concrete, material places, and things that are classified, ranked, and managed through the system of inventory, evaluation, planning, protection, and utilization.
>
> Traditional lifeway value: the quality of being useful in or important to the maintenance of a specified social and/or cultural group's traditional systems of (a) religious belief, (b) cultural practice, or (c) social interaction, not closely identified with definite locations. Another group's shared values are abstract, nonmaterial, ascribed ideas that one cannot know about without being told. Traditional lifeway values are taken into account through public participation during planning and environmental analysis.

The cultural resources inventory shall be conducted by a qualified professional cultural resource specialist; i.e., archaeologist, anthropologist, historian, or historical architect, as appropriate and necessary, and approved by the Authorized Officer (BLM if the surface is privately owned). A report of the inventory and recommendations for protection of any cultural resources identified shall be submitted to the Western Regional Director of the Office of Surface Mining (hereinafter referred to as the Assistant Director) by the Authorized Officer. Prior to any on-the-ground cultural resource inventory, the selected professional cultural resource specialist shall consult with the BLM, the Northern Cheyenne Cultural Protection Board, and the Crow Historic and Cultural Committee. The purpose of this consultation will be to guide the work to be performed and to identify cultural properties or traditional lifeway values within the immediate and surrounding mine plan area. The lessee shall undertake measures, in accordance with instructions from the Assistant Director to protect cultural resources on the leased lands. The lessee shall not commence the surface-disturbing activities until permission to proceed is given by the Assistant Director in consultation with the Authorized Officer.

[1] Refer to page v for a list of abbreviations and acronyms used in this document.

(2) The lessee shall protect all cultural resource properties within the lease area from lease related activities until the cultural resource mitigation measures can be implemented as part of an approved mining and reclamation plan or exploration plan.

(3) The cost of carrying out the approved site mitigation measures shall be borne by the lessee.

(4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Assistant Director, or the Authorized Officer if the Assistant Director is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Assistant Director. Within two (2) working days of notification, the Assistant Director will evaluate or have evaluated any cultural resources discovered and will determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations shall be borne by the surface managing agency unless otherwise specified by the Authorized Officer.

(5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

(6) The mitigation plan found in Appendix D of the EA DOI-BLM-MT-020-2010-29 for Spring Creek Coal Lease Modification MTM 069782 for mitigating impacts to NRHP Cultural site (24BH3392) must be initiated and completed prior to surface disturbing activities occurring on the tracts.

(7) Prior to surface disturbance, the information for archaeological sites 24BH2530, 24BH2531, 24BH3388, 24BH3396, ad 24BH3401 in Section 35, T08S, R39E will be updated. The purpose of the updating is to better refine the spatial extent and relationships between the sites, man-made disturbances, and Archaeological Site 24BH1589 on adjacent state lands.

(b) PALEONTOLOGICAL RESOURCES -

If a paleontological resource, either large and conspicuous, and/or of significant scientific value is discovered during construction, the find will be reported to the authorized officer immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 feet of such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant interest discovered during the operation.

(c) PUBLIC LAND SURVEY PROTECTION -

The lessee will protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the lease areas. If any monuments, corners or accessories are destroyed, obliterated or damaged by this operation, the lessee will hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories at the same locations, using surveying procedures in accordance with the "Manual of Surveying Instructions for the Survey of Public Lands of the United States." The survey will be recorded in the appropriate county records, with a copy sent to the authorized officer.

(d) RESOURCE RECOVERY AND PROTECTION PLAN (R2P2) -

Notwithstanding the approval of a resource recovery and protection plan (R2P2) by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (i) the operator/lessee fails to achieve maximum economic recovery (MER) [as defined at 43 CFR 3480.0-5.2(21)] of the recoverable coal reserves or (ii) the operator/lessee is determined to have

caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecovered coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unmineable by the operation, the operator shall submit appropriate justification to obtain approval by the authorized officer to leave such reserves unmined. Upon approval by the authorized officer, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or a portion of the lease as authorized by statute and regulation.

In the event the authorized officer determines that the R2P2 as approved will not attain MER as the result of changed conditions, the authorized officer will give proper notice to the operator/lessee as required under applicable regulations. The authorized officer will order a modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the authorized officer that the coal reserves have been rendered unmineable or at such time that the lessee has demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the Minerals Management Service (MMS) demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

(e) MULTIPLE MINERAL DEVELOPMENT

Operations will not be approved which, in the opinion of the authorized officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

The BLM realizes that coal mining operations conducted on Federal coal leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as Federal oil and gas leases issued in a Federal coal lease area may inhibit coal recovery. BLM retains the authority to alter and/or modify the R2P2 for coal operations on those lands covered by Federal mineral leases so as to obtain maximum resource recovery.

(f) RECLAMATION/WILDLIFE -

SCCC will be required to reclaim disturbed habitats within the areas designated as *Unsuitable for Leasing with Exceptions Applied* back to wildlife habitat as outlined in the Habitat Recovery and Replacement Plan (HRRP), which is included in part in Appendix B. This reclamation stipulation suffices for the needs of other wildlife species within the tract disturbance area.

To mitigate the loss of and replace habitats within the tract disturbance area delineated as value sage-grouse habitat (BLM 2006) SCCC will be required to adhere to terms of the HRRP, which is included in part in Appendix B.

STIPULATIONS DEVELOPED FOR MTM-74913 SCCC LAND USE LEASE ASSIGNMENT/RENEWAL/AMENDMENT

a. Land Use Lease MTM-74913 is being renewed for an additional 20 years, along with the amendment, and will expire April 22, 2032.

b. This amendment is subject to the terms and conditions in 43 CFR 2920, the mitigations set forth in the application/plan of development, the stipulations and special conditions of the original lease, except Item (i) of "Section 3 – Restrictions on Use" of the original lease regarding reclamation is no longer in effect. Reclamation of the federal land affected by the LUL will be in accordance with the Habitat Recovery and Replacement Plan (HRRP) and the reclamation plan, contained in the approved State and Federal Mine Permits.

c. The Flood Control Structures will be constructed in accordance with the Mine Safety and Health Administration (MSHA) design and operation requirements.

d. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

e. The holder shall conduct all activities associated with the construction, operation, and termination of the land use lease within the authorized limits of the lease.

f. The holder shall be responsible for weed control on disturbed areas within the limits of the lease. The holder is responsible for consultation with the authorized officer and/or local authorities for acceptable weed control methods.

g. The holder shall coordinate with the parties holding authorized rights on the adjacent and affected lands [such as working out other grazing options with the grazing permittees/lessees].

h. This land use authorization renewal and amendment are issued subject to a subsequent appraisal by a qualified appraiser of the Bureau of Land Management. The authorized user agrees to pay the Bureau of Land Management, upon demand, those fees determined in the appraisal to represent the fair market rental for the use of the public lands involved in this land use authorization amendment.

APPENDIX B

HABITAT RECOVERY AND REPLACEMENT PLAN
REQUIREMENT FOR UNSUITABILITY CRITERION 15

And

LEASE BY MODIFICATION MTM-069782
HABITAT RECOVERY AND REPLACEMENT PLAN

HABITAT RECOVERY AND REPLACEMENT PLAN
REQUIREMENT FOR UNSUITABILITY CRITERION 15
(From Management Situation Analysis (MSA) available at the BLM Miles City Field Office)

A. The lessee shall be required to mitigate for grouse habitat loss where applicable and the resultant loss or displacement of these species due to surface coal mining operation.

The habitat recovery and replacement plan shall indicate the methods to be employed by the lessee which will ensure that the recovered or replaced land has the capacity to support these species, as determined by Bureau of Land Management (BLM[1]) in consultation with the State of Montana.

Mitigation methods may require the lessee to employ techniques for wildlife range manipulation or intensive wildlife habitat range management. Habitat recovery or replacement may not be completely feasible in the permit area; therefore, recovery or replacement may be accomplished on lands made available through the surface management agency, the state or the lessee outside the permit area in combination with recovery and replacement methods on suitable lands within the permit area. In addition, habitat enhancement may be undertaken, outside the permit area, to accommodate or compensate for these displaced species that will move from the mining area during disturbance.

The habitat recovery and replacement plan shall consist of, at least, the following five parts:

1. A habitat analysis of the permit areas which:

   a. Identifies the state wildlife species of high interest listed in paragraph A which occupy the permit area.

   b. Includes an analysis of the quality of the habitat for those species.

   c. Map and identify all riparian areas or mesic woody draws critical to the survival of these species.

2. A detailed description of the methods selected by the lessee to recover, replace or mitigate habitat loss, together with a comparative analysis of alternate methods which were considered and rejected by the lessee and the rationale for the decision to select the proposed methods.

   The methods utilized by the lessee for recovery and replacement may include, but are not limited to, any of the following techniques:

   a. Increasing the quantity and quality of forage available to these wildlife species.

   b. The acquisition of critical wildlife habitat for the identified species.

   c. Mechanical manipulation of low quality wildlife habitat.
   d. Recovery, replacement or protection of critical wildlife habitat by selected fencing.
   e. Development of grazing management system that will enhance the wildlife habitat potential.

[1] Refer to page v for a list of abbreviations and acronyms used in this document.

3. A timetable specifying that which will be required to accomplish the habitat recovery or replacement plan and showing how this timetable relates to the overall mining plan.
4. An evaluation of the final plan by the BLM in consultation with the State of Montana. The State and BLM may comment on the methods selected and the techniques to be employed by the lessee and may recommend alternate recovery or replacement methods. If there are recommended alternative methods, the lessee shall consider those recommendations and, if the lessee rejects them, the lessee shall indicate its reasons as required by provision 2 above. If no State or BLM comment is included in the plan, the lessee will provide verification of its consultation with these agencies and the plan may be considered without comment.
5. In the development of this plan, direct liaison with the State of Montana is essential.

B. The stipulations set forth herein are not, in any way, intended to conflict with nor preempt the responsibilities of the Department of State Lands, nor any other state or federal agency, regulating surface coal mining and reclamation. Lessee shall comply with all valid and applicable laws and regulations of federal, state and local governmental authority.

C. The authorized BLM officer shall provide written approval of the plan to the lessee. Resolution of conflicts, during development of this plan, will be brought to the attention of the authorized officer. Failure to resolve the conflicts or comply with agreements worked out under this plan will constitute noncompliance as described in Section 21 of the coal lease.

LEASE BY MODIFICATION MTM-069782
HABITAT RECOVERY AND REPLACEMENT PLAN

Note: The entire Habitat Recovery and Replacement Plan document, including attachments, maps, and supporting baseline habitat data, can be viewed at the BLM Miles City Field Office Montana Department of Environmental Quality/Coal and Uranium Bureau or is available in electronic format from the Miles City Field Office.

Introduction

On May 15, 2007, Spring Creek Coal Company (SCCC) submitted an application for a coal lease modification MTM-069782 in T. 8 S., R. 40 E., Section 31; and T. 9 S., R. 40 E., Section 6, Big Horn County, Montana. The lease by modification (LBM) encompasses approximately 498 acres adjacent to the current lease areas that would be mined in accordance with the requirements of Surface Coal Mine Permit #79012. The disturbance within and associated with this LBM is approximately 820 acres.

On March 4, 2009, SCCC submitted a proposal assigning Spring Creek Coal Company's Land Use Lease (LUL) MTM-74913 from Spring Creek Coal Company to Spring Creek Coal Limited Liability Company and renewing the land use lease for an additional 20 years and amending the lease to authorize the use of 197.12 additional acres of public land for coal mine layback, construction of a flood control structure, placement of topsoil and overburden stockpiles, and establishment of transportation and utility line corridors in order to fully recover coal reserves from existing Federal Coal Lease MTM-94378 and Montana State Coal Lease C-1088-05, and from the above referenced pending LBM. The disturbance within this LUL amendment area total approximately 197 acres.

The following document is a Habitat Recovery and Replacement Plan (Plan) that was developed through consultation with the Bureau of Land Management (BLM), Montana Fish Wildlife and Parks (MFWP), and the Montana Department of Environmental Quality (MDEQ). This consultation was necessary due to the requirements of the Unsuitability Criteria found in 43 CFR 3461.5(o) (1) which states in part "On some Criterion 15 acreage a lease may be issued if, after consultation with the MDEQ, the surface management agency determines that all or certain methods of coal mining will not have a significant long term impact on the species [sage-grouse] being protected." The framework of this Plan follows the BLM's Appendix II, Habitat Recovery and Replacement Plan Requirement for Unsuitability Criterion 15.

The Habitat Recovery and Replacement Plan for SCCC is based on a holistic approach that considers proper conservation practices for all species of concern, including the sage-grouse. SCCC will also continue to follow proactive practices, such as monitoring and treating for mosquito larvae in ponds and stored tires around the mine site to prevent potential West Nile Virus with potential impacts to sage-grouse. SCCC is including several conservation practices as determined through collaboration with MFWP, BLM, and MDEQ. Specifically, the Plan includes habitat analyses, enhancements to the current approved reclamation plan, and off-site mitigation options.

1. A detailed habitat analysis of the permit area will accomplish the following:

a. Identify the state wildlife species of high interest listed in paragraph A which occupy the permit area.

The wildlife chapter in the Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement (SEIS) and Amendment of the Powder River and Billings Resource Management Plans (December 2008a) addresses the sage-grouse as a State species of special concern (pages 3-118 through 3-125). Due to its location within baseline and annual survey perimeters, SCCC has monitored wildlife activity, including spring sage-grouse use, on the LBM every year from 1976 through 2008. Sage-grouse use of the LBM during other seasons was monitored with less regularity during that period. No sage-grouse leks have been recorded on the LBM surface during the last 33 years. SCCC will continue to monitor for sage-grouse and other wildlife species as per the Administrative Rules of Montana (ARM) 17.24.1129 and 17.24.751 through the life of the mine.

b. Include an analysis of the quality of the habitat for those species.

It is shown in the Final SEIS on Map 3-13 (page 3-124) that the LBM is located within a "crucial sage-grouse habitat area" (CX Ranch B). SCCC conducted baseline permitting requirements (per ARM 17.24.304) in 2006/2007. These baseline studies were inclusive on numerous aspects including wildlife (Attachment 1 and Maps 1 and 2), vegetation and range analysis (Attachment 3 and Map 5), soils (Attachment 4 and Map 6), and water (Attachment 5). This data has been compiled and submitted to the MDEQ – Industrial and Energy Minerals Bureau; the wildlife component was included with the 2007 Annual Wildlife Monitoring Report (enclosed), submitted to MDEQ. The summary reports show sage-grouse have not used the LBM area for lekking activities, though less is known about other potential seasonal use. The LBM has been described as having very little, if any, surface water in the immediate area. Much of the vegetation within the LBM is comprised of sagebrush, cheatgrass, and other native and introduced plant species, and the draws and steeper aspect areas include sporadic stands of trees (mostly juniper). These data have been submitted with the baseline studies. However, the influence of these physical characteristics on the presence/absence of sage-grouse in the LBM, beyond the spring display season, has not yet been determined.

c. Map and identify all riparian areas critical to the survival of the species.

Per the baseline permitting requirements as stated above, riparian areas were dry and no apparent subirrigation was available to produce or support stands of succulent forbs. Twenty-three riparian areas were documented during the studies. There are various mesic woody draws along the drainages of the ephemeral Pearson Creek and its south tributary. Baseline studies (Attachment 2, Maps 3, 4, and 4a) have also documented 26 cliff features and 91 rock outcrop features in Sections 6, 31, 35, and 36 of the LBM area. Slope assessment also showed approximately 32% of the topography to be greater than 15% slope. Baseline drawings also show a predominance of juniper and pine trees along drainages that support raptor perching and/or nesting activity. These features are unattractive habitat for sage-grouse. These data have been submitted with the baseline studies to the MDEQ as part of revising the MDEQ mining permit. Permitting the LBM through MDEQ will include additional details on the plans.

2. A detailed description of the methods selected by the lessee to recover, replace or mitigate habitat loss; a comparative analysis of alternate methods that were considered and rejected by the lessee, and the rationale for the decision to select the proposed methods. The methods utilized by the lessee for recovery and replacement may include, but are not limited to, any of the following techniques:

a. Increasing the quantity and quality of forage available to these wildlife species.

Sage-grouse utilize diverse forages and habitats during different seasons – for example: green forbs and grasses found in mesic habitats in spring and summer, forbs for brood rearing, and sagebrush leaves throughout the year, with almost total use during winter. Additionally, sagebrush provides an important yearlong habitat component for nesting cover, security cover, and thermal cover. The importance of sagebrush grasslands to sage-grouse is well documented; however, re-establishment of this habitat type has been met with varying degrees of success in coal mine reclamation. At SCCC, several reclamation techniques have also yielded varying degrees of success; however, the experimentation has lead to the development of more than one successful technique (e.g., direct haul of platy soils, use of scoria and suitable spoil as a growth media, and use of seed mixes containing more shrubs with a reduced herbaceous component). One such reclamation example is Par 2C in Pit #1, for which SCCC received an Office of Surface Mining Reclamation award in 2005.

In recognition of the difficulties in establishing sagebrush, SCCC will continue to investigate several methods of sagebrush establishment. Improved methods may include considerations of focused timing windows for sagebrush seeding and modifications to seedbed preparation methods, among other potential options to enhance sagebrush establishment. Additionally, SCCC will evaluate enhancing specific areas of existing reclamation with sagebrush interseeding and or other normal husbandry practices. One experimental method will be conducted by chemically fallowing pilot areas of reclaimed vegetation, followed by interseeding with sagebrush. Example pilot areas would consist of multiple plots covering less than one-half-acre each in Par 1E or Par 4B.

Prior to mining the baseline studies identified 626 acres of pastureland at SCCC. SCCC's Mining Permit #79012 includes a revegetation plan which establishes only 440 acres of pastureland in the postmine. As a result SCCC voluntarily replaced 186 acres of pastureland with other land use types which contain all native species seed mixes (South Fork Amendment, Application 174 approved 01/08).

Additionally, SCCC commits to revising their revegetation plan by removing the pastureland seed mix. This revision eliminates seeding future reclamation as pastureland on lands owned by SCCC. As a result, this revision will seed roughly 440 acres currently identified as pastureland with all native seed mixes such as sagebrush grassland, for example. SCCC will continue to confer with the MDEQ to obtain their approval to further revise the reclamation plan as part of permitting Application 183, the Pearson Creek Permit Amendment. This collaborative approach will assure the design addresses the diverse needs of all wildlife.

SCCC and MDEQ anticipate approval of Application 183 in 2009. Upon MDEQ approval, the revised reclamation plan will be incorporated into the mining permit. However, SCCC will work with MDEQ to approve sagebrush grassland or other native seed mixes which could potentially be applied in fall 2008.

b. Acquiring critical wildlife habitat for the identified species.

SCCC anticipates disturbing approximately 848 acres inside the crucial sage-grouse area associated with the mining activities within the LBM and LUL amendment areas. In 2007, SCCC donated $135,000 towards the Montana Land Owner Incentive Program (LIP) as part of permitting Pit #4. SCCC will provide additional funding in the amount of $12 per acre, or the established LIP payment rate, at the time these funds are needed, for each acre to be disturbed by the LBM mining activities. SCCC understands that offering a standard LIP program agreement to landowners in the area may be difficult. SCCC will work with MFWP to assist them with finding eligible lands for applying the pool of funds towards the LIP program or similar conservation efforts that will provide protection of sage-grouse habitat. Funds could be used to implement grazing systems, conservation easements, or to buy or retire private mineral leases, for example. SCCC offers to assist the BLM and MFWP in identifying landowners eligible for conservation programs, with an emphasis on lands inside the crucial sage-grouse areas and/or with active sage-grouse leks or identified winter ranges.

SCCC will work with the BLM and MFWP to find areas at least equal to the acreage disturbed by the LBM mining activity. At least one year prior to disturbing the crucial sage-grouse habitat within the LBM, SCCC will provide the MFWP with a list of landowners either within the lands identified as crucial sage-grouse habitat in the SEIS area or having similar habitat characteristics. This list of landowners will have been initially contacted by SCCC to introduce the conservation programs, and will include those individuals who have expressed an interest in participating.

c. Performing manipulation to improve habitat.

SCCC will provide MFWP and BLM with a manipulation study plan defining the treatment areas, methods of manipulation, and monitoring methods. The study plan will focus on areas of mature and/or low quality sagebrush stands in the LBM area. Additional lands beyond the LBM area will also be included in areas identified for habitat improvement; with agency approval, as opportunities and resources become available. The study plan will be approved by MFWP and BLM prior to implementation.

With agreement of the agencies, SCCC will study and assess manipulation beginning in 2009, after issuance of the LBM. A phased approach over several years will be used to assess various methods (including, but not limited to, size of area being manipulated, aspect of the terrain being manipulated, and manipulation techniques). Examples of m manipulation include, but are not limited to, cutting, mowing, combining, fire, grazing, raking, harrowing, pitting, and aerating. The results will be used as a guide for the successful use of manipulation methods for future reclamation planning. Dependent upon the location of the vegetation being manipulated, the area could be assessed for response(s) over several years.

d. Using selected fencing for recovery, replacement, or protection of critical wildlife habitat.

Fencing has been known to cause sage-grouse fatalities. SCCC will consult with the agencies to determine if removal of some fencing between Sections 36 and 31 would benefit the sage-grouse habitat. Fencing may be used to control grazing on grouse habitat. Any new fencing will be constructed to include wildlife friendly design.

e. Developing grazing management systems that will enhance the wildlife habitat potential.

Properly controlled livestock grazing can be a useful land management tool for enhancing wildlife habitat. Grazing can stimulate the growth of grasses and forbs, which are important habitat components for a wide variety of wildlife species, including sage-grouse. Managed grazing can also contribute to the dispersal and fertilization of native seeds as livestock herds move through the area.

The LBM area has not been grazed by domestic livestock for the past two seasons, and grazing options are limited in that area due to the lack of natural streams and standing water. Current grazing agreements between SCCC and local ranchers are renewed annually. SCCC will work with the local livestock operator in the development of future grazing agreements in Sections 31 and 6 to ensure that they provide livestock forage while also enhancing the composition and structure of sagebrush grassland and other vegetation communities in the LBM. SCCC will seek flexibility in modifications to the timing and extent of the grazing program to adjust to natural conditions such as drought or excessive precipitation. That flexibility will ensure that grazing operations do not negatively impact wildlife habitat in the LBM area. Any changes in grazing use on BLM administered lands will be approved by the BLM's Miles City FO prior to implementation.

3. A timetable specifying what will be required to accomplish the habitat recovery or replacement plan and will show how this timetable relates to the overall mining plan.

Timetables specific to each item listed in provision 2 have been provided. The current mine plan proposes mining activity in the LBM area starting in 2012 and continuing through end of mine life in late 2028. This does not take into account potential future coal leasing activity. That potential is unknown at this time due to several factors of uncertainty. As previously described, the reclamation plan has been revised *as part of this mitigation plan* to include additional native seed mixes to create a mosaic of wildlife habitat; for example sagebrush grassland. These revised reclamation practices, as well as experimental manipulation practices, which prove to be successful, will be applied to areas currently being mined. As mining advances into the LBM area, reclamation will follow the approved plan. Phase III bond release signifies that MDEQ has approved the satisfactory establishment of post-mining vegetative composition and cover. The bonding period is a minimum of 10 years after the reclaimed area has been re-topsoiled and seeded. Final habitat recovery will be achieved during Phase IV bond release of the current mining areas and the LBM area. Relative to reclamation of wildlife habitat, the Administrative Rules of Montana, at 17.24.1116 (6)(d)(ii) outline that the applicable reclamation bond will not be released until fish and wildlife habitats and related environmental values have been restored, reclaimed, or protected in accordance with the Act, the rules, and the approved permit.

SCCC will continue to minimize surface disturbance by limiting the disturbance areas necessary for mining and mine related activities.

SCCC will continue to treat for mosquito larvae in ponds and tires stored around the mine site to prevent potential West Nile Virus impacts to sage-grouse.

In addition to standard monitoring efforts, SCCC will implement an expanded winter/spring wildlife monitoring plan for sage-grouse during 2008. This plan (Attachment 6 of the complete plan available at the Miles City Field Office) has been approved by BLM, MFWP, and MDEQ and initiated. The need for additional sage-grouse monitoring in future years will be reviewed with the agencies following the results of the enhanced 2008 monitoring efforts.

4. An evaluation of the final plan by the BLM in consultation with the State of Montana.

The MDEQ and BLM may comment on the methods selected and the techniques to be employed by the lessee and may recommend alternate recovery or replacement methods. If there are recommended alternative methods, the lessee shall consider those recommendations and, if the lessee rejects them, the lessee shall indicate its reasons as required by provision 2 above. If no MDEQ or BLM comment is included in the plan, the lessee will provide verification of its consultation with these agencies and the plan may be considered without comment.

The final Habitat Recovery and Replacement Plan will include recommendations received from the different agencies.

5. In the development of this plan, direct liaison with the MDEQ is essential.

SCCC will continue to work with the MDEQ, MFWP, and BLM in the development of the plan.

Status of HRRP Updated June 2009

Subsequent to development of the HRRP, SCCC has completed several of the commitments made in the HRRP.

- Item 2a. MDEQ approved minor permit revision on September 29, 2009 granting approval to remove the pastureland seed mix. The minor revision also included the addition of a sagebrush-forb mosaic native seed mix. Three acres of this seed mix was applied to permanent reclamation in the fall of 2008.

- Item 2c. SCCC prepared a Manipulation Study Plan on April 26, 2009, which is being reviewed by BLM and MFWP.

APPENDIX C

SPECIAL STATUS SPECIES AFFECTS
DETERMINATIONS SUMMARY TABLES FOR LEASE BY
MODIFICATION MTM-069782
AND
LAND USE LEASE MTM-74913

APPENDIX C

SPECIAL STATUS SPECIES AFFECTS DETERMINATIONS SUMMARY TABLES

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES AND SPECIES PROPOSED FOR LISTING

Species	Status	In Range (Yes/No)[1]	Habitat Present in Tract (Yes/No)[2]
Bald Eagle	T	Yes	Yes
Least tern	E	Yes	No
Piping Plover	T	No	
Whooping Crane	E	No	
Black-footed ferret	E	Yes	No
Canada Lynx	T	No	
Gray wolf	E	No	
Grizzly Bear	T	No	
Bull Trout	T	No	
Pallid Sturgeon	E	No	
Ute Ladies'-tresses	T	No	
Water Howellia	T	No	

[1] If project is not within the range of the species no determination of habitat presence is needed.
[2] Includes disturbance area associated with tract.

BLM (Montana and Dakotas) Designated Sensitive Species

BIRDS			
Species	In Range (Yes/No)[1]	Habitat Present in Tract (Yes/No)[2]	Effects Determination (brief rationale)[3]
Black Tern	Yes	No	See discussion, section 3.10.5
Blue-gray gnatcatcher	Yes	Yes	See discussion, section 3.10.5
Burrowing owl	Yes	Yes	See discussion, sections 3.10, 4.2.9
Common loon	No		
Dickcissel	Yes	No	See discussion, section 3.10.5
Ferruginous hawk	Yes	Yes	See discussion, section 3.10.3
Flammulated owl	No		
Franklin's gull	Yes	No	See discussion, section 3.10.5
Golden eagle	Yes	Yes	See discussion, section 3.10.3
Great gray owl	No		
Sage grouse	Yes	Yes	See discussion, sections 3.10.4, 4.2.8, 4.2.9, 4.2.10
Harlequin duck	No		
Loggerhead shrike	Yes	Yes	See discussion, section 3.10.5
Long billed curlew	Yes	No	See discussion, section 3.10.5
Chestnut-collared longspur	Yes	Yes	See discussion, section 3.10.5
McCown's longspur	Yes	Yes	See discussion, section 3.10.5
Marbled godwit	Yes	No	See discussion, section 3.10.5
Mountain Plover	Yes	No	See discussion, section 3.10.5
Northern goshawk	Yes	No	See discussion, section 3.10.3
Peregrine falcon	Yes	Yes	See discussion, section 3.10.3
Sage thrasher	Yes	Yes	See discussion, section 3.10.5
Baird's sparrow	Yes	No	See discussion, section 3.10.3
Brewer's sparrow	Yes	Yes	See discussion, section 3.10.5
LeConte's sparrow	No		
Nelson's sharp-tailed sparrow	No		
Sage sparrow	No		
Sedge wren	No		
Sprague's pipit	No		
Swainson's hawk	Yes	Yes	See discussion, section 3.10.3
Trumpeter swan	No		
White-faced ibis	No		
Willet	Yes	No	See discussion, section 3.10.5
Wilson's phalarope	Yes	No	See discussion, section 3.10.5
Black-backed woodpecker	No		
Three-toed woodpecker	No		
Red-headed woodpecker	Yes	No	See discussion, section 3.10.5
Yellow rail	No		

[1] If project is not within the range of the species no determination of habitat presence is needed.
[2] Includes disturbance area associated with tract.
[3] Detailed Effects Determination is provided in the narrative of Environmental Assessment only if species is considered within range.

MAMMALS

Species	In Range (Yes/No)[1]	Habitat Present in Tract (Yes/No)[2]	Effects Determination (brief rationale)[3]
Townsend's big-eared bat	Yes	No	See discussion, section 3.10.2
Spotted bat	Yes	Yes	See discussion, section 3.10.2
Fringed-tailed myotis	No		
Fringed myotis	No		
Long-legged myotis	Yes	No	See discussion, section 3.10.2
Long-eared myotis	Yes	No	See discussion, section 3.10.2
Northern myotis	No		
Pallid bat	Yes	Yes	See discussion, section 3.10.2
Fisher	No		
Great basin pocket mouse	No		
North American wolverine	No		
Black-tailed prairie dog	Yes	Yes	See discussion, sections 3.10.2, 4.2.9
White-tailed prairie dog	No		
Pygmy rabbit	No		
Swift fox	No		
Spotted skunk (western)	No		

[1] If project is not within the range of the species no determination of habitat presence is needed.
[2] Includes disturbance area associated with tract.
[3] Detailed Effects Determination is provided in the narrative of Environmental Assessment only if species is considered within range.

REPTILES and AMPHIBIANS

Species	In Range (Yes/No)[1]	Habitat Present in Tract (Yes/No)[2]	Effects Determination (brief rationale)[3]
Boreal/western toad	Yes	No	See discussion, section 3.10.6
Coeur d'Alene salamander	No		
Great Plains Toad	Yes	No	See discussion, section 3.10.6
Greater short-horned lizard	Yes	Yes	See discussion, section 3.10.6
Milk snake	Yes	Yes	See discussion, section 3.10.6
Northern leopard frog	Yes	No	See discussion, section 3.10.6
Plains Spadefoot	Yes	No	See discussion, section 3.10.6
Snapping turtle	Yes	No	See discussion, section 3.10.6
Spiny softshell turtle	Yes	No	See discussion, section 3.10.6
Western hog-nosed snake	Yes	Yes	See discussion, section 3.10.6

[1] If project is not within the range of the species no determination of habitat presence is needed.
[2] Includes disturbance area associated with tract.
[3] Detailed Effects Determination is provided in the narrative of Environmental Assessment only if species is considered within range.

FISH

Species	In Range (Yes/No)[1]	Habitat Present in Tract (Yes/No)[2]	Effects Determination (brief rationale)[3]
Arctic grayling	No		
Blue sucker	No		
Northern redbelly X Finescale dace	No		
Paddlefish	No		
Pearl dace	No		
Sauger	Yes	No	See discussion, section 3.10.6
Shortnose gar	No		
Sicklefin chub	No		
Sturgeon chub	No		
Westslope cutthroat trout	No		
Yellowstone cutthroat trout	No		

[1] If project is not within the range of the species no determination of habitat presence is needed.
[2] Includes disturbance area associated with tract.
[3] Detailed Effects Determination is provided in the narrative of Environmental Assessment only if species is considered within range.

2006 Montana Natural Heritage Program List of Species of Concern

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale)[1]
Acorus americanus	SH			
Adoxa moschatellina	S2	SENSITIVE		
Agastache cusickii	S1	SENSITIVE		
Allium acuminatum	S1			
Allium columbianum	S1			
Allium parvum	S2S3			
Allium simillimum	S1			
Alnus rubra	S1			
Amerorchis rotundifolia	S2S3	SENSITIVE		
Ammannia robusta	SH			
Amorpha canescens	SH	SENSITIVE		
Antennaria densifolia	S1			
Aquilegia brevistyla	S2			
Aquilegia formosa	S1S2	SENSITIVE		
Arabis demissa	S1	SENSITIVE		
Arabis fecunda	S2	SENSITIVE		
Arabis kamchatica	SH			
Arctostaphylos patula	S1			
Asclepias incarnata	S1			
Asclepias ovalifolia	S1			
Asclepias stenophylla	S1	SENSITIVE		
Asplenium trichomanes	SH			
Aster frondosus	SH			
Aster ptarmicoides	S1			

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Astragalus aretioides	S1	SENSITIVE		
Astragalus barrii	S3	SENSITIVE	**X**	See discussion, sections 3.9, 4.1.8
Astragalus ceramicus var. apus	S1	SENSITIVE		
Astragalus convallarius	S2	SENSITIVE		
Astragalus geyeri	S2	SENSITIVE		
Astragalus grayi	S1S2	SENSITIVE		
Astragalus lackschewitzii	S2			
Astragalus oreganus	S1	SENSITIVE		
Astragalus racemosus	S2			
Astragalus scaphoides	S2	SENSITIVE		
Astragalus terminalis	S2	SENSITIVE		
Athysanus pusillus	S1			
Atriplex truncata	S1			
Bacopa rotundifolia	S1			
Balsamorhiza hookeri	S1			
Balsamorhiza macrophylla	S2	SENSITIVE		
Bidens beckii	S2	SENSITIVE		
Boisduvalia densiflora	SH			
Botrychium ascendens	S1S2			
Botrychium campestre	S1			
Botrychium crenulatum	S2S3			
Botrychium hesperium	S2			
Botrychium lineare	S1			
Botrychium montanum	S3			
Botrychium pallidum	S1			
Botrychium paradoxum	S2			
Botrychium pedunculosum	S1			
Botrychium spathulatum	S1			
Brasenia schreberi	S1S2			
Braya humilis	S1	SENSITIVE		
Brickellia oblongifolia	S1			
Calamagrostis tweedyi	S3			
Calochortus bruneaunis	SH			
Camissonia andina	S1	SENSITIVE		
Camissonia parvula	S1	SENSITIVE		
Camissonia subacaulis	S2S3			
Cardamine oligosperma var. kamtschatica	S1			
Cardamine rupicola	S3			
Carex amplifolia	S1			
Carex chordorrhiza	S2			
Carex comosa	S1			
Carex crawei	S2	SENSITIVE		
Carex gravida	S1S2			
Carex idahoa	S2S3	SENSITIVE		
Carex incurviformis	S1			
Carex lacustris	S1			
Carex lenticularis var. dolia	S1			
Carex multicostata	S1			

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Carex norvegica ssp. stevenii	S1			
Carex occidentalis	SH			
Carex petricosa	S1			
Carex prairea	S2			
Carex rostrata	S1			
Carex scoparia	S1S2			
Carex stenoptila	S1S2			
Carex sychnocephala	S1			
Carex tenuiflora	S1			
Carex tincta	S1			
Carex vaginata	S1			
Castilleja cervina	SH			
Castilleja covilleana	S2			
Castilleja crista-galli	S1			
Castilleja exilis	S2			
Castilleja gracillima	S2			
Castilleja nivea	S2?			
Ceanothus herbaceus	SH			
Celastrus scandens	S1			
Centaurium exaltatum	SH			
Centunculus minimus	S2	SENSITIVE		
Cercocarpus montanus var. glaber	S1S2			
Chenopodium subglabrum	S1			
Chrysothamnus parryi ssp. montanus	S1			
Cirsium brevistylum	S1S2			
Cirsium longistylum	S3	SENSITIVE		
Clarkia rhomboidea	S2			
Claytonia arenicola	S1			
Cleome lutea	S1	SENSITIVE		
Collomia debilis var. camporum	S2			
Collomia tinctoria	S1			
Corydalis sempervirens	S2			
Cryptantha fendleri	S2	SENSITIVE		
Cryptantha humilis	SH			
Cryptantha scoparia	S1	SENSITIVE		
Cyperus acuminatus	S1			
Cyperus erythrorhizos	SH			
Cyperus rivularis	S1			
Cyperus schweinitzii	S2	SENSITIVE		
Cypripedium fasciculatum	S2			
Cypripedium passerinum	S2			
Cystopteris montana	SH			
Dalea enneandra	S1			
Dalea villosa	S1			
Delphinium bicolor ssp. calcicola	S3			See discussion, sections 3.9
Delphinium burkei	S2			
Dichanthelium oligosanthes var. scribnerianum	S1	SENSITIVE		

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Downingia laeta	S1			
Draba crassa	S3			
Draba daviesiae	S3			
Draba densifolia	S2			
Draba fladnizensis	S1			
Draba globosa	S1	SENSITIVE		
Draba macounii	S1			
Draba porsildii	S1			
Draba ventosa	S1	SENSITIVE		
Drosera anglica	S2S3			
Drosera linearis	S1			
Dryas integrifolia	S1			
Dryopteris cristata	S2			
Eleocharis rostellata	S2			
Elodea longivaginata	S1	SENSITIVE		
Elymus flavescens	S1	SENSITIVE		
Elymus innovatus	S1			
Epipactis gigantea	S2			
Erigeron allocotus	S3			
Erigeron asperugineus	S1	SENSITIVE		
Erigeron eatonii ssp. eatonii	S1			
Erigeron evermannii	S1			
Erigeron flabellifolius	S3			
Erigeron formosissimus	S1			
Erigeron lackschewitzii	S2			
Erigeron leiomerus	S1			
Erigeron linearis	S1	SENSITIVE		
Erigeron parryi	S2	SENSITIVE		
Erigeron radicatus	S3			
Erigeron tener	S1			
Eriogonum brevicaule var. canum	S3			
Eriogonum caespitosum	S1	SENSITIVE		
Eriogonum capistratum var. muhlickii	S3			
Eriogonum salsuginosum	S1	SENSITIVE		
Eriogonum soliceps	S2	SENSITIVE		
Eriogonum visheri	S1	SENSITIVE		
Eriophorum callitrix	S1			
Eriophorum gracile	S2			
Eupatorium maculatum	S1S2			
Eupatorium occidentale	S2	SENSITIVE		
Euphrasia subarctica	S1			
Eustoma grandiflorum	S1			
Festuca vivipara	S1			
Gentiana glauca	S1			
Gentianopsis macounii	S1			
Gentianopsis simplex	S1			
Githopsis specularioides	S1			
Glossopetalon spinescens	S1			

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Goodyera repens	S2S3			
Gratiola ebracteata	S1			
Grayia spinosa	S2	SENSITIVE		
Grindelia howellii	S2S3	SENSITIVE		
Gymnosteris parvula	SH			
Halimolobos perplexa	S1			
Haplopappus aberrans	S1			
Haplopappus carthamoides var. subsquarrosus	S1S2	SENSITIVE		
Haplopappus macronema var. macronema	S1			
Haplopappus nanus	SH			
Haplopappus pygmaeus	SH			
Hemicarpha drummondii	SH			
Heteranthera dubia	S1			
Heterocodon rariflorum	S2			
Howellia aquatilis	S2			
Hutchinsia procumbens	S1	SENSITIVE		
Idahoa scapigera	S1			
Ipomoea leptophylla	S1S2			
Ipomopsis congesta ssp. crebrifolia	S1	SENSITIVE		See discussion, sections 3.9
Ipomopsis minutiflora	S1			
Juncus acuminatus	S1			
Juncus albescens	S1			
Juncus covillei var. covillei	S1			
Juncus covillei var. obtusatus	S1			
Juncus hallii	S2			
Kalmia polifolia	S1			
Kelloggia galioides	SH			
Kobresia macrocarpa	S1			
Kobresia simpliciuscula	S2	SENSITIVE		
Kochia americana	S1	SENSITIVE		
Koenigia islandica	S1			
Lagophylla ramosissima	S1			
Lathyrus bijugatus	S1			
Leptodactylon caespitosum	S2	SENSITIVE		
Lesquerella carinata var. languida	S1	SENSITIVE		
Lesquerella douglasii	S1			
Lesquerella humilis	S1			
Lesquerella klausii	S3			
Lesquerella lesicii	S1	SENSITIVE		
Lesquerella paysonii	S1			
Lesquerella pulchella	S2	SENSITIVE		
Lewisia columbiana	S1			
Lewisia pygmaea var. nevadensis	S1			
Lilaea scilloides	SH			
Liparis loeselii	S1S2			
Listera borealis	S1S2			
Lobelia spicata	S1			

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Lomatium attenuatum	S2	SENSITIVE		
Lomatium geyeri	S2			
Lomatium nuttallii	S1	SENSITIVE		
Lomatogonium rotatum	S1	SENSITIVE		
Lycopodium dendroideum	S1			
Lycopodium inundatum	S1			
Lycopodium lagopus	S1			
Maianthemum canadense	SH			
Malacothrix torreyi	S1	SENSITIVE		
Mentzelia montana	S1	SENSITIVE		
Mentzelia nuda	S1	SENSITIVE		
Mentzelia pumila	S2	SENSITIVE		
Mertensia bella	S1			
Mimulus breviflorus	S1S2			
Mimulus nanus	S1	SENSITIVE		
Mimulus patulus	S1			
Mimulus primuloides	S2			
Mimulus ringens	S1	SENSITIVE		
Najas guadalupensis	S1			
Nama densum	S1	SENSITIVE		
Nuttallanthus texanus	S1			
Nymphaea tetragona ssp. leibergii	S1			
Ophioglossum pusillum	S2			
Orogenia fusiformis	S2	SENSITIVE		
Oxytropis campestris var. columbiana	S1			
Oxytropis deflexa var. foliolosa	S1			
Oxytropis lagopus var. conjugens	S3			See discussion, sections 3.9
Oxytropis parryi	S1			
Oxytropis podocarpa	S1			
Papaver kluanensis	S1			
Papaver pygmaeum	S1			
Pedicularis contorta var. ctenophora	S3			
Pedicularis contorta var. rubicunda	S3			
Pedicularis crenulata	S1	SENSITIVE		
Penstemon angustifolius	S1S2	SENSITIVE		
Penstemon attenuatus var. militaris	SH			
Penstemon caryi	S3			
Penstemon flavescens	S3			
Penstemon globosus	S1			
Penstemon grandiflorus	S1			
Penstemon lemhiensis	S3	SENSITIVE		
Penstemon payettensis	S1			
Penstemon whippleanus	S1	SENSITIVE		
Petasites frigidus	S1			
Phacelia incana	S2	SENSITIVE		
Phacelia scopulina	SH			
Phacelia thermalis	S1			
Phippsia algida	S1			

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Phlox andicola	S2	SENSITIVE		
Phlox kelseyi var. missoulensis	S2			
Physaria brassicoides	S2	SENSITIVE		
Physaria didymocarpa var. lanata	S1	SENSITIVE		
Physaria saximontana var. dentata	S3			
Plagiobothrys leptocladus	S1	SENSITIVE		
Poa curta	S1	SENSITIVE		
Poa laxa ssp. banffiana	S1			
Polygonum douglasii ssp. austinae	S2S3			
Polygonum polygaloides ssp. confertiflorum	S1S2			
Polystichum kruckebergii	S1			
Polystichum scopulinum	S1			
Potamogeton obtusifolius	S2			
Potentilla brevifolia	S1			
Potentilla hyparctica	S1			
Potentilla plattensis	S1	SENSITIVE		
Potentilla quinquefolia	S1			
Potentilla uniflora	S1			
Primula alcalina	S1	SENSITIVE		
Primula incana	S2	SENSITIVE		
Prunus pumila	S1			
Psilocarphus brevissimus	S1	SENSITIVE		
Psoralea hypogaea	S2S3			
Puccinellia lemmonii	S1	SENSITIVE		
Quercus macrocarpa	S1	SENSITIVE		
Ranunculus cardiophyllus	S1			
Ranunculus gelidus	S1			
Ranunculus hyperboreus	S1			
Ranunculus jovis	S2			
Ranunculus orthorhynchus	SH			
Ranunculus pedatifidus	S1			
Ranunculus verecundus	S2			
Ribes laxiflorum	S1			
Ribes triste	S1			
Ribes velutinum	S1			
Rorippa calycina	S1	SENSITIVE		
Rotala ramosior	S1			
Sagina nivalis	S1			
Salix barrattiana	S1			
Salix cascadensis	S1			
Salix serissima	S2			
Satureja douglasii	S2			
Saussurea densa	S1S2			
Saussurea weberi	S1			
Saxifraga apetala	S1			
Saxifraga hirculus	S1			
Saxifraga tempestiva	S2			

VASCULAR PLANTS

Species	State Rank	BLM	Observed at SCCC	Effects Determination (brief rationale) [1]
Scheuchzeria palustris	S2			
Scirpus cespitosus	S2			
Scirpus heterochaetus	S1	SENSITIVE		
Scirpus hudsonianus	S1			
Scirpus pumilus ssp. rollandii	S1	SENSITIVE		
Scirpus subterminalis	S2			
Selaginella selaginoides	S2			
Senecio amplectens	S1			
Senecio eremophilus	S1S2			
Senecio spribillei	S1			
Shoshonea pulvinata	S1	SENSITIVE		
Sidalcea oregana	S1			
Silene spaldingii	S1			
Sisyrinchium septentrionale	S1			
Solidago sparsiflora	S1	SENSITIVE		
Sphaeralcea munroana	S1	SENSITIVE		
Sphaeromeria argentea	S2S3	SENSITIVE		
Sphaeromeria capitata	S3			
Sphenopholis intermedia	S1			
Spiranthes diluvialis	S1			
Sporobolus asper	SH			
Sporobolus neglectus	S1			
Stellaria crassifolia	S1			
Stellaria jamesiana	S1	SENSITIVE		
Stephanomeria spinosa	S1	SENSITIVE		
Stipa lettermanii	S1			
Suckleya suckleyana	S1			
Sullivantia hapemanii	S2	SENSITIVE		
Synthyris canbyi	S3			
Taraxacum eriophorum	S2	SENSITIVE		
Thalictrum alpinum	S2	SENSITIVE		
Thelypodium paniculatum	SH	SENSITIVE		
Thelypodium sagittatum	S2	SENSITIVE		
Thelypteris phegopteris	S2			
Thlaspi parviflorum	S2	SENSITIVE		
Tofieldia pusilla	S2			
Townsendia condensata	S1	SENSITIVE		
Townsendia florifera	S1	SENSITIVE		
Townsendia nuttallii	S3			
Townsendia spathulata	S3			
Trifolium eriocephalum	S2			
Trifolium gymnocarpon	S2			
Utricularia intermedia	S1S2			
Vaccinium myrtilloides	S1			
Veratrum californicum	S1			
Viburnum lentago	S1			
Viguiera multiflora	S1	SENSITIVE		
Viola selkirkii	S1			
Waldsteinia idahoensis	S1			
Wolffia columbiana	S2			
Zizia aurea	SH			

[1] Detailed Effects Determination is provided in the narrative of Environmental Assessment only if species has been observed at SCCC.

APPENDIX D

CULTURAL RESOURCE DATA RECOVERY PLAN
FOR
PISTOL PETE SITE 24BH3392

CULTURAL RESOURCE DATA RECOVERY PLAN

for

PISTOL PETE SITE 24BH3392

for

Rio Tinto Energy America's
Spring Creek Coal, LLC
Decker, Montana

Prepared by

GCM Services, Inc.
P. O. Box 3047
Butte, MT 59702

June 2009

TABLE OF CONTENTS

INTRODUCTION D-1

PISTOL PETE SITE DESCRIPTION D-1
Expected Cultural Deposit Characteristics at 24BH3392 ..... D-8

SITE CONTEXT FOR 24BH3392 ..... D-8

RESEARCH GOALS AND SPECIFIC HYPOTHESES D-9
Cultural Chronology D-10
Site Function D-10
Subsistence D-11
Seasonality D-12
Site Structure and Social Organization D-12
Paleoenvironment D-14
Intersite Relationships D-14

GENERAL EXCAVATION PROCEDURES D-14
Mapping D-14
The Grid D-14
Vertical Control D-14
Features D-15
Field Notes D-15

SITE SPECIFIC EXCAVATION PROCEDURES FOR 24BH3392 ..... D-16

GENERAL METHODS OF ANALYSES D-17
Lithic Analysis D-17
Faunal Analysis D-17
Macrofloral Analysis D-17
Pollen Analysis D-17
Wood Speciation D-18
Radiocarbon Dating D-18
Dendrochronological Dating D-18
Obsidian Trace Element Analysis D-18
Obsidian Hydration Band Analysis D-18
Protein Residue Analysis D-18
Ceramic Analysis D-19
Feature Analysis D-19

SCHEDULE D-19

REFERENCES D-20

Appendix A: Site Form

LIST OF FIGURES

Figure 1. The location of 24BH3392 on the USGS 7.5-minute maps *Pearl School* (1967) and *Decker, Montana* (1967) D-2

Figure 2. Site overview looking north at landform from the upper bench D-3

Figure 3. Looking north at Feature 1 (right) and Feature 2 (left) D-3

Figure 4. Site overview facing east-southeast (datum rock pile in lower right) D-4

Figure 5. Feature 1, looking west (Feature 2 in background) D-4

Figure 6. Feature 2, looking north D-5

Figure 7. Sketch map of site 24BH3392 ..... D-6

CULTURAL RESOURCE DATA RECOVERY PLAN

INTRODUCTION

Prehistoric occupation site 24BH3392, the Pistol Pete Site, is located on private land within Rio Tinto Energy America's Spring Creek Coal, LLC. The site was found and recorded in 2006 by GCM Services, Inc., Butte (Ferguson and Meyer 2007).

In the 2007 report it was stated that this site met Criterion D of the National Register of Historic Places (NRHP). Site 24BH3392 was recommended NRHP eligible under Criterion D because of its archaeological content and unique shelter remains, consisting of the recognizable remains structures made of stacked juniper logs surrounding central hearth features. Dateable charcoal, bison bone and a variety of tools and lithic materials are additional attributes that make this site exceptional, with potential to yield additional significant information. Figure 1 shows the location of this site on the USGS Quadrangle Map, *Pearl School, Montana* (Photo-revised 1978). The contour interval is 20 ft (6 m).

The site is located in the pine breaks of southeastern in a dissected upland setting on the south side of the Pearson Creek drainage, about three miles west of the Tongue River Valley. Pearson Creek is an ephemeral drainage characterized by narrow, steep sided ravines that are separated by high, flat-topped ridges. Scattered stands of ponderosa pine and juniper grow in the ravines and along the slopes. Outcrops of pale grayish brown shale sandstone and pink scoria are exposed along the ridge tops. The scoria contains porcellanite veins, nodules and gravel, which is a primary source of prehistoric stone tool material integral to the cultural history of the region. Pistol Pete Site occupies the top of a lobe-shaped landform, about 200 meters to the south and 18 m above the Pearson Creek drainage bottom.

The following is a data recovery plan designed to mitigate proposed direct impacts associated with coal mining on 24BH3392. This mitigation will be achieved through collection, excavation and analysis of cultural remains. The secondary objectives, although equally important in terms of the archaeological discipline, are to raise and to help answer broader questions regarding the prehistory of the Pine breaks region.

PISTOL PETE SITE DESCRIPTION

The cadastral description for 24BH3392 is: SENWSWSESW; N1/2SESWSESW; SWNESWSESW 31 Township 8 South, Range 40 East. The Universal Transverse Mercator (UTM) location of the site datum is 351927 Easting, 4993654 Northing (North American Datum 1927). Figures 2-6 are photographs of the site and Figure 7 is a sketch map of the site. The site form is attached as Appendix A.

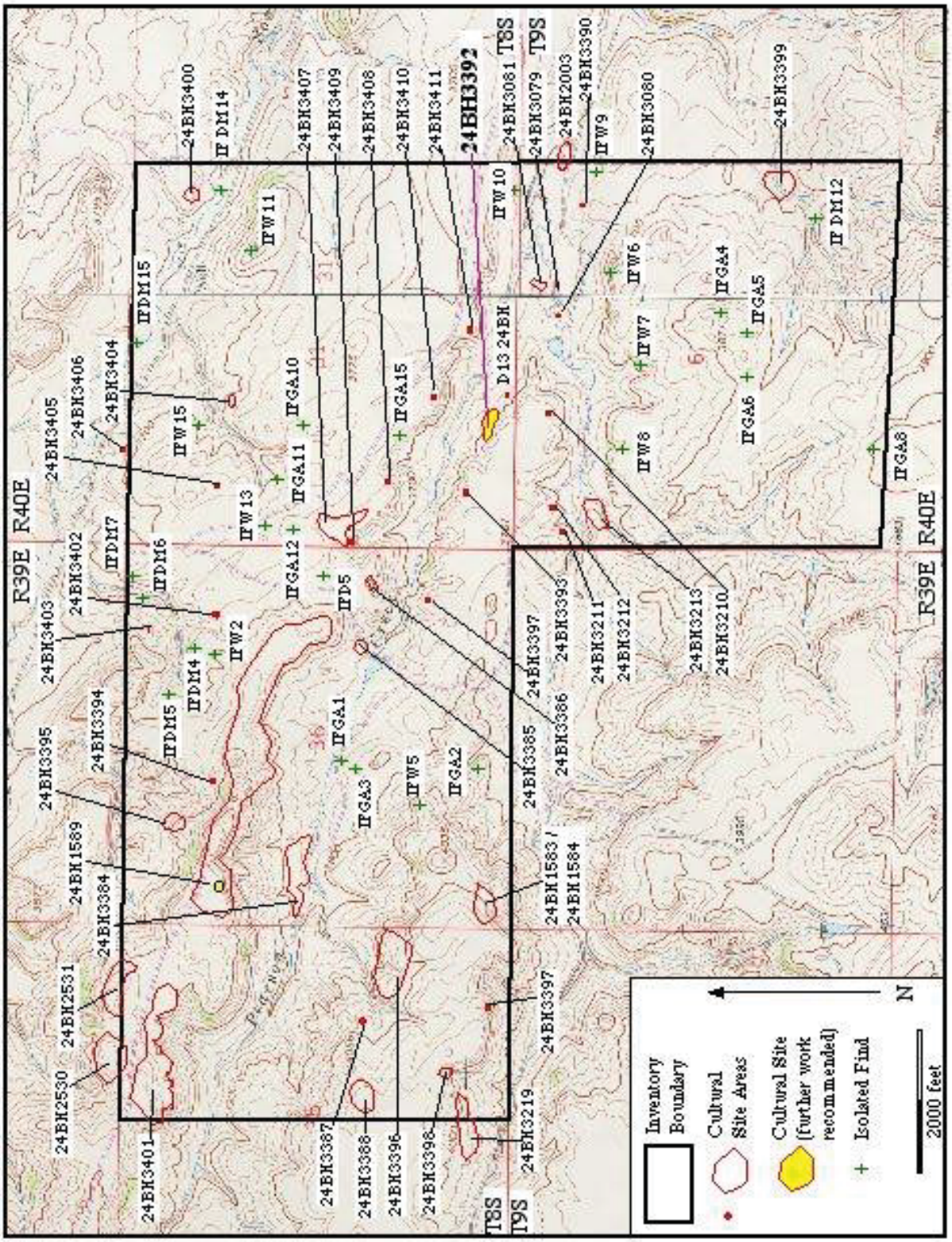


Figure 1. The location of 24BH3392 on the USGS 7.5-minute maps *Pearl School* (1967) and *Decker, Montana* (1967).

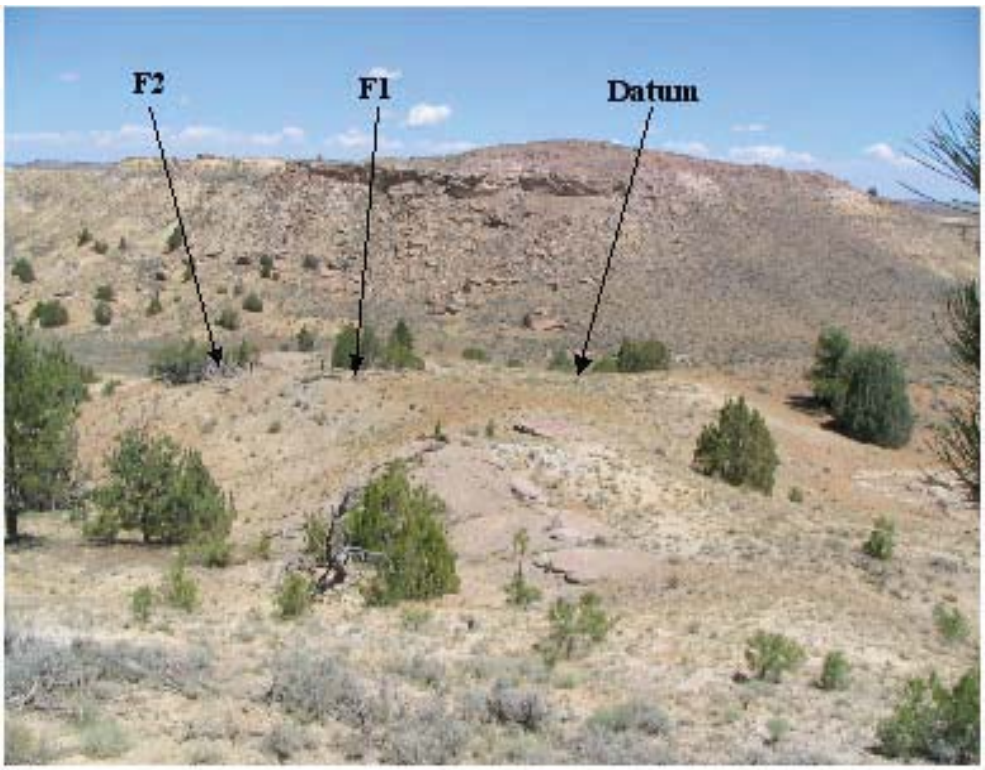


Figure 2. Site overview looking north at landform from the upper bench.

Figure 3. Looking north at Feature 1 (right) and Feature 2 (left).

Figure 4. Site overview facing east-southeast (datum rock pile in lower right)

Figure 5. Feature 1, looking west (Feature 2 in background).

Figure 6. Feature 2, looking north (note: standing dead juniper is not part of the feature)

The Pistol Pete Site area is about 140-m east-west by 70-m north-south, based upon the distribution of features and artifacts observed on the surface. The site is a Late Prehistoric Period campsite consisting of two juniper crib structures, a variety of lithic artifacts and bison bone located on a lobe-shaped projection of the ridge on the south side of the Pearson Creek drainage. The site occupies the top of a lobe-shaped landform overlooking Pearson Creek, ephemeral drainage, about 200 meters to the north, and 18 m below the site. The site also extends to an arroyo bottom on the southeast side of this landform, where a number of bison bone fragments are found.

The soil at the site is pale grayish brown clay loam and weathering sandstone. The cultural deposits are believed to be very shallow, as there is little soil development overlying the sandstone cap rock. Based upon surface observations of the landform, there may be a maximum of 30 cm of depth to the cultural deposits in the central area of the site, with perimeter areas of exposure very near the surface. Again, the underlying sandstone cap rock limits the potential depth of cultural deposits.

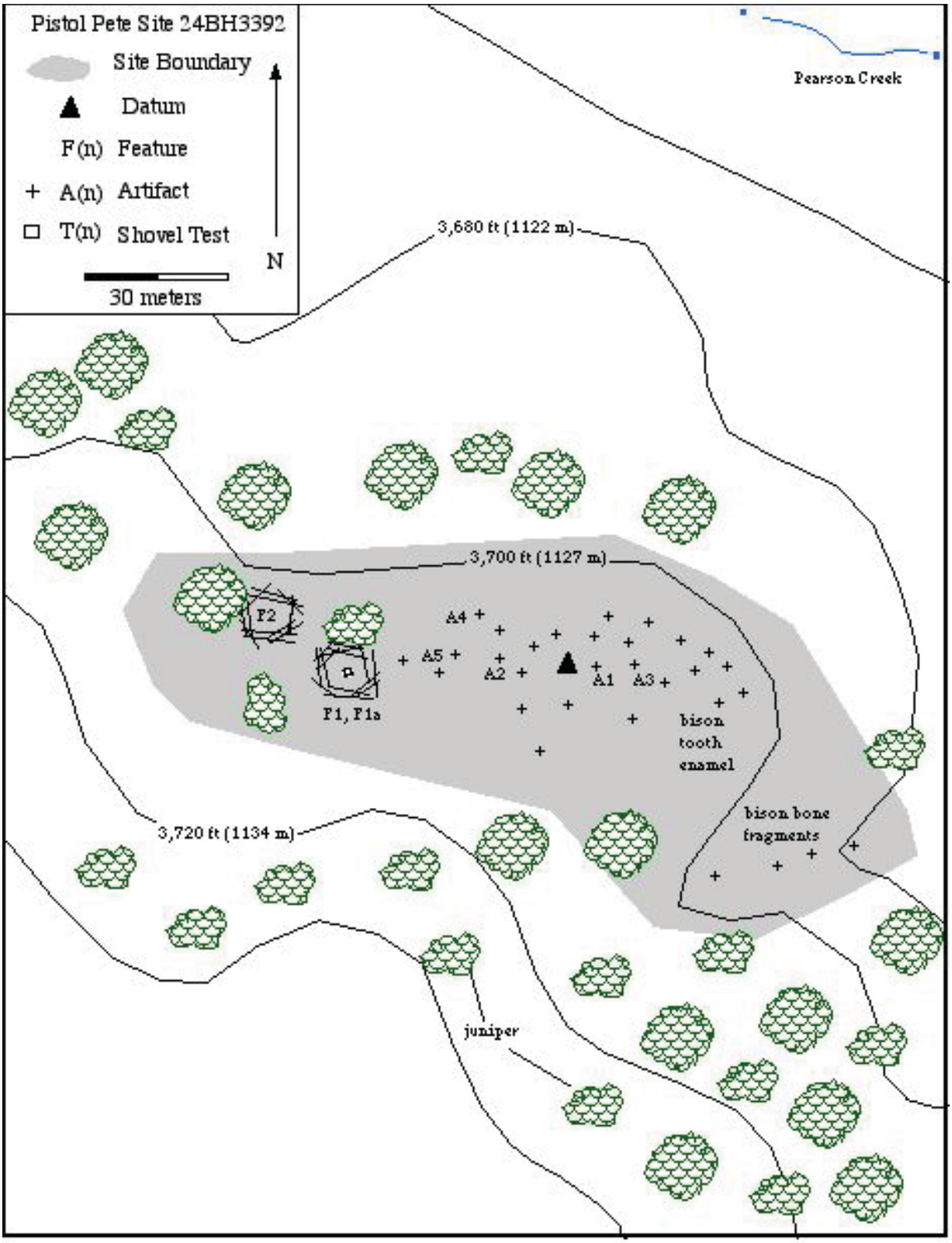


Figure 7. Sketch map of site 24BH3392.

Vegetation types observed at or in the vicinity of the site includes: *Artemisia tridentata* (sage); *Opuntia* (prickly pear); Yucca glauca; juniperus; Phlox hoodii; *Liatris*; tumble mustard; yellow salsifry; arrowleaf balsamroot; yarrow; prairie smoke; clustered broomrape; flax; chokecherry; hairy golden aster; rabbitbrush; silver sage; thistle; sweet clover; prairie clover; willow leaf sage (sweet sage); globe mallow; gumweed; sunflower; goldenrod; bindweed; buckwheat; hopsage; pussytoes; Acer negundo; coneflower; Solomon's seal; jimsonweed; *Ribes* (currant).

Features observed at the site consist of the remains of two shelter structures made of stacked juniper logs. Feature 1 is a vaguely hexagonal-shaped alignment of stacked juniper logs 44 meters west of the site datum. The logs are nearly deteriorated but the remnant log ends are clearly interlaced in log-cabin fashion. The dimension of this feature is roughly 3.5-m north-south by 5-m east-west. A juniper has grown up in the north side of the feature and has disturbed a portion of the feature. In the center of this feature is a 2-m diameter scatter of sandstone fire-cracked rock (FCR), with a 1-m diameter charcoal and ash stain within the FCR scatter (F1a). This is the remains of a hearth feature, which appears to be partially deflated, but which clearly retains sufficient charcoal for a radiocarbon date. Wire pin probing indicates that buried rocks are within the feature.

Feature 2, located 6 m northwest of Feature 1, was not immediately recognizable. What initially appeared to be a tangle of dead juniper was recognized as a second "crib" structure that contains more old juniper logs but is less well-defined than Feature 1 because of the intrusion of a living juniper. This feature is an amorphous tangle of old juniper logs occupying an area of roughly 4 by 4 meters. The feature was identified and confirmed by the presence of sandstone FCR under the tangle of juniper logs. It is believed that Feature 2 is a log "crib" similar to Feature 1, but in a state of greater deterioration.

This type of feature is rare, if not unique, in this area. Unlike cone-shaped wickiups documented in southwestern Montana, these are tentatively interpreted as having been a tipi ring-sized hexagonal shelter constructed of stacked logs (scavenged from the juniper grove surrounding the site). It is presumed that these are Late Prehistoric in age, because of the juniper remains. The logs could be several hundreds of years old when they were collected by the inhabitants, and still have been used hundreds of years ago. A core sample from a standing dead ponderosa pine in Rosebud County, Montana, was radiocarbon dated at 400+/-60 years before present (AD 1550) (Beta 41279) by Munson, et al. (1991). Juniper is far more resistant to deterioration than pine, and given the particularly dry environment at this site, could conceivably be much older that that.

Lithic artifacts observed include five formal tools, and about 20 primary and secondary reduction flakes of porcellanite and five chert flakes. Artifact 1 (A1, 2 m at 90 degrees from datum) is a distal fragment of a stage III biface made of siliceous gray quartzite. Artifact 2 (A2, 6.5 m at 270 degrees) is a medial fragment of a small projectile point preform made of Tongue River Silicified Sediment. Artifact 3 (A3, 5 m at 90 degrees) is an end scraper made of brown agate. Artifact 4 (A4, 20 m at 320 degrees) is an exceptionally large end scraper, probably a hand-held variety, made of mottled tan and gray chert. Artifact 5 (A5, 18 m at 280 degrees) is a well worn fragment of a quartzite cobble, possibly a mano and/or hammer stone fragment. Lithic debitage included primary, secondary and tertiary flakes,

predominantly porcellanite, but chert, quartzite and Knife River Flint ("root beer" colored chalcedony) were also observed. No artifacts were collected. Soil deposition at the site is limited to the center of the landform, but pin flag probes there indicate that there is enough soil to have preserved a subsurface cultural component, perhaps 15 to 30 centimeters.

On the southeast margin of the main landform containing the site is a highly erosive arroyo about 6 meters deep. At the head of the arroyo were found several bison bones and bone fragments that bear the attributes of having been butchered and fractured when "green." It appears that a bison was killed and butchered at this location, perhaps accounting for the site location. Bison tooth enamel is also found on the site about 20 m east of datum.

The site was not shovel tested. Shovel testing could only have a deleterious effect to the rather fragile and shallow cultural component. The site is obviously NRHP eligible and obviously has a significant subsurface cultural deposit. This site is recommended as eligible for the NRHP under Criteria D. The site has significant archaeological content, including unique feature types; dateable organic materials (charcoal, bone and juniper) and a variety of tools indicating that prolonged occupation and various activities (not just lithic reduction) occurred here. Thermal features are present within defined activity areas (e.g., the structures). A variety of lithic materials are present, not just porcellanite. Faunal remains may potentially yield seasonality data. A generally time-diagnostic tool (A2) provides preliminary indication of a Late Prehistoric Period occupation. This site has potentially significant archaeological research potential. It is surficial to shallowly buried and subject to adverse impact from any surface traffic.

Expected Cultural Deposit Characteristics at 24BH3392

The majority of the cultural remains can be expected within the top 10-20 centimeters, however, the cultural horizon may extend to 30 cm level in the interior of the site. Also the bison bones found at the head of an adjacent arroyo may be expected to require excavation to 40 or 50 cm below surface. It is anticipated that the margins of the landform have been subject to erosion and will be determined to have been deflated.

The Late Prehistoric projectile point and presence of juniper features provides a temporal context likely no more than 500 years old. Radiocarbon dating of the charcoal from Feature 1a, as well as the juniper itself, bone fragments and possibly other features will give a broad and comprehensive evaluation of the sites period(s) of occupation. At this time only one period of occupation (affiliated with Late Prehistoric II) is anticipated.

SITE CONTEXT FOR 24BH3392

No other sites have been excavated along Pearson Creek. However, a few sites have been excavated along drainages to the north, namely Spring Creek and South Fork Spring Creek (Munson, et al., 2003; 1992). Comparisons with the results of these investigations may be possible. Sites that may offer comparative data are 24BH514, 24BH1048, 24BH2518, 24BH2521, 24BH2529 and 24BH2254. These campsites contain a variety of feature types and artifacts dating from the Middle Archaic to the Late Prehistoric II. It may be possible to compare

the Late Prehistoric Period features and artifacts from these sites, as well as also to compare activity loci structures, with 24BH3392.

Also, on the west site of the Little Wolf Mountains two ridge top sites have been recently excavated; Dagan (24BH2622) (Munson and Ferguson 2000) and Minime (24BH2626) (Munson and Ferguson, 2006). These two sites are also examples for a comparison of sites in similar settings.

A comparison of sites containing juniper structure features throughout the Pine breaks region and beyond will be made. Similar structures have been documented in the Pine breaks region of southeastern Montana; many such sites having been described in *Archaeology of Montana.* Juniper wickiups and brush shelters also appear in archaeological literature from Wyoming, Utah, California, Nevada, Idaho and Colorado (Martin 2005). Applicable references will be reviewed and discussed.

RESEARCH GOALS AND SPECIFIC HYPOTHESES

The research goal is to document and study the apparent juniper features with their attendant thermal features and concentrations of cultural materials, as well as the open space of the site to identify any other features and activity loci. Locating and studying features and activity loci is only a subset of the overall goal of archaeological investigations in southeastern Montana's Pine breaks area which aims to reconstruct the prehistoric settlement and subsistence patterns or what is commonly placed under the rubric “the reconstruction of past lifeways.” In order to meet this goal such topics as intra-site patterns, dietary preferences, seasonality and temporal association are addressed. Collection of these kinds of data is important and should always be included in any investigation but the objective of this research design is to go beyond these basic questions and attempt to better define "who" these people were. This is attempted by using activity loci patterns as the basis of cultural division.

The following hypotheses are designed to yield information on a number of important issues including: chronology, cultural affiliation, site function, subsistence, seasonality, site structure and social organization, lithic technology, paleo-environment, and inter-site relationships. Sufficient materials may not be recovered to address all of these research questions. The following hypotheses will be addressed individually for 24BH3329.

Cultural Chronology

Hypothesis: Site 24BH3392 is a single component occupation.

Data Requirements: The site will yield similar radio-carbon dates from charcoal, wood and bone sources. The site will yield temporally diagnostic artifacts will corroborate the hypothesis, i.e., a homogenous Late Prehistoric period projectile point assemblage. The excavation will reveal a single cultural stratum.

Criteria for Hypothesis Rejection: Archaeological evidence that the site has statistically diverse radiocarbon dates, a variety of temporally diagnostic artifacts and/or multiple components preserved as distinct cultural strata.

Discussion: The occupation of the Spring Creek / Pearson Creek area may not have been continuous but at varying intervals over the last several thousand years. The site may be a single occupation associated with a single activity or event (such as the killing and processing of a few bison).

Site Function

Binford (1980) set out a criteria for determining functional site types. These types include residential bases, locations, field camps, stations, and caches. These types need not be independent of each other.

Hypothesis: The site is a field camp; a short-term occupation associated with a single activity or event (such as the killing and processing of a few bison).

Data Requirements:
(1) Low artifact diversity representative of short-term use and limited activity

(2) An artifact assemblage focused on bison processing

(3) A corresponding faunal assemblage limited to bison bone

Criteria for Hypothesis Rejection:
(1) Identification of cultural features and work areas representing multiple activities including processing and consumption of plant and animal materials.

(2) Recovery of a representative sample of artifacts which would have been used for a variety of activities and not just bison processing, such as a large volume of primary lithic reduction debris or the remains of a variety of faunal species

(3) Evidence of long-term occupation, such as multiple-reuse of thermal features, abundant quantities of fire-cracked rock and multiple strata of cultural deposition.

Discussion: Locating and exposing activity loci will help determine the presence or absence of different activity areas and possibly overall site structure.

Subsistence

The procurement, processing and consumption of floral and faunal resources are activities that can be examined archaeologically. These activities are reflected in presence of biological remains (bones and paleobotanical remains). Lithic tools and debitage can provide insight into the subsistence activities, which took place at sites. A full range of subsistence activity data may exist.

Hypothesis 1: Hunting activities will be represented in the site assemblage.

Data Requirements:

(1) Recovery of faunal materials from cultural context.

(2) Recovery of formal artifacts associated with hunting activities.

(3) Recovery of lithic debitage representing the resharpening of tools used in animal processing.

Criteria for Hypothesis Rejection:

(1) No faunal remains are recovered from the archaeological context.

(2) Lack of artifacts associated with the procurement, preparation, and consumption of animals.

(3) Lack of lithic debitage associated with maintenance of tools used in animal processing.

Hypothesis 2: Non-hunting related subsistence activity data will not be recovered from the site.

Data Requirements:

(1) The site lacks subsistence data related to non-hunting activities.

Criteria for Hypothesis Rejection:

(1) Recovery of archaeobotanical remains (e.g., macrofloral remains, etc.).

(2) Recovery of formal artifacts not associated with hunting activities.

Discussion: Materials from diverse activities should be recovered if the site is a residential base.

Seasonality

Data from certain faunal species can be used to determine seasonality. Mandibular tooth eruption schedules for large mammals with known birthing times can be used to ascertain seasonality, as can fetal bone in recognizable stages of development (Niven and Hill 1998).

Floral materials can also aid in determining seasonality. Carbonized seeds from fruits and berries with known seasonality can suggest seasonality of occupation.

Hypothesis 1: The site was occupied during one season (summer, fall, winter or spring).

Data Requirements: Recovery and analysis of floral and faunal remains indicative of seasonality.

Criteria for Hypothesis Rejection: Floral and faunal remains indicating occupation in multiple (non-adjacent) seasons.

Discussion: It is likely that the site will not contain preservation of seasonally sensitive materials and that seasonality will not be determinate.

Site Structure and Social Organization

These questions will focus on intra-site analysis. The distribution of activity areas, artifacts, cultural features, floral and faunal remains will be explored. Particular questions that will be important include (1) how many people (approximately) used the site, (2) identification of any gender specific activity areas, (3) identification of specific task areas, (4) estimation of the duration of site occupation, and (5) issues of social hierarchy and social organization.

Hypothesis 1: Activity loci specific to lithic reduction (inferred to be male) and other spatially separate activity loci (e.g., hide processing activities with their inferred female activity association) will be identified.

Data Requirements:

(1) Identification and analysis of lithic reduction locus.

(2) Identification of activity loci not directly related to lithic reduction.

Criteria for Hypothesis Rejection:

(1) Lack of discrete lithic reduction locus.

(2) No discernible, discrete activity areas.

Hypothesis 2: Activity loci specific to plant processing (with an inferred female activity association) will be identified.

Data Requirements: Identification and analysis of artifacts associated with plant processing (e.g., manos, metates).

Criteria for Hypothesis Rejection:

1) No discernible plant processing activity area(s).

2) No artifacts found which were directly related to plant processing.

Hypothesis 3: Activity loci specific to hide processing (with an inferred female activity association) will be identified.

Data Requirements:

(1) Identification and analysis of artifacts associated with hide processing (e.g., scrapers).

(2) Identification of features associated with hide processing (i.e. smudge pits).

Criteria for Hypothesis Rejection: Lack of discrete activity loci associated with materials associated with hide processing.

Hypothesis 4: Activity areas specific to food preparation (and consumption) will be identified.

Data Requirements:

(1) Identification of hearths used for food preparation.

(2) Identification of faunal and/or floral remains in direct association with food preparation activities.

(3) Identification and analysis of artifacts used for food preparation.

Criteria for Hypothesis Rejection:

(1) No hearths found which can be associated with food preparation.

(2) Lack of floral and/or faunal remains.

(3) Analysis of artifacts indicates that none were used for food preparation.

Paleoenvironment

Collection of data related to the environment includes faunal and macrofloral samples. The distribution of these types of data in cultural context are not necessarily an ideal representation of the total environment at the time of occupation. However, data collected may contribute to regional paleoclimatic models.

The site is unlikely to have a cultural horizon sufficiently deep to contain a stratigraphic pollen profile.

Intersite Relationships

An attempt will be made to explore the relationship of this site to other local sites, and other regional sites having similar features and periods of occupation.

GENERAL EXCAVATION PROCEDURES

Standard excavation procedures as described by Heizer (1962), Heizer and Graham (1968) and Fladmark (1976) will be maintained in the excavation of the site. Special methods and techniques, described in the following respective sections, will be utilized when necessary to gather specific data in order to address the research objectives.

Mapping

Mapping procedures are employed not only to record the surficial features and topography of the site prior to excavation but also to lay out the scale drawing of feature planviews and profiles. The site will be mapped utilizing transit survey techniques. All mapping will be done from a base datum point.

The Grid

Horizontal control will be established by laying out an excavation grid. The grid consists of square excavation units oriented along the true north axes (i.e., N-S, E-W). The grid is established using a horizontal datum point from which regular intervals are numbered 0 to "n", with right angled lines produced from these intervals. Each unit is numbered in relation to datum (i.e., 2N, 8E), the number reference corresponding to the northwest corner of the excavation unit. All artifacts located within the excavation unit will be recorded in reference to the respective NW corner and subsequently in relation to the entire grid. In practice, the grid will be laid out on the surface of the site by stakes, each stake being labeled with the appropriate coordinate.

Vertical Control

Possibly no other aspect of the field data collection procedure is as important in the initial ordering of excavated materials as vertical and stratigraphic control. In order to provide continuous stratigraphic sections, soil blocks will be left to ensure stratigraphic profile control.

Vertical provenience will be maintained by measuring the depth of a line level and measuring tape in relation to the NW corner stake. The elevation of each stake is established in relation to point 0,0 (datum). This method (depth below datum or DBD) establishes a common vertical measuring base for all objects found, regardless of the irregularity of the ground surface. Centimeters below surface (cmbs) measurements will be used where cultural levels are parallel to the surface. These measurements will be achieved in the same manner as DBD but will be based on the surface of the nearest wall instead of the NW corner stake.

An excavation unit is not dug in its entirety but is excavated in systematic levels reflecting either natural or arbitrary layers.

Where stratigraphic levels do not exist, arbitrary levels will be used. The entire pit will be excavated in 5 or 10 cm levels paralleling the natural contour of the ground surface such that the centimeters below surface (cmbs) is the same in all four corners of the unit.

Features

The exposure of features of any type is a time-consuming task. Once a feature is recognized, it will be cleaned, and its limits defined. The feature will be mapped and photographed throughout its excavation.

All soil removed from hearth and hearth related features will be retained for water separation procedures in order to recover micro-cultural debris for analysis.

In addition to hearth and hearth related features, small clusters of lithic debris are likely to be uncovered. Such clusters will be treated as features so they can be more readily and thoroughly analyzed.

The remains of the juniper structures will be mapped with scaled drawings, photographed and described in detail.

Field Notes

Each excavator will be responsible for the full and accurate recording of all data in his/her excavation unit. This will include minimally the following:

1) Level notes:

-unit coordinates
-level number
-DBD and/or cmbs of the corners of each excavation unit
-description of the level matrix
-possible sources of disturbance
-description of features and artifacts
-description of any ancillary samples taken (carbon, soil matrix, etc.).

2) Floor plan:

   scaled map of all significant features, cultural associations and metric change for each level to include unit coordinates.

3) Features:

   complete description of cultural material, form, structure and interpretation.

4) Profile drawings:

   scaled maps of stratigraphy for both excavation units and features.

In most cases, data forms will be used to record and map levels, features, floor plans and profiles. The use of forms serves to maintain congruity in all excavation recording.

SITE SPECIFIC EXCAVATION PROCEDURES FOR 24BH3392

The following lists the proposed site specific excavation procedures for 24BH3392:

1) Make a contour map of the site based on Spring Creek Coal, LLC's 1:200 scale map with 5 ft (1.5 m) contour intervals.

2) Establish a staked grid with east-west and north-south axis across the site to control the horizontal extent of excavations.

3) Place 1 by 1 m or larger units at the locations where surface cultural remains and intact soil deposits are observed, expanding the excavations where there appears to be intact cultural horizons.

4) The remains of the juniper structures will be mapped with scaled drawings, photographed and described in detail.

5) Place 4 by 4 m block excavations at Features 1 and 2. Enlarge the excavation to fully expose any associated activity locus.

6) In order to fully explore the site for subsurface cultural remains more subsurface testing is recommended. This may take as much as 10 square meters of testing. The tests will measure 0.5 by 0.5 m. Test areas will include the adjacent small arroyo where bison bone was observed in 2006.

7) Testing may expose hearth related features and possibly lithic workshop areas. If such cultural remains are found, they will be fully exposed by hand excavations.

8) The total amount of excavation will probably be around 80 square meters. The actual square meters of excavation will depend on the number, extent and complexity of activity loci located.

GENERAL METHODS OF ANALYSES

Analyses of materials and information obtained from the excavations will be sorted into the various categories and labeled appropriately. The bulk of the analyses and interpretation will be by GCM Services staff. The methods of the analyses are explained below.

Lithic Analysis

The lithic analysis will focus on two aspects: predominant technology and inferred cultural behavior. All lithic materials will be initially examined and identified as to material type. Then debitage and tools of each material type will be examined in terms of dominant reduction technologies and progressive sequences of manufacture as indicated by quantities and variations in flake type and rejected tool preforms. Formal tools will be examined in terms of type, function, cultural variation, breakage patterns and attritional wear patterns. In conjunction with intra-site spatial distribution of lithic materials, inferences will be made concerning specialized activities and associated activity areas. The lithic analysis will be conducted by David Ferguson and Viktor Kujawa.

All tools will be sorted into the conventional gross categories of projectile points, end scrapers, drills, bifaces, etc. Standard metric measurements and raw material determinations will be made for each item.

Faunal Analysis

Bones recovered from the excavation will be identified, whenever possible, to element and species. John Rittel, Wolf Creek, Montana, will analyze the faunal material.

Macrofloral Analysis

The flotation of the soil from the features will be done by GCM Services. The light fraction will be sent to Dr. Richard Holloway, Quaternary Services, Flagstaff, Arizona for identification of macro-floral remains.

Pollen Analysis

The value of pollen analysis at the sites probably will be limited because of the shallow nature of the cultural deposit and the likelihood of contamination by the modern pollen rain being deposited by such means as drying cracks, downwashing, and burrowing animals. However, if pit features or deeply buried cultural levels are located, soil samples for pollen analysis will be sent to Linda Scott Cummings, PaleoResearch Lab, Golden, Colorado for pollen study.

Wood Speciation

Charcoal samples from the features will be sent to Dr. Edwin Burke, School of Forestry, University of Montana, Missoula, for species identification.

Radiocarbon Dating

Radiocarbon dating will be by Beta Analytic, Inc., Coral Gables, Florida. Whenever there is sufficient charcoal, samples from the same features will also be speciated.

Accurate chronometric dating of Protohistoric sites is critically important in regards to a number of research topics, yet remains one of the key problems. Until the acquisition of steel axes, wood cutting was a highly labor intensive activity. For both fuel wood and shelter poles, long dead wood that could be easily gathered or brought down without tools was far more appealing than living trees. Because of this old wood problem (the fact that both dendrochronological and radiocarbon dates provide only chronometric information on a tree's *death* rather than the year of its use), the resultant dates tend to be from one to three centuries earlier than the cultural utilization of a sample of wood...a distinct problem with resources that are only a few hundred years in age.

Dendrochronological Dating

If possible, constituent juniper elements from Features 1 and 2 will be dated using dendrochronology (tree ring) dating to offset the "old wood" problem described above. Dendrochronology dating will be done by the University of Arizona.

Obsidian Trace Element Analysis

If obsidian is recovered, it will be sent to Dr. Richard Hughes, Geo Chem Research Lab, Portola Valley, California, for trace element analyses. This information is used for the possible source(s) of the obsidian.

Obsidian Hydration Band Analysis

If obsidian is recovered, Thomas Origer, Sonoma State University, Rohnert Park, California, will conduct obsidian hydration band analysis. The thickness of the band provides information on the age of the specimen when compared to other local specimens.

Protein Residue Analysis

Selected tools will be sent to Amy Girado, Archaeological Sciences, California State University, Bakersfield, California, for protein residue analysis. This information is used for input on species of animals and plants utilized by the inhabitants of the site.

Ceramic Analysis

Ceramics, if found, will be analyzed by Dr. William Lucius, Boulder, Colorado. The analysis includes ceramic characterization as well as the apparent number of vessels represented in the sample.

Feature Analysis

The term "feature" as used in this report defines those physical manifestations that the field archaeologist investigated and described as a separate unit unto itself. Features usually cannot be readily removed from a site without destruction. Generally, features are clearly the result of the inhabitants' activities; e.g., rock-filled hearths and living surfaces.

The features will be placed into categories such as pit hearth, surface hearth, pit oven, dump, and living surface. Their structures, as well as their spatial /contextual relationships will be analyzed.

SCHEDULE

The excavation of 24BH3392 is not currently scheduled by the project proponent. It is assumed that the excavation will be scheduled upon approval and acceptance of this mitigation plan. Tentatively, the excavation will scheduled in the Fall of 2009 or the Spring of 2010. A letter report briefly describing the results of the fieldwork will be submitted within 30 days after fieldwork is completed. The report on excavation results will be submitted to the agencies by one year after completion of fieldwork. Artifacts collected from the site will be housed at the Bureau of Land Management curation facility in Billings, Montana.

REFERENCES

Fladmark, K.R.
1976 *A Guide to Basic Archaeological Field Procedures*. Department of Anthropology, Simon Fraser University.

Heizer, Robert F.
1962 *A Guide to Archaeological Field Methods.* The National Press, Palo Alto, California.

Heizer, Robert F. and John A. Graham
1968 *A Guide to Field Methods in Archaeology*. The National Press, Palo Alto, California.

Martin, Curtis
2005 *Colorado Wickiups: An Archaeological Context*. Paper presented at the 2005 Colorado Council of Professional Archaeologists Annual Meeting, Grand Junction, Colorado, March 4-5, 2005.

Meyer, Garren and Gene Munson
1998*Archaeological Investigations at Another Site, 24RB1605*. Prepared for Big Sky Mine, Colstrip by GCM Services, Inc., Butte, Montana.

Munson, Gene, et al.
2003 Excavation of Lost Hearth 24BH2254. With contributions by Richard Holloway, Dave McKee, Beta-Analytic, Laboratory of Archaeological Science and Richard Hughes. Report prepared for Spring Creek Coal Company, Decker, Montana, by GCM Services, Inc., Butte

1992 Archaeological Investigations at 24BH514, 24BH1048, 24BH2518, 24BH2521 and 24BH2529. Prepared for Spring Creek Coal Company by GCM Services, Inc., Butte.

Munson, Gene and David Ferguson
1994 *Archeological Investigations at Windmill Site 24RB1606.* With contributions by Gary Wendt, Ann Johnson, William Lucius, Stephen Aaberg, Jack Fisher, Edwin Burke and Kathryn Puseman. Prepared for Peabody Coal Company by GCM Services, Inc., Butte.

2000 *Excavation of Dagan Site, 24BH2622*. With contributions by Margaret Newman, Darrel Myran, Dave McKee, Richard Holloway, Edwin Burke and Alan Cvancara. Report prepared for Westmoreland Resources, Inc., Absaloka Mine, Hardin, Montana, by GCM Services, Inc., Butte.

2007 *Excavation of Minime Site, 24BH2626*. With contributions by Margaret Newman, Darrel Myran, Dave McKee, Richard Holloway and Edwin Burke. Report for Westmoreland Resources, Inc., Absaloka Mine, Hardin, Montana, by GCM Services, Inc., Butte.

Niven, Laura B. and Mathew Glenn Hill
1998 Season of Bison Mortality at Three Plains Archaic Kill Sites in Wyoming. *Plains Anthropologist*, 43(163) 5-26.