DES08-08

U.S. Department of the Interior
Bureau of Indian Affairs
Rocky Mountain Regional Office

Montana Department of Environmental Quality
Industrial and Energy Minerals Bureau

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


Typical landscape in the South Extension


Mining operations at the Absaloka Mine


Reclaimed land at the Absaloka Mine

March 2008

BUREAU OF INDIAN AFFAIRS
MISSION STATEMENT

The mission of the Bureau of Indian Affairs is to enhance the quality of life and to promote economic opportunity in balance with meeting the responsibility to protect and improve the trust resources of American Indians, Indian tribes and Alaska Natives.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
MISSION STATEMENT

The Department of Environmental Quality's mission is to protect, sustain, and improve a clean and healthful environment to benefit present and future generations.

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Rocky Mountain Regional Office
316 North 26th Street
Billings, Montana 59101

TAKE PRIDE IN AMERICA

IN REPLY REFER TO: Environmental, Safety and Cultural Resources Management-620

March 21, 2008

Dear Reader:

The Bureau of Indian Affairs (BIA) and the State of Montana, Department of Environmental Quality (MDEQ), as joint lead agencies, have prepared this Draft Environmental Impact Statement (EIS) to document and disclose the results of an environmental analysis. The analysis is of anticipated impacts associated with an application received by the BIA to lease a tract of Indian owned coal, the Absaloka Mine South Extension, to Westmoreland Resources Inc. (WRI) for the continuation of mining at the Absaloka Mine on the Crow Indian Reservation, and allows the MDEQ to evaluate impacts associated with Absaloka Mine's proposed Tract III Revision. This document was prepared in cooperation with the Crow Tribe, Office of Surface Mining, Bureau of Land Management and U.S. Environmental Protection Agency. These agencies/entities also have decision-making authority independent of the BIA and MDEQ and are entities from which WRI will obtain separate approvals or permits. A copy of this document is provided for your review and comments. The Draft EIS may also be reviewed via the Internet at *deq.mt.gov*. Copies of the Draft EIS are also available for public inspection at:

Bureau of Indian Affairs
Weaver Drive, Bldg. 2
Crow Agency, MT 59022

Bureau of Indian Affairs
Rocky Mountain Regional Office
316 N. 26th St. (room 4433)
Billings, MT 59101

Montana Department of Environmental Quality
Industrial and Energy Minerals Bureau
1520 E. 6th Avenue
P.O. Box 200901
Helena MT 59620-0901

A formal public hearing on this proposal to lease Indian Coal and extend the Absaloka Mine will be held during the comment period. The purpose of the hearing is to receive comments on the proposed coal lease and extension of the mine. This hearing will be April 23, 2008, beginning at 7 P.M., at the Big Horn County Court House, 121 3rd St. West in Hardin, MT. Further information about this hearing can be obtained by contacting Rick Stefanic at 406/247-7911. Specifics are also available on the Internet at *deq.mt.gov/meetings.asp*.

BIA and MDEQ will accept public comments on this Draft EIS for 45 days, commencing on the date the Environmental Protection Agency publishes a Notice of Availability in the Federal Register. Comments received after the end of the 45-day comment period will be considered in preparation of the Final EIS as time permits. BIA is also publishing a Notice of Availability and Notice of Hearing, locally for residents of the area.

Comments must cite the location or locations of the document on which you are commenting. The agencies involved in preparing this Draft EIS are required to respond in the Final EIS to all substantive comments submitted on the Draft EIS. Substantive comments should: (1) give any new information that could alter conclusions; (2) show why or how analysis or assumptions in the Draft EIS are flawed; (3) show errors in data, source or methods; or (4) request clarifications that bear on conclusions. Opinions or preferences will not receive a formal response. However, they will be considered and included as part of the BIA/MDEQ decision making process.

This Draft EIS was prepared pursuant to the National Environmental Policy Act and Montana Environmental Policy Act as well as applicable regulations and other statutes, to address possible environmental and socioeconomic impacts that could result from this proposal/project. This Draft EIS is not a decision document. Its purpose is to inform the public and agency decision makers of the impacts of leasing the Crow Indian coal for the extension of mining at the Absaloka Mine and to evaluate alternatives to this leasing.

Comments including names, home address, home phone numbers and email addresses of respondents, will be available for public review and will be published as part of the Final EIS. Individual respondents may request that we withhold their names and/or home addresses, etc., but if you wish us to consider withholding this information, you must state this prominently at the beginning of your comments. In addition, you must present a rationale for withholding this information. This rationale must demonstrate that disclosure would constitute a clearly unwarranted invasion of privacy. Unsupported assertions will not meet this burden. In the absence of exceptional, documentable circumstances, this information will be released. We will always make submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please send written comments to the Bureau of Indian Affairs, Crow Agency, Attn: George Gover, Superintendent, P.O. Box 69 Crow Agency MT. Written comments may also be e-mailed to *westmorelandeis@mt.gov*. E-mail comments must include the name and mailing address of the commenter to receive consideration.

If you have any questions or would like additional copies of this DEIS please contact Mr. Gover at 406/638-2672.

Sincerely,

Edward Parisian

Edward Parisian
Director, Rocky Mountain Region

ABSALOKA MINE CROW RESERVATION SOUTH EXTENSION COAL LEASE APPROVAL, PROPOSED MINE DEVELOPMENT PLAN, AND RELATED FEDERAL AND STATE PERMITTING ACTIONS DRAFT ENVIRONMENTAL IMPACT STATEMENT

Prepared by

WWC Engineering
Sheridan, Wyoming

Under the Direction of

U.S. Department of the Interior
Bureau of Indian Affairs
Rocky Mountain Regional Office
Billings, Montana

Montana Department of Environmental Quality
Permitting and Compliance Division
Industrial and Energy Minerals Bureau
Helena, Montana

and

Cooperating Agencies

U.S. Department of the Interior
Office of Surface Mining
Reclamation and Enforcement
Denver, Colorado

U.S. Environmental Protection Agency
Region 8, Montana Office
Helena, Montana

U.S. Department of the Interior
Bureau of Land Management
Billings Field Office
Billings, Montana

Crow Tribe
Crow Agency, Montana

March 2008

EXECUTIVE SUMMARY

Background

Westmoreland Resources, Inc. (WRI[1]) has owned and operated the Absaloka Mine, a surface coal mine located in northeastern Big Horn County, Montana, approximately 30 miles east of Hardin, Montana (Figure ES-1), since 1974. The Absaloka Mine is located in the Crow Ceded Area north of and adjacent to the Crow Indian Reservation on what is known as the Tract III Coal Lease. Although the Tract III Coal Lease is outside of the Crow Reservation, the coal estate is actually part of the Reservation and held in trust by the United States for the Crow Tribe. In 2004, WRI entered into an Exploration and Option to Lease Agreement with the Crow Tribe under the Indian Mineral Development Act (IMDA) for a coal reserve area encompassing approximately 3,660 acres on the Crow Indian Reservation, south of and adjacent to the Tract III Coal Lease. WRI exercised its lease option on June 1, 2006, for this coal reserve, which WRI refers to as the proposed Absaloka Mine Crow Reservation South Extension.

Absaloka Mine's current permit area is almost entirely within the Tract III Coal Lease, extending to the Crow Indian Reservation boundary (Figure ES-2). The permit area contains coal reserves that are not yet included within Absaloka Mine's currently approved mining plan. WRI has filed an application with the Montana Department of Environmental Quality (MDEQ) and the Federal Office of Surface Mining Reclamation and Enforcement (OSM) to revise its existing permits to mine these additional reserves (referred to herein as the Tract III Revision). The Tract III Revision area lies completely within the Absaloka Mine's current mine permit boundary, while the proposed South Extension tract is contiguous to and south of the current mining permit boundary. Figure ES-2 shows the location of the Tract III Revision area with respect to the South Extension. WRI wishes to maximize coal recovery and ultimately facilitate an orderly advancement of mining operations into the South Extension. For purposes of this Environmental Impact Statement (EIS), WRI's proposed Tract III Revision is considered an integral part of the proposed South Extension development plan.

Purpose

These proposals by WRI to extend the mineable coal reserves at the Absaloka Mine would require various approvals and permits by federal and state agencies with Indian trust, coal mine permitting and other regulatory responsibilities. This EIS analyzes the environmental and socioeconomic impacts of advancing surface coal mining operations at the Absaloka Mine and constitutes compliance with the requirements of both the National Environmental Policy Act of 1969 (NEPA) and the Montana Environmental Policy Act (MEPA) to support those possible approvals and permitting actions.

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

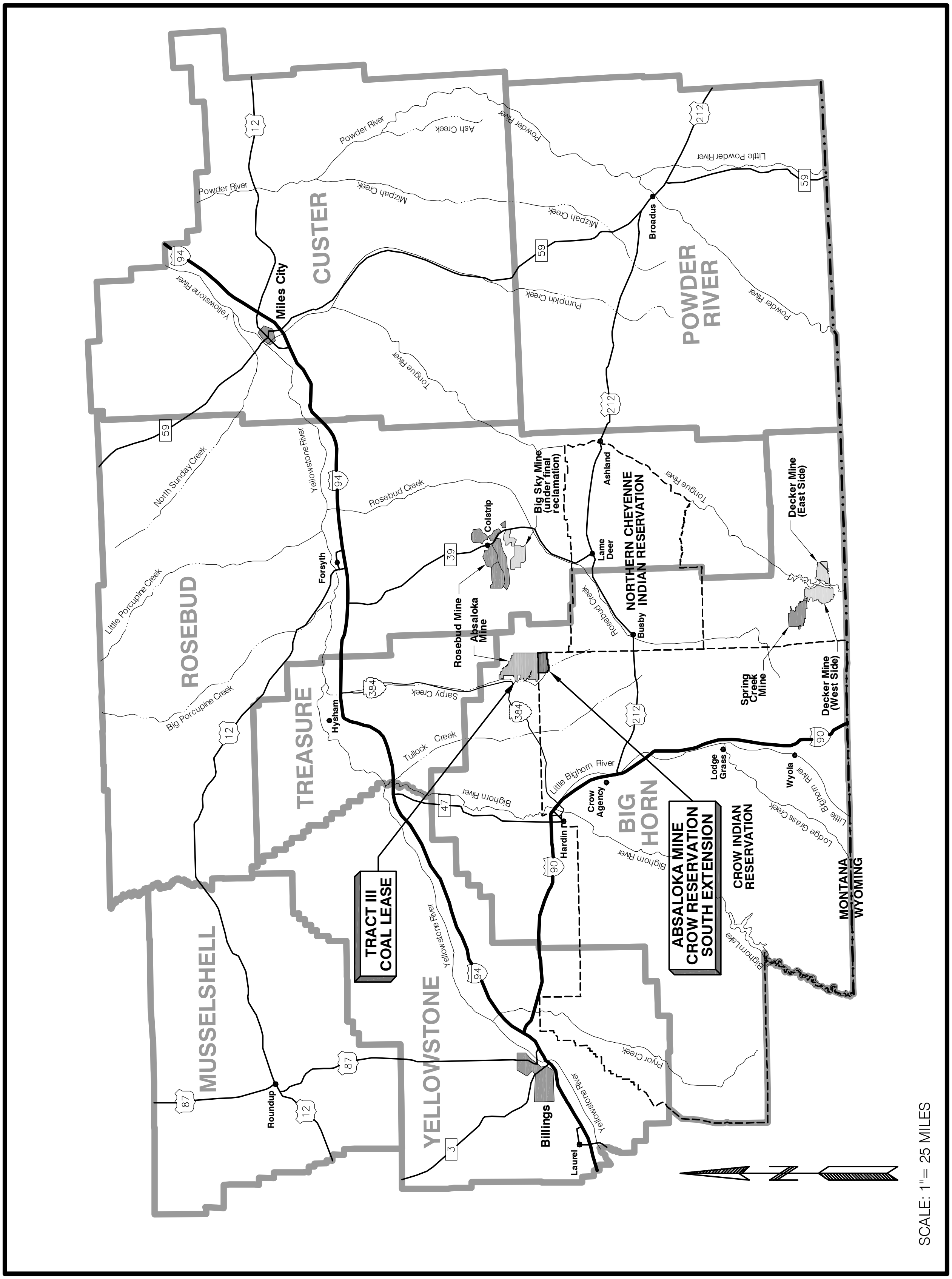

Figure ES-1. General Location Map.

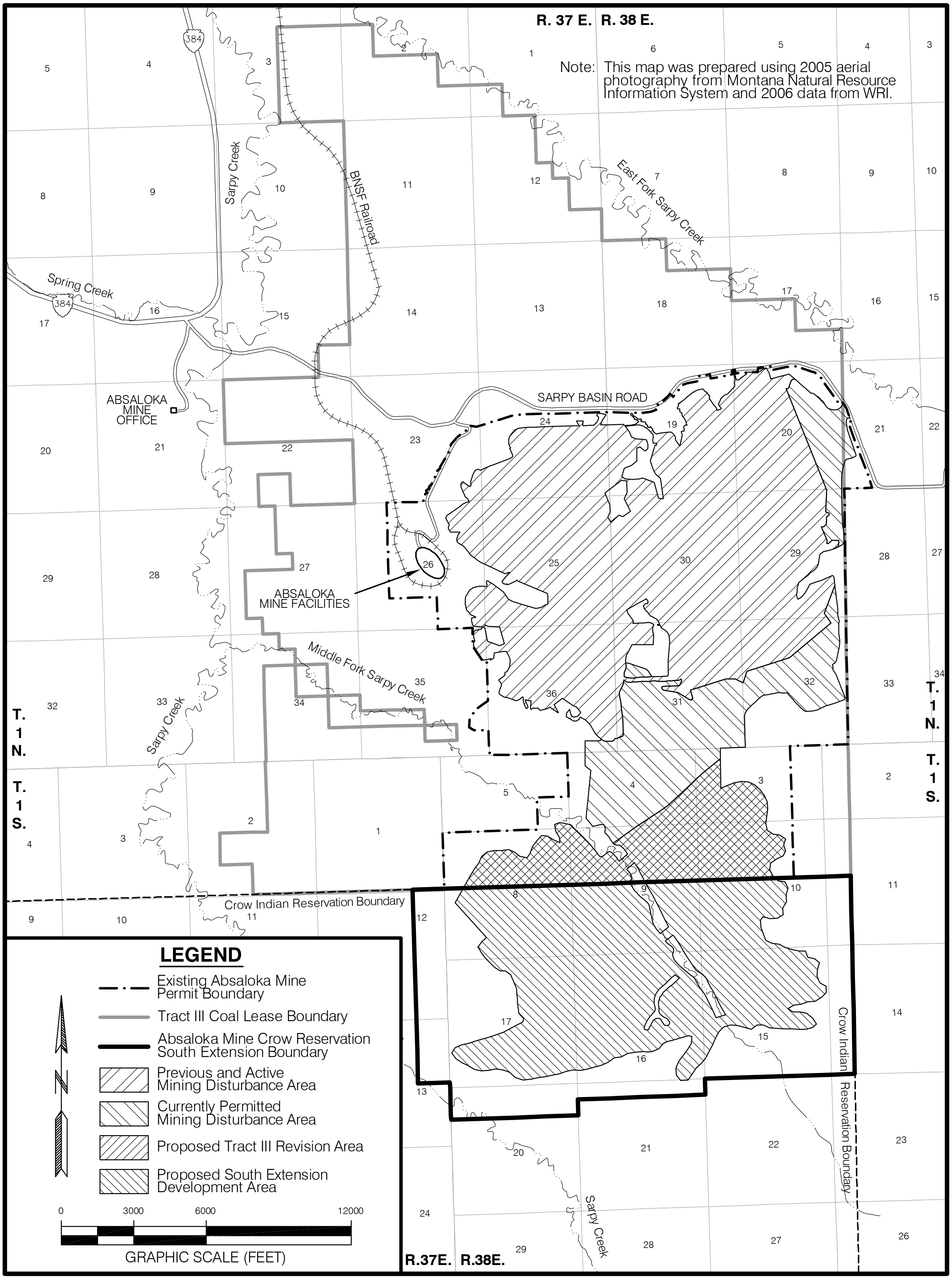

Figure ES-2. Absaloka Mine, Tract III Coal Lease, and Proposed Development Area.

In response to WRI's proposal, the Bureau of Indian Affairs (BIA) must decide whether to approve the IMDA lease for the South Extension. In order to approve the lease, the BIA must fulfill the requirements of NEPA by evaluating the environmental impacts of leasing and subsequently mining the coal reserves within the South Extension. BIA has determined that approval of the South Extension coal lease is a major action, which requires preparation of an EIS.

The preparation of this EIS is a prerequisite for BIA's approval of the IMDA lease and mining of coal reserves in the Tract III Revision and South Extension areas; however, it is not the enabling action that would allow mining to begin. WRI would not be authorized to conduct mining operations by the preparation of this document and BIA's approval of the lease. Prior to conducting any mining-related activities within these two proposed mine development areas, WRI must obtain an approved mine permit revision from MDEQ (with OSM concurrence) for the Tract III Revision and a separate surface mining permit from OSM for the South Extension. OSM is the regulatory authority for surface mining on the Crow Indian Reservation. If the BIA approves the IMDA lease for the South Extension and the surface use agreements, OSM will then have the responsibility for a permit decision on WRI's South Extension mining permit application.

With regard to the proposed Tract III Revision, this EIS analyzes the environmental impacts of mining currently leased coal reserves within the Tract III Coal Lease that is held in trust by the United States for the Crow Tribe, as required by NEPA and MEPA and associated rules and guidelines. With regard to the proposed South Extension, this EIS analyzes the environmental impacts of leasing and mining the coal reserves within the Crow Reservation South Extension lease tract, which is held in trust by the United States for the Crow Tribe, as required by NEPA and associated rules and guidelines. This analysis emphasizes the cumulative impacts that would result from proposed mining in the Tract III Revision and South Extension together.

The currently permitted mining area on the existing Tract III Coal Lease will sustain the current production rate of 6.5 to 7.0 million tons of coal per year only through 2009 since the remaining mineable and marketable coal reserves on that portion of Tract III are limited. Within the Tract III Revision area, approximately 13 million additional tons are potentially mineable and recoverable. Permitting this coal would extend the mine life by two additional years, or potentially through 2011. Approval of the Tract III Revision by MDEQ and OSM, IMDA lease approval, and OSM approval of the South Extension permit application would add approximately 94 million tons of in-place coal reserves. WRI estimates that 77 million of these tons are recoverable and marketable. This would enable the mine to extend its productive life to 2020 or 2021 at the current production rate of 6.5 to 7.0 million tons per year.

The Absaloka Mine provides substantial benefits to the Crow Tribe in several ways. The Tribe receives income from royalties on the coal production from the Absaloka Mine. 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. These tax payments currently comprise the majority of the Tribe's general fund budget. Finally, the majority of the employees of the mine are members of the Crow Tribe, and this mine employment provides some of the best paying jobs in the area.

Coordination

The BIA and the MDEQ are joint lead agencies responsible for the preparation of this EIS pursuant to their respective authorities under NEPA and MEPA. OSM, EPA, BLM, and the Crow Tribe are cooperating agencies as entities with a permit decision function and/or with special expertise or interest in the proposed project.

The EPA will publish a notice announcing the availability of the Draft EIS (DEIS) in the Federal Register. BIA will post a notice of availability and notice of public hearing in local (Hardin and Billings, Montana) newspapers. A 60-day comment period on the DEIS will commence with publication of the EPA's Notice of Availability. The BIA's public notice will be used to solicit public comments on the DEIS. All comments received on the DEIS will be included, with responses, in the Final EIS.

Proposed Action and Alternatives

A Proposed Action and two alternatives to that action are analyzed in detail in this DEIS.

- **Proposed Action** – The Proposed Action is the approval of Absaloka Mine's Tract III Revision and the approval of the South Extension coal lease. Contingent on the lease approval, the Proposed Action also includes approval of the surface mining permit for the South Extension. In each case, action may consist of approval, approval with stipulations, or disapproval.

  The area of interest lies to the south of the existing Absaloka Mine operations and is divided into two distinct proposed disturbance areas, the Tract III Revision and the South Extension. For the purpose of this analysis, the combined areas that would be disturbed by removal of the economically mineable coal reserves within the Tract III Revision area and South Extension area will be referred to herein as either the South Extension development area or the proposed development area (Figure ES-3). This alternative assumes that the leased reserves in the southern portion of the Tract III Coal Lease would be added to the existing mine

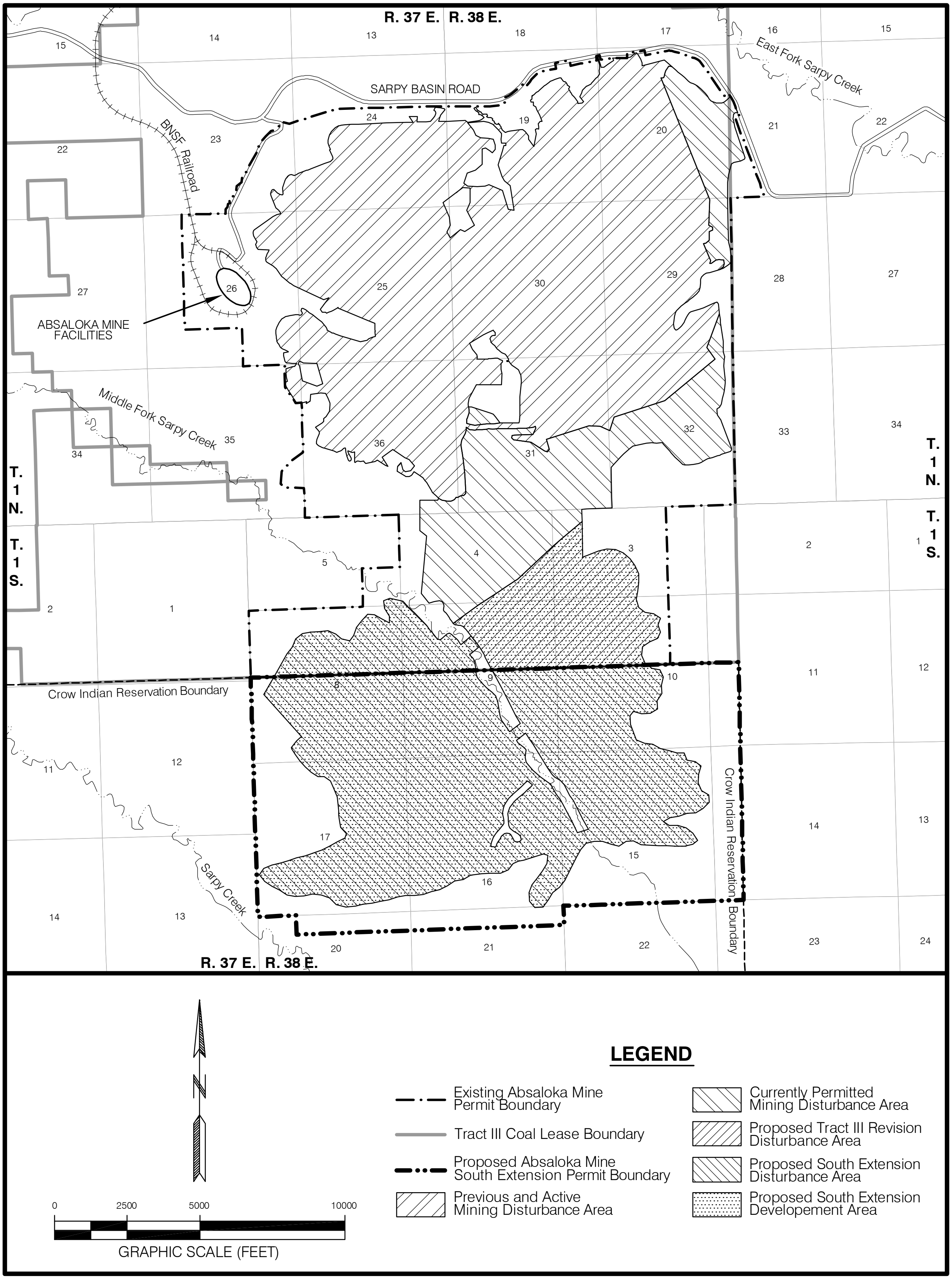

Figure ES-3. Absaloka Mine's Previously and Actively Disturbed Areas, Areas Currently Permitted to be Disturbed, and Proposed Disturbance Areas.

plan and that surface coal mining operations would eventually be allowed to advance onto a new tract of land located entirely within the adjacent Crow Indian Reservation.

The South Extension lease tract includes 3,660.23 acres. WRI estimates that the Proposed Action, involving both the Tract III Revision area and the South Extension tract, would add approximately 93.9 million tons of in-place coal reserves, and that approximately 76.6 million of those reserves would be recoverable. The Tract III Revision area would provide approximately 17.4 million of those additional tons, while the South Extension tract would provide approximately 59.2 million additional tons.

Under the Proposed Action, WRI currently estimates that average annual production would be 6.5 to 7.0 million tons. The life of the existing mine would be extended to 2020 or 2021 and employment would be about 171 persons.

The Proposed Action will require various approvals and permits by federal and state agencies with Indian trust and coal mine permitting responsibilities. The following federal and state agency actions would be taken:

- BIA would approve WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract.
- BIA would approve all surface use agreements between the allottee surface owners in the South Extension tract and WRI.
- MDEQ would use this EIS and information included in WRI's permit revision package to approve the advancement of surface mining operations at Absaloka Mine into the Tract III Revision area.
- OSM would use this EIS and information included in WRI's permit revision package to concur with MDEQ approval of WRI's permit revision package for the Tract III Revision.
- OSM would use this EIS and information included in WRI's permit application package to approve the advancement of surface mining operations at the Absaloka Mine from the Tract III Coal Lease into the South Extension tract.
- BLM and other federal and state agencies could use this EIS, the Tract III South permit revision package, and the South Extension permit application package to ensure compliance with the terms of the coal lease agreements, Mineral Leasing Act of 1920 (MLA), NEPA, the Clean Water Act, and other federal laws and their attendant regulations.

- **Alternative 1** – Under Alternative 1, the coal contained within the South Extension tract on the Crow Indian Reservation would not be mined if the BIA does not approve the IMDA lease for the South Extension tract.

Furthermore, because the South Extension includes allotted trust lands, the coal contained within the South Extension tract on the Crow Indian Reservation would not be mined if the BIA does not approve all surface use agreements between the allottee surface owners and WRI. WRI would, however, receive approval from MDEQ and OSM to revise Absaloka Mine's existing mine and reclamation plan to include the Tract III Revision area, and that portion of the coal reserves contained within the Tract III Revision area east of Middle Fork Sarpy Creek would be mined (Figure ES-3).

The Tract III Revision area lies completely within Absaloka Mine's currently approved mine permit area and the existing Tract III Coal Lease area. The coal reserve within the Tract III Coal Lease is held in trust by the United States for the Crow Tribe and is part of the Crow Indian Reservation. The economically mineable coal reserves within the Tract III Coal Lease that are on the west side of Middle Fork Sarpy Creek and north of the Crow Indian Reservation boundary are within Absaloka Mine's currently approved mine permit area. However, this block of coal (approximately 4.5 million tons of recoverable coal) is considered mineable only in conjunction with mining the South Extension tract and would not be included in this alternative.

WRI estimates that Alternative 1, involving just the Tract III Revision area east of Middle Fork Sarpy Creek, would add approximately 15 million tons of in-place coal and that approximately 13 million tons of those in-place coal reserves would be recoverable. Annual coal production would be approximately 6.5 to 7.0 million tons per year, and at that mining rate, the life of the mine would be extended to 2011. Employment would be about 171 persons.

Under Alternative 1, Absaloka Mine's permit area would not change, but the area of permitted disturbance would be increased. The following federal and state agency actions would be taken:

- MDEQ would use this EIS and information included in WRI's permit revision package to approve the advancement of surface mining operations at Absaloka Mine into the Tract III Revision area.
- OSM would use this EIS and information included in WRI's permit revision package to concur with MDEQ approval of WRI's permit revision package for the Tract III Revision.
- BLM and other federal and state agencies could use this EIS and the Tract III South permit revision package to ensure compliance with the terms of the coal lease agreements, MLA, NEPA, and other federal laws and their attendant regulations.
- BIA would not approve WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract.

  - OSM would not approve the advancement of surface mining operations at Absaloka Mine from the Tract III Coal Lease into the South Extension tract on the Crow Indian Reservation.

- **Alternative 2 (No Action)** – Under this alternative, WRI would not implement the South Extension development plan if the BIA does not approve the IMDA lease for the South Extension tract. Alternative 2 also assumes that WRI would not receive approval from MDEQ and OSM to revise the existing mining and reclamation plan to include mining the Tract III Revision area. Under the No Action Alternative, the coal contained within the South Extension development area (Figure ES-3) would not be mined at this time.

  Under the No Action Alternative, Absaloka Mine would mine its remaining 14 million tons of in-place coal reserves (as of December 2007) by the end of 2009 at the current 6.5 to 7.0 million-ton annual production rate and average employment would be about 171 persons. The mine would close and final reclamation would be complete by approximately 2012.

Another alternative (Alternative 3) that was considered but not analyzed in detail is the approval of the South Extension coal lease, approval of all surface use agreements between the South Extension tract's allottee surface owners and WRI, and approval of the necessary permits that would allow surface mining to occur on the South Extension tract. WRI would not, however, receive approval from MDEQ and OSM to revise Absaloka Mine's existing mining and reclamation plan to include the Tract III Revision area, and the coal contained within the Tract III Revision area would not be mined. Geologic factors and Absaloka Mine's current mine plan dictate that the Tract III Revision area be mined as part of the South Extension development plan in order to achieve the most efficient recovery of the coal resource and avoid bypassing approximately 17.5 million tons of recoverable coal. If the Tract III Revision area could not be mined as proposed, the existing mining operation could not advance into the South Extension via the Tract III Revision area, resulting in a probable interruption of mining that would jeopardize WRI's coal supply agreements with its customers. Development of an efficient and economically viable mine plan is considered unlikely without including the Tract III Revision area; therefore, this alternative is not analyzed in detail in this EIS.

Table ES-1 summarizes the projected mine permit and surface disturbance areas, coal production, mine life, and employment for the Absaloka Mine. The environmental impacts of mining would be similar under the Proposed Action and Alternative 1, although differ in areal extent and duration.

Table ES-1. Summary Comparison of Permit Area, Surface Disturbance, Coal Production, and Mine Life for the Absaloka Mine and the South Extension Development Plan.

Item	No Action Alternative (Existing Absaloka Mine)	Added by Proposed Action	Added by Alternative 1
Permit Area	7,110 ac	3,316.9 ac	0 ac
Lease Area	≈ 14,000 ac	3,660.2 ac	0 ac
Surface Disturbance Area	4,835 ac	2,637 ac	385 ac
Coal Removal Area (Post-2007)	360 ac	1,771 ac	268 ac
Recoverable Coal (Post-2007)	14 mmt	76.6 mmt	13 mmt
Coal Mined Through 2007	154 mmt	—	—
Average Annual Post-2007 Coal Production	6 – 7 mmt	6 – 7 mmt	6 – 7 mmt
Remaining Life of Mine (Post-2007)	2 yrs	11 – 12 yrs	2 – 3 yrs
Average Number of Employees	171	0	0

Affected Environment and Environmental Consequences

Critical elements of the human environment (BLM 1988) that could be affected by the Proposed Action or Alternative 1 include air quality, cultural resources, Native American religious concerns, Threatened and Endangered (T&E) species, migratory birds, water quality (both surface and ground), wetlands/riparian zones, floodplains, invasive non-native species, and environmental justice. Four other critical elements of the human environment (areas of critical environmental concern, prime or unique farmlands, wild and scenic rivers, and wilderness) are not present in the general analysis area and are not addressed further. In addition to the critical elements that are potentially present in the general analysis area, the EIS discusses the status and potential effects of mining the proposed development plan on topography and physiography, geology and mineral resources, soils, water quantity, alluvial valley floors, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics.

Topography and Geology

The proposed development area is located in the Powder River Basin (PRB), a part of the Northern Great Plains that includes most of northeastern Wyoming and a smaller portion of southeastern Montana. The Absaloka Mine and the South Extension are located near the northwestern edge of the PRB, in an area consisting primarily of dissected rolling hills, plateaus, and ridges of moderate to low relief that formed in the near-flat lying sedimentary strata. Resistant sandstone and clinker beds cap most of the upland areas and form steep cliff escarpments and isolated knobs. Elevations range from about 3,500 to 3,790 feet above sea level, slopes range from nearly flat on the valley bottoms and ridge tops to around 40 and 50 percent on the flanks of the surrounding ridges and hilltops, and approximately 61 percent of the surface has a slope of 10 percent or less.

The three lowermost coal seams of the Tongue River Member of the Fort Union Formation are the Rosebud, McKay, and the Robinson. In the Absaloka Mine area, all younger, stratigraphically higher coal seams have been removed by erosion. In parts of the current mine area, the Rosebud and McKay seams are joined into a single seam referred to as the Rosebud-McKay, which averages 32 feet in thickness. Mining within the proposed development area would be limited to the Rosebud and McKay coal seams. Where not affected by erosion or oxidation, the Rosebud and McKay seams are relatively consistent in thickness throughout the proposed development area. The Rosebud coal seam thickness ranges up to 22.3 feet and averages 17.9 feet. The McKay coal seam thickness ranges up to 16.6 feet and averages 12.5 feet. All or parts of the Rosebud and McKay coal seams have been removed by erosion in the Middle Fork Sarpy Creek drainage bottom (Figure ES-3). Recent alluvial and/or colluvial deposits have replaced the coal in these areas. This feature effectively separates the proposed development area into western and eastern coal reserve blocks. A claystone parting, ranging from less than 1 foot to more than 30 feet and averaging 11.7 feet thick, separates the Rosebud and McKay seams throughout the proposed development area. Mining would remove an average of approximately 70 feet of overburden under the Proposed Action. The Robinson seam, which averages just over 20 feet in thickness, would not be mined in the proposed development area. The Robinson seam lies below and is separated from the McKay seam by approximately 80 to 100 feet of interburden. The Robinson seam was mined in the early years of the mine's operation, but is no longer mined primarily due to customer concerns regarding poor combustion characteristics.

The existing topography on the proposed development area would be substantially changed during mining. A highwall with a vertical height equal to overburden plus coal thickness would exist in the active pits. After reclamation, the postmining topography would be similar to the premining topography, but somewhat gentler and more uniform, and would blend with the undisturbed surroundings. After the coal is removed, highwalls would be eliminated and the land surface would be restored to the approximate original contours or to a configuration approved by MDEQ and OSM during the mine permitting processes. Following reclamation, the average surface elevation on the proposed development area would be slightly lower (approximately 5.5 feet) due to coal removal. The basic drainage network would be retained; however, topographic moderation would include a reduction in microhabitats (e.g., steep bedrock bluffs and escarpments) for some wildlife species and a reduction in habitat diversity, particularly a reduction in woody plant communities and associated habitat values. Absaloka Mine's existing reclamation plan, and the reclamation plan for the proposed development area, includes measures, to the extent possible, to establish wildlife habitat enhancement features, including micro-topographic features. These impacts, which would be greater in those areas characterized as rough breaks, may result in a long-term reduction in the carrying capacity for some species.

No mining would take place within a corridor approximately 500 to 600 feet wide straddling the Middle Fork Sarpy Creek channel, thereby preserving this natural drainage feature. The approximate original drainage pattern of all other tributary streams would be restored. No major changes in the average overland slope are predicted. Any topographic changes would not conflict with regional land use, and the post-mining topography would adequately support anticipated land use.

The geology from the base of the Rosebud-McKay coal to the land surface would be subject to permanent change after the coal is removed under the Proposed Action or Alternative 1. The coal would be removed and the replaced overburden and interburden (backfill) would be a relatively homogeneous, unconsolidated mixture as opposed to the geologically distinct layers of sandstone, siltstone, shale, and coal that currently exist.

No conventional oil and gas wells have been drilled within the proposed development area. About a dozen wildcat exploratory wells drilled within T.1N. and T.1S., R.37E. and T.38E. were all dry holes and subsequently plugged and abandoned without any reported production (MBOGC 2006). The only coal bed natural gas (CBNG) development that currently exists in Big Horn County is at the CX Ranch field located near Decker, which is approximately 50 miles south of the proposed development area. To date, no CBNG development has occurred within the Tract III Coal Lease or the Crow Indian Reservation. No other minerals of economic interest are present in the proposed development area.

Paleontology

No paleontological resource localities have been recorded on lands within the Absaloka Mine's existing permit area, and no significant or unique fossils have been recorded in the proposed development area.

Air Quality

Moderately adverse short-term impacts to air quality would be extended onto the proposed development area during the time it is mined. Under the Proposed Action and Alternative 1, the air quality impacts would be similar to those expected from the existing mining operation. All available particulate emissions data recorded by WRI at the Absaloka Mine indicate that there have been no exceedances of current air quality standards. There would not be additional sources of fugitive dust and there are no proposed changes in the mining methods or rates from the existing approved mine plan. The relative locations of emission sources such as soil removal areas, haul roads, and active pit areas would change, but the numbers and types of sources would not. Air quality dispersion modeling of particulate matter (PM_{10}), nitrogen oxides (NO_X), and sulfur dioxide (SO_2) concentrations within the South Extension development area for the life of the mine predicted that the proposed mining activities would be in compliance with all annual and short-term national ambient air quality standards (NAAQS) and Montana ambient air quality standards (MAAQS). The MAAQS are effective in the area around the Absaloka Mine permit area that is north of the reservation boundary, and the NAAQS are effective on the Crow Indian and Northern Cheyenne Indian Reservations.

Control measures to limit public exposure to emissions from surface mining operations are in place and being implemented at the Absaloka Mine. Employment of these same control measures were assumed in the air quality dispersion model predicting the effects of the mine expansion onto the Crow Indian Reservation. WRI intends to continue implementing these operational measures if the proposed development area is mined.

Public exposure to emissions from surface mining operations is most likely to affect travelers on publicly accessible roads and highway that pass near the mine and occupants of dwellings near the area of mining operations. Figure ES-4 shows the locations of currently occupied residences, public roads and highway, and other publicly accessible facilities in the vicinity of the South Extension development area. There are just two occupied dwellings on or within one mile of the South Extension development area and one non-mine related business within 4.6 miles of the proposed development area. The two dwellings are located within the South Extension development area and the occupants of those dwellings would relocate prior mining. The density of public roads and accessible facilities is very low in the vicinity of the proposed development area.

The impacts to visibility from mining the South Extension development area have been inferred from the currently permitted impacts of mining at the Absaloka Mine. The South Extension development area would be mined as an integral part of the Absaloka Mine. The average annual coal production is anticipated to remain at the current rate of 6.5 to 7.0 million tons, with or without the South Extension development area. Therefore, impacts to visibility under the Proposed Action and Alternative 1 would be similar to the impacts under the No Action Alternative, but they would be expected to continue for up to 12 years longer. Material (soil, overburden, and coal) movement would continue to be accomplished in the same manner using the same equipment, mine facilities described in the current air quality permit would not change, and there are no plans to revise blasting procedures associated with mining the South Extension development area. Long-term and short-term modeling results indicate that the projected mining activities would be in compliance

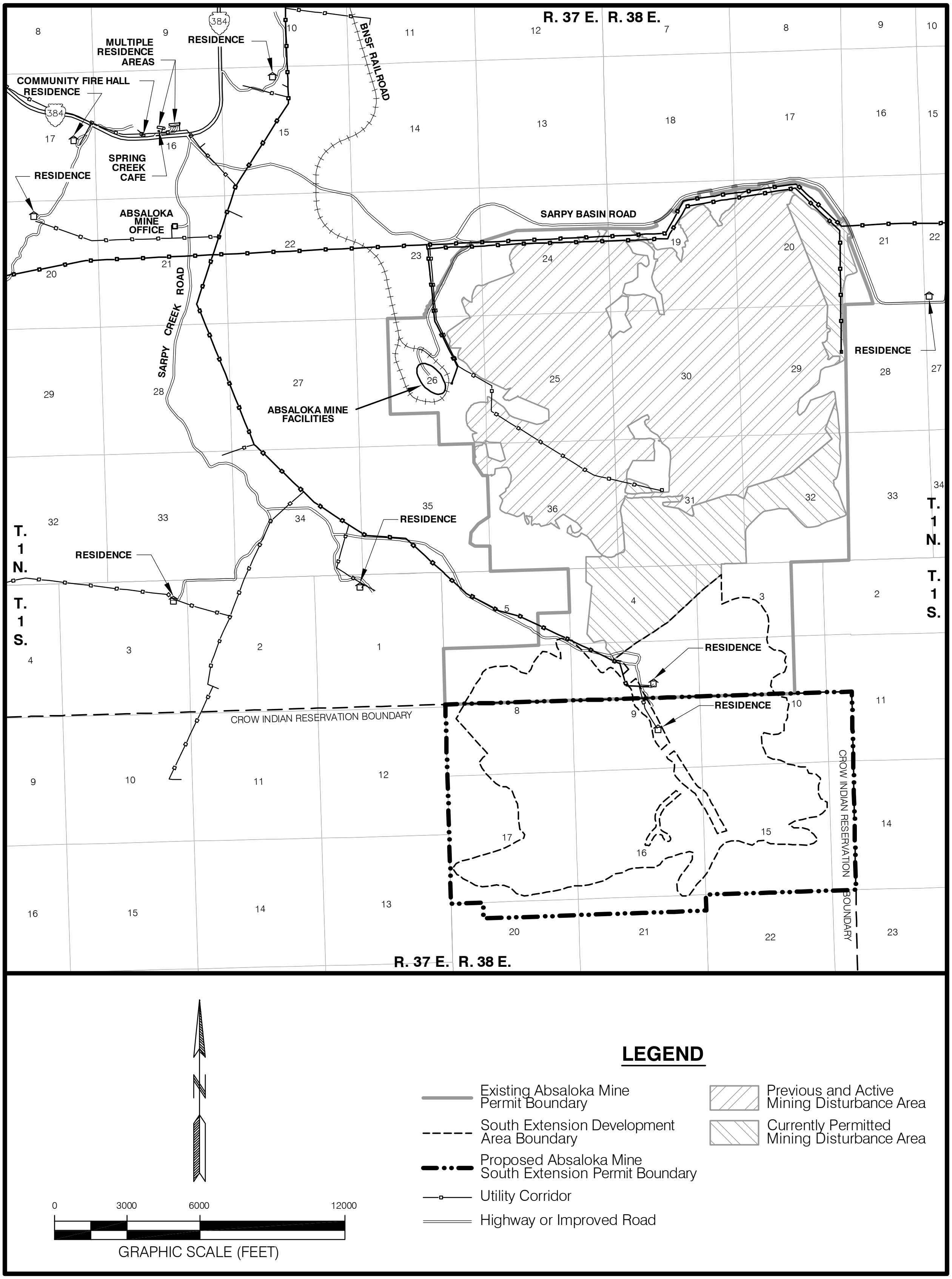

Figure ES-4. Public Roads, Occupied Residences, and Other Publicly Accessible Facilities in the Vicinity of the South Extension Development Area.

with the annual and short-term NAAQS for $PM_{2.5}$ for the life of the Absaloka Mine.

Groundwater

Mining would impact the quantity of the groundwater resource in two ways: 1) the coal aquifer and any water-bearing overburden strata are removed during mining and replaced with unconsolidated backfill after the coal is removed, and 2) water levels in the coal and overburden aquifers adjacent to the mine pits are depressed as a result of seepage into and dewatering from the open excavations in the area of coal and overburden removal. Under the Proposed Action or Alternative 1, the area of coal removal and reclamation would increase at the Absaloka Mine, which would result in an increase in the area of mining-related impacts to groundwater quantity. While there would be variations in hydrologic properties, the time the pits are open, and the distance from mining and dewatering that has occurred as a result of previous mining, the area subject to lower water levels would be increased roughly in proportion to the increase in area affected by mining. Groundwater levels in the overburden and coal were modeled to project the life-of-mine of drawdowns that would result from mining the proposed development area. The predicted five-foot drawdown contour, which is considered to be equivalent to the maximum extent that mine dewatering would extend, for the overburden and Rosebud-McKay coal aquifers is shown on Figures ES-5 and ES-6, respectively. These figures show that the area of drawdown caused by coal and overburden removal would be extended mostly to the east of the active mine area, and drawdowns would be limited by major northeast-southwest-trending geologic faults or areas where the aquifers are not naturally saturated. Groundwater level drawdowns are not expected to extend much beyond the boundary of the proposed mine development area.

The Rosebud and McKay coal seams have been largely eroded away beneath the Middle Fork Sarpy Creek valley and replaced by unconsolidated alluvial and colluvial deposits. A corridor along the drainage bottom, which includes the stream channel, would not be mined, thus preserving the integrity of the Middle Fork Sarpy Creek alluvium and the adjacent and underlying bedrock strata. This would limit impacts to the alluvial aquifer in the drainage and allow surface water in the main channel to flow through this area during mining. Recharge to the alluvial aquifer is primarily from upstream runoff sources, of which only a small portion would be interrupted during mining by the mine's drainage control measures. Some interruption of lateral recharge to the alluvium may occur during mining due to the interception of groundwater in the bedrock aquifers by the pits on either side of the Middle Fork Sarpy Creek drainage bottom. Groundwater flowing through the Middle Fork Sarpy Creek alluvium recharges the sandy sub-Robinson aquifer, which subcrops beneath the alluvial deposits approximately 5,000 feet downstream of the South Extension development area, leaving the alluvium essentially dry downstream from that point. Therefore, discernable impacts due to any

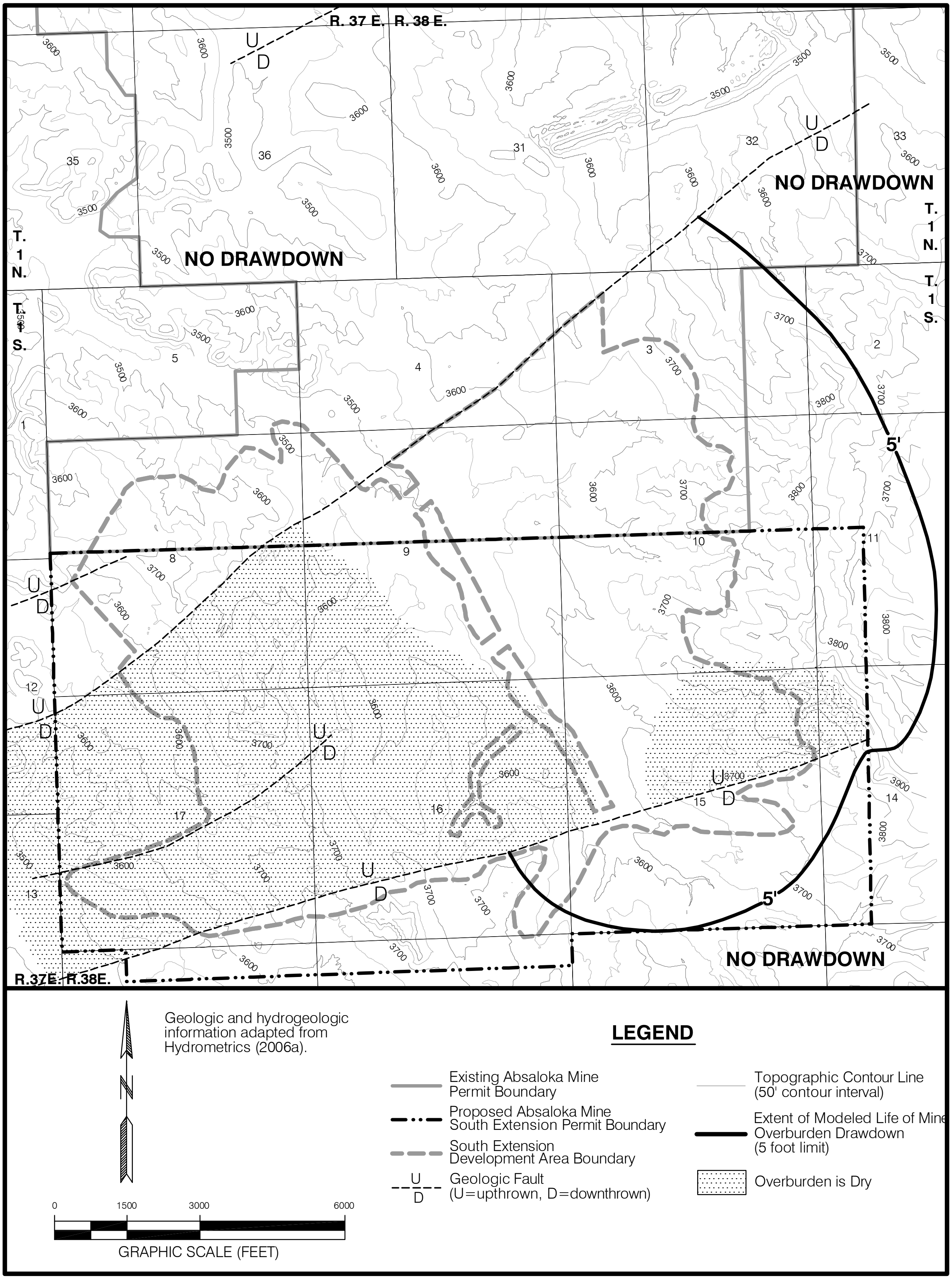

Figure ES-5. Life of Mine Drawdown Map - Overburden, Resulting from Mining the South Extension Development Area.

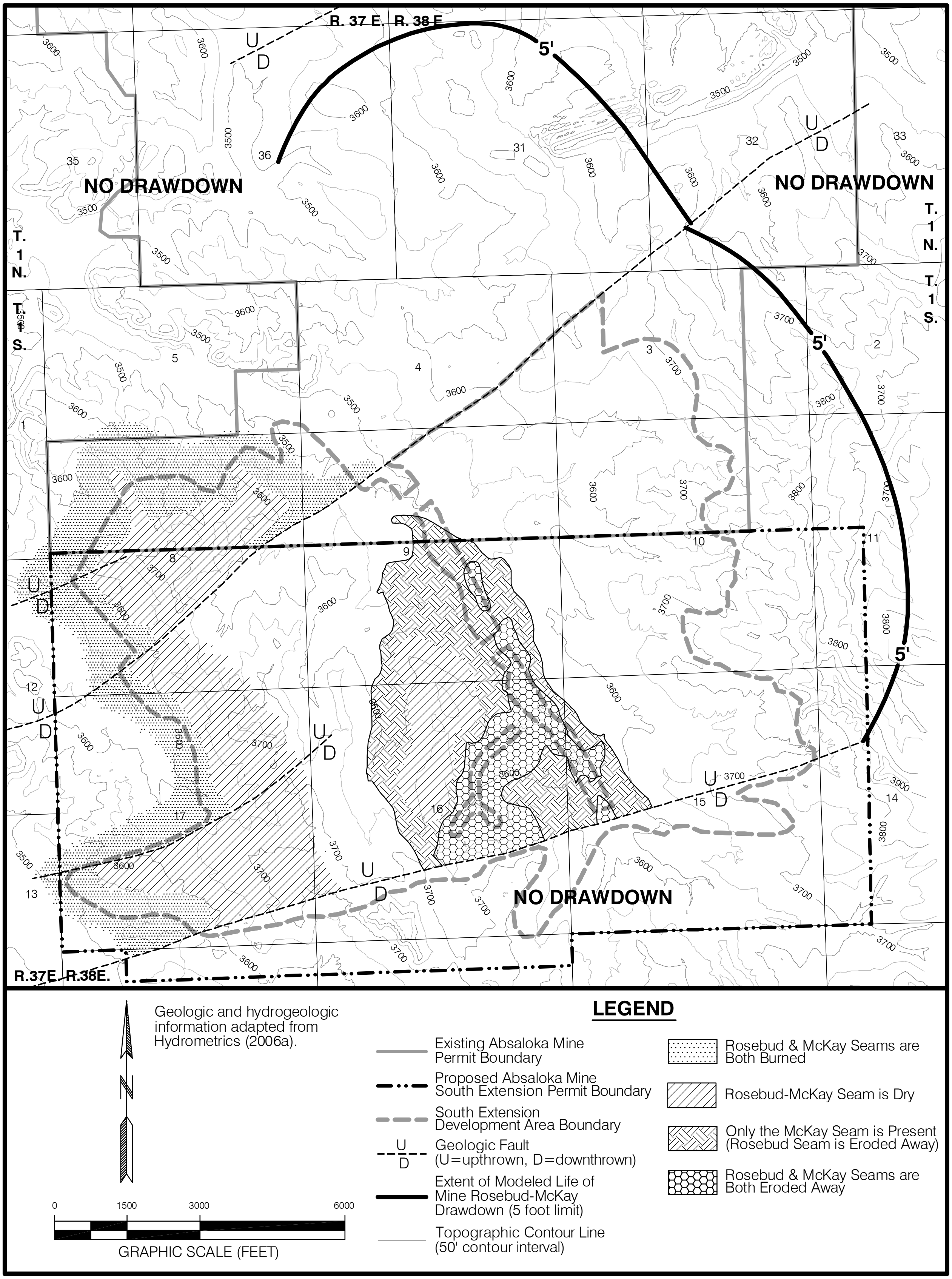

Figure ES-6. Life of Mine Drawdown Map - Rosebud-McKay Coal, Resulting from Mining the South Extension Development Area.

temporary reduction of alluvial groundwater flow during mining would not be expected to extend downstream to the main stem of Sarpy Creek. Once mining is completed, water levels would be reestablished in the adjacent backfill, and lateral recharge to the alluvium would resume. Furthermore, all surface runoff from the reclaimed lands would be reestablished, thus reestablishing that component of recharge to the alluvial aquifer.

The data available indicate that, after reclamation, the backfill would resaturate as potentiometric elevations recover in the surrounding undisturbed aquifers, and that wells completed in the backfill (including in the South Extension development area) would be capable of yields sufficient for livestock watering uses. Groundwater quality within the backfill aquifer in the South Extension development area would be expected to be similar to groundwater quality measured in existing wells completed in the backfill at the Absaloka Mine, and would therefore meet Montana's Class III standard for livestock and wildlife use.

Surface Water

The existing Absaloka Mine permit area and the adjacent South Extension are located entirely within the Sarpy Creek drainage basin. Middle Fork Sarpy Creek, a tributary of Sarpy Creek, drains the majority of the South Extension development area. The extreme western portion of the proposed development area drains directly to Sarpy Creek. Sarpy Creek is intermittent, but all tributary streams in the general analysis area are ephemeral and flow only in response to snowmelt or rainfall events, which is typical for this region. Surface water flows in the channels vary considerably and are dependent on precipitation patterns, the intensity and duration of rainfall and snowmelt events, antecedent soil moisture conditions, vegetation cover, and other factors (i.e., gradient, impoundment storage, etc.), which affect runoff to channels.

The ephemeral/intermittent nature of streamflow affects water quality. Surface water quality in this area typically varies with flow and/or season. Surface water in the vicinity of the Absaloka Mine is used primarily for agricultural purposes (livestock watering), industrial uses (primarily haul road watering), and wildlife. No public or domestic water supplies are known to exist that rely on surface water from the Sarpy Creek drainage.

Springs and seeps are present in some of the tributary drainages in the general analysis area, most of which flow only in response to sustained local recharge. Springs most commonly occur in drainage bottoms and issue from the unconsolidated valley fill deposits where the local alluvial water table intersects the ground surface. Whenever springs do flow, discharge rates are typically quite low (less than one gallon per minute), contributing little or nothing to the overall stream flow. Water from springs normally flows for only a short distance before being lost to evapotranspiration or infiltration back into the streambed. WRI has monitored or observed roughly 50 springs in the general

Absaloka Mine area since 1980, and based on these historical data, no definitive impacts to the flow rate at any monitored spring can be directly attributable to mining. One spring would be physically removed within the proposed development area; however, no flow has been observed at that site since 2002.

Currently permitted and proposed future mining operations would affect a total of about 3,382 acres, or 41.4 percent, of the 8,160-acre Middle Fork Sarpy Creek watershed. Less than 100 acres of the upper Sarpy Creek watershed (excluding any portion of the Middle Fork Sarpy Creek watershed) would be disturbed by the proposed South Extension development plan.

The mining and reclamation plan for the South Extension development area is designed to avoid disturbance to Middle Fork Sarpy Creek and its alluvial deposits by not disturbing a corridor 500 to 600 feet wide that includes the stream channel. No mining disturbance would take place within this corridor except for three road and dragline crossings. The outer edges of the 500 to 600 feet-wide corridor that straddles Middle Fork Sarpy Creek would be no closer than 100 feet from the stream channel; therefore, all surface disturbances would be at least 100 feet away from the channel except at the three crossings. The majority of the mining-related impacts to Middle Fork Sarpy Creek and Sarpy Creek would be the result of disturbances to some of the two streams' unnamed ephemeral tributaries. Flow from upstream areas will pass through the mine, unaltered, and into the lower portion of Middle Fork Sarpy Creek drainage basin. Changes in water quality from these undisturbed areas are therefore not expected.

Changes in surface runoff characteristics and sediment discharges would occur during mining of the South Extension development area as a result of the removal and reconstruction of drainage channels as mining progresses and the use of runoff and sediment control structures to manage discharges of surface water from the mine permit area. Since the South Extension development area would be mined as an extension of the existing mine, there would not be a large increase in the size of the area that is disturbed and not reclaimed at any given time as a result of the Proposed Action or Alternative 1.

The presence of disturbed areas creates a potential that sediment produced by large storms (i.e., greater than the 10-year, 24-hour storm) could potentially adversely impact areas downstream of the mining operation. Mining also affects surface water by reducing runoff during storm and snowmelt runoff events. During these events, water and sediment are intercepted by mine pits or routed to and contained within ponds or impoundments constructed along the perimeter of the mine. Under normal operating conditions, water is detained and released slowly after sediment has settled, or utilized for dust abatement. The net result would be a reduction in surface water runoff and sediment load from the mine area, compared to premining conditions.

Once mining is completed the pits would be backfilled and drainage would be reestablished. Reclaimed ephemeral drainageways would be constructed to approximate the pre-mine condition and blend with the existing drainage system above and below the area disturbed by the mining operation. All surface drainage from reclaimed areas would be controlled using best management practices until the area is sufficiently stable that drainage control is no longer required. Sedimentation rates would be similar to premining conditions, based on modeling results, past experience and monitoring. The proposed mine plan for the South Extension development area avoids disturbance of the Middle Fork Sarpy Creek stream channel; therefore, restoration of surface drainage flow patterns as part of the reclamation plan would be expedited.

Alluvial Valley Floors

Middle Fork Sarpy Creek within and adjacent to the existing Absaloka Mine permit area, downstream of the Crow Indian Reservation boundary, was investigated for the presence of an alluvial valley floor (AVF) in 2004. The study was conducted directly north of the South Extension boundary, although the evaluation gave consideration to the entire upper Middle Fork Sarpy Creek drainage basin. MDEQ and OSM subsequently evaluated the study and determined that Middle Fork Sarpy Creek does not meet AVF criteria downstream of the Crow Indian Reservation boundary. Middle Fork Sarpy Creek within the South Extension tract has not been formally evaluated for the presence of an AVF. Although it can be reasonably concluded that unconsolidated stream laid deposits exist within the drainage bottom, there is no potential for natural or artificial flood irrigation or subirrigation to support agricultural activities.

Wetlands

Based on 1980 U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping, potential wetlands occurred continuously along the length of Middle Fork Sarpy Creek within the South Extension development area. Field surveys of soils and vegetation conducted in 2005 in the proposed development area demonstrate that areas having characteristics of a wetland do occur along the Middle Fork's drainage channel, but are discontinuous and quite limited in extent. The 1980 NWI survey was completed after a series of wet years, and at that time the extent of lush drainage bottom vegetation visible on infrared aerial photographs may have been greater than demonstrated by the 2005 field mapping. This region has experienced a moderate to severe drought cycle that has persisted since 2000.

The mining and reclamation plan for the South Extension development area is designed to avoid disturbance to Middle Fork Sarpy Creek by not disturbing a corridor 500 to 600 feet wide that includes the stream channel. No mining disturbance would take place within this corridor except for three road and dragline crossings over the channel. Therefore, only about one acre of the potential wetlands, as delineated by the presence of both hydric soils and herbaceous drainage bottom vegetation in 2005, would be disturbed at the crossings. WRI's current mine and reclamation permit requires that mitigation measures will be implemented to replace wetland areas that are disturbed or removed by the mining operation. During mining, sediment control structures will act as seasonal wetland areas, and the reclamation plan includes drainage bottom enhancement and enhancement of existing dams and/or ponds for wetlands. EPA, COE, MDEQ and OSM rules require protection and enhancement of important wildlife habitats, and replacement of wetland habitats disrupted by mining is a standard permit requirement. The 0.9 acre of potential wetlands disturbed by the road and dragline crossings over the Middle Fork's channel would be restored when the crossings are removed during reclamation of the South Extension development area and there would be no net loss of wetlands.

<u>Soils</u>

The salvage and redistribution of soils during mining and reclamation cause changes in physical, biological, and chemical properties of the soil resources. In reclaimed areas, soil chemistry and soil nutrient distribution would generally be more uniform, and average topsoil quality would be improved because soil material that is not suitable to support plant growth would not be salvaged for use in reclamation. This would result in more uniform vegetative productivity on the reclaimed land. The baseline soils survey indicates that the amount of suitable soil that would be available for redistribution on all disturbed acres within the soils analysis area during reclamation would vary from 0.5 foot to 5.0 feet. Average redistributed soil thickness would be about 24 inches across the entire reclaimed surface; however, soil redistribution depth would vary to mimic the native undisturbed situation. For example, redistribution depths would increase from hilltops to drainage bottoms, with greater depths in reclaimed drainages to mimic premine conditions. Redistribution depth will generally be more uniform in cropland and pastureland areas. The redistributed soil would support a stable and productive vegetation community adequate in quality and quantity to support the planned postmining land uses of grazing land and some cropland. Wildlife habitat would be a joint land use since wildlife inhabit the area naturally.

<u>Vegetation</u>

Approximately 63 percent of the proposed development area is comprised of native plant communities, with the remainder consisting of agricultural types. The predominant vegetation types, in terms of total acres of occurrence in the vegetation analysis area are grassland (22 percent), shrub/grassland (18 percent), ponderosa pine-grassland (18 percent), drainage bottom (5 percent), and agricultural (13 percent managed for crops and 22 percent managed for pasture). Common plant species on these types include western wheatgrass, green needlegrass, needle-and-thread, little bluestem, bluebunch wheatgrass, prairie sandreed, sand bluestem, Idaho fescue, snowberry, cordgrass, Nebraska sedge, cattail, bulrush, Woods' rose, silver sagebrush, skunkbush sumac, chokecherry, hawthorn, wild plum, serviceberry, ponderosa pine, boxelder, dryland alfalfa-grass hay, winter wheat, barley, and crested wheatgrass. Mining would progressively remove this vegetation. Reclamation, including revegetation of mined areas, would occur contemporaneously with mining on adjacent lands. In an effort to approximate premining conditions, reestablished vegetation types would reflect premine land uses and allow a reasonable comparison of relative land use valuations. Accordingly, the mine's currently approved revegetation plan emphasizes establishment of native grassland vegetation types to support grazing by domestic livestock. The objective of the reclamation plan is to establish grassland vegetation that is diverse, effective, and permanent; composed of species that are native to the area; at least equal in extent of cover to the natural vegetation of the area; and capable of stabilizing the soil surface to control erosion similar to pre-mining conditions. Reclamation of cropland would be at a similar percentage to premine cropland acreage. Overall, native plant communities would increase in extent and agricultural types would be similar in extent after mining and reclamation are complete.

Wildlife habitat is not a primary post-mining land use; however, wildlife use would occur jointly with the primary land uses. To promote topographic and vegetative diversity in the short and long term for the benefit of wildlife, the reclamation plan would include establishment of wildlife habitat enhancement features in combination with the primary land uses. Ponds and seasonal wetlands are expected to revegetate naturally, but appropriate wetland species would be seeded or planted if necessary. Woody plant sites would be established in upland areas and along reclaimed drainageways where topographic position, aspect, and configuration serve to provide an enhanced moisture regime. Species of trees and shrubs to be planted would reflect the site characteristics. The reclamation strategy for long-term woody plant establishment is construction of suitable sites in the reclaimed landscape, planting of seedlings on those suitable sites, inclusion of shrub species in the seed mix, and direct haulage and redistribution of soils supporting shrub growth prior to mining. By providing suitable sites and a base population of woody species, tree and shrub density, vegetation diversity, and vertical structure will increase with time. A reduction in shrubs would result in a long-term reduction of habitat carrying capacity for some species and may delay use of the reclaimed area by shrub-dependent species. Greater dominance of native grass species will increase livestock grazing capacity.

Following completion of reclamation (seeding with the approved seed mixture) and before release of the reclamation bond (a minimum of 10 years), a diverse, effective, and permanent vegetative cover would be established on the proposed development area. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas, and the proposed postmining land use of grazing land should be achieved even with the changes in vegetation composition and diversity. The reclamation plans would also include steps to control invasion by weedy (invasive, nonnative) plant species.

In an undisturbed condition, the major vegetation types in the general Absaloka Mine area provide habitats for many species. Predominant wildlife habitat types classified in the proposed development area and adjacent area correspond with the major plant communities identified during the vegetation baseline study and consist primarily of grassland, shrub/grassland, and ponderosa pine-grassland. Other habitats present in limited extent include drainage bottom (riparian), cropland, special use pasture, disturbance, rock outcrops, and open water. No designated critical, crucial, or unique habitats are present.

Wildlife

Mining directly and indirectly impacts local wildlife populations. These impacts are both short term (until successful reclamation is achieved) and long term (persisting beyond successful completion of reclamation). 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 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, or occupy poorer quality habitat than that from which they were displaced. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. Indirect impacts are longer term and include alterations in the topography and vegetative cover, particularly the reduction in shrub density, and could cause a decrease in carrying capacity for some species and a decrease in vegetation diversity. Trees and shrubs would gradually become reestablished on the reclaimed land, but the topographic changes would be permanent. Microhabitats may be reduced on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in shrub density.

Threatened and Endangered Species

At this time, Threatened and Endangered (T&E) species that could potentially occur in the area (Big Horn, Rosebud, and Treasure counties, Montana) include the least tern and black-footed ferret, both of which are designated as endangered. The bald eagle was removed from the USFWS list of T&E species, effective August 8, 2007, but prior to that date it was the only listed T&E species that had been observed in the Absaloka Mine area. Suitable habitat for the least tern and black-footed ferret is not available on or near the South Extension development area. The only T&E plant species that could potentially occur in the area is the Ute ladies'-tresses. This plant has not been documented in southeastern Montana and was not found on the proposed development area during baseline field studies. USFWS has reviewed the proposed development area and does not anticipate impacts to any threatened, endangered, candidate, or proposed plant or animal species or their identified critical habitats, and no further review under Section 7 of the Endangered Species Act is necessary.

Land Use

The surface of the Tract III Revision area is owned by WRI, and the surface of the South Extension is owned by the Crow Tribe (32 percent), allotted Indian owners (14 percent), and non-Indian fee owners (54 percent). All trust surface estate (Tribal acres and individual allotted acres) within the Crow Reservation South Extension tract is currently leased for agricultural uses. Through its IMDA lease agreement for the South Extension, WRI has the right of surface use for mining on Tribal lands. WRI has negotiated surface use agreements with the allotted Indian owners and the largest fee surface owner, and negotiation with the remaining fee surface owner is in progress.

Premining land use within the Absaloka Mine area, including the proposed development area, includes grazing land, pastureland (for grazing or occasional hay production), cropland (primarily dryland alfalfa and small grains) and associated land use support facilities such as building complexes, stock reservoirs, and roads. The impacts on land use as a result of leasing and mining the proposed development area would be the temporary reduction of livestock (cattle) grazing and crop production, incremental loss of wildlife habitat (particularly big game) while the area is being mined and reclaimed, and alteration of wildlife habitat after reclamation. Livestock grazing, and to a lesser extent wildlife use, would be displaced while the area is being mined and reclaimed. Access for ranching and other (i.e., recreational) activities would be restricted during mining operations. The loss of accessibility to lands within the area is long term (during mining and reclamation), but is not permanent. Unless otherwise provided for in agreements between the State of Montana and the Crow Tribe, big game hunting within the Crow Reservation boundary is limited to tribal members only. Hunting on the proposed development area would not occur during mining and reclamation. Following reclamation, the land would be suitable for grazing by domestic livestock or occasional hay production (i.e., grazing land, pasture land, and crop land), which are the historic land uses.

Cultural Resources

The Tract III Revision area and the South Extension tract have been surveyed for cultural resources at the Class III level. A total of 62 cultural sites were documented in three separate survey areas that covered the proposed development area and additional adjacent lands. Of the 62 cultural sites, 46 are prehistoric, seven are historic, seven are multi-component, one is a cairn of unknown age, and one is a rock shelter of unknown age. Disturbance associated with the Proposed Action would impact 30 cultural sites, whereas disturbance associated with Alternative 1 would disturb six cultural sites. All cultural sites within the entire South Extension development area have been evaluated for National Register of Historical Places (NRHP) eligibility. Eight sites recommended eligible to the NRHP would be impacted by disturbance associated with the Proposed Action, and no NRHP eligible sites would be impacted by disturbance associated with Alternative 1. One of the eight NRHP eligible sites has been mitigated to date.

Because this proposed project is located in traditional Crow territory and a portion of the proposed development area is within the boundaries of the Crow Indian Reservation, Crow tribal representatives participated in the cultural resource inventory and site evaluations. Cultural properties that are determined to be eligible for the NRHP would be avoided or, if avoidance is not possible, a data recovery plan would be implemented prior to disturbance. Such plans would be drafted in consultation with Crow Tribal Historic Preservation Office (THPO), the Montana State Historic Preservation Office (SHPO) and the BIA. Any other tribes who have expressed an interest in these sites would also be consulted when preparing plans.

Based on recent cultural resource inventories and site evaluations, no Native American heritage, traditional cultural, special interest, or sacred sites have been formally identified and recorded to date within the proposed development area. BIA and MDEQ are conducting Native American consultation and coordination on the South Extension development plan as part of the NEPA and MEPA environmental analyses required for this EIS. Indian Tribes that have been identified as potentially having concerns about actions at the Absaloka Mine will be provided with more specific information about the known cultural sites in the proposed development area, if requested. Their help is being requested in identifying potentially significant religious or cultural sites in the proposed development area before approval of WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract. This consultation is also required pursuant to the National Historic Preservation Act, Archaeological Resources Protection Act, and American Indian Religious Freedom Act.

Visual Resources

The natural scenic quality in and near the immediate South Extension development area is fairly high due to its relatively remote location, and the natural character of the landscape has not been materially altered. No visual resources that are unique to this area have been identified on or near the proposed development area. The Absaloka Mine facilities and mining activities are not visible from Montana Highway 384. Under the currently approved mine plan, mining has not approached this public road and is not visible to passers-by. The relocated Sarpy Basin Road runs along the northern boundary of the current mining operations. Under the currently approved mine plan, mining has approached this public road and is visible to passers-by. Most of the traffic on Highway 384 and the Sarpy Basin Road is associated with the Absaloka Mine and the local ranching community. The proposed development area is located over 2.5 miles from both of these public roads and is not visible to the general public from either road due to the area's moderately rugged terrain.

Noise

Because mining is already ongoing in the area, noise impacts would not be noticeably different than existing conditions off-site. The nearest public facilities are the Spring Creek Café and a community Fire Hall that is located close to the café. The nearest occupied dwellings are two residences located within the proposed development area. The residents of these two dwellings would relocate prior to mining. The next closest occupied dwelling to the proposed development area is a single residence that is located more than 6,000 feet from the proposed development area. Figure ES-4 depicts the locations of occupied residences and public facilities with respect to the South Extension development area. There would be no adverse noise impacts since mining activities (particularly blasting) would occur nearly 5 miles from the nearest public facilities and over a mile from the closest occupied dwelling.

Transportation

Since the proposed development area would be an extension of the Absaloka Mine operations, mining of the Tract III Revision area and South Extension would extend the length of time by 3 to 12 years, depending on which alternative is implemented, that coal is shipped from the mine using existing coal transportation facilities. The existing railroad infrastructure would be used to transport coal to utility customers in the Upper Midwest region of the United States, and the transportation of coal from the mine to the Hardin Generating Station, located at Hardin, Montana, via Montana Highway 384 would not change. Vehicular traffic to and from the mine would continue for an additional 3 to 12 years.

Socioeconomics

The Absaloka Mine is unique from other Montana surface coal mines in that the coal reserves being mined are held in trust by the United States for the Crow Tribe. As a result, all royalties and production taxes from this in-trust coal are paid directly to Crow Tribe. Production taxes are collected by the tribe at a rate similar to mineral severance and gross proceeds taxes collected by the state. The State of Montana receives only corporate income tax revenues and Resource Indemnity Trust tax from WRI, as well as personal income taxes from mine employees. Big Horn County receives only property tax revenues from the Absaloka Mine. Aggregate coal royalty and production taxes paid to the Crow

Tribe from Absaloka Mine's production in 2006 were $16.6 million. If the IMDA lease for the South Extension is approved by the BIA and the South Extension development plan is permitted and mined, the potential annual aggregate revenues paid to the tribe from the Absaloka Mine (using coal tonnages shown in Table 3-1) would continue for from five up to 15 additional years (post 2007), depending on which alternative is selected. If the proposed development area is leased and mined under the Proposed Action, the total potential additional tribal revenues (post 2009) would be approximately $200 million through year 2021. Under Alternative 1, the total potential additional tribal revenues would be about $33 million through year 2011.

Approval of the South Extension development plan would extend the life of the Absaloka Mine, and current employment at the mine (approximately 170 persons), from two to as many as 12 years at the current rate of production, depending on which alternative is selected. The number of employees would then decline during final reclamation phase, which would occur over about a two-year period, until all jobs have been completed. The Absaloka Mine has employed between 70 and 130 Crow tribal members, depending on variable annual levels of production at the mine.

<u>Environmental Justice</u>

With regard to Environmental Justice issues, it was determined that no significant adverse human health or environmental effects are falling disproportionately on minority or low-income populations as a result of current mining activities at the Absaloka Mine. Consequently, implementation of the proposed South Extension development plan would extend the current health and environmental effects created by the Absaloka Mine, but not adversely affect the environmental justice considerations in the area. The loss of employment opportunities and royalty and tax revenues as a result of the Absaloka Mine's early closure could have significant social and economic impacts within the Crow Indian Reservation and Big Horn County. The Crow Tribal Administration views leasing of tribal coal reserves as a way for the tribe to raise money to save its land base and to enhance the tribe's ability to govern itself. If the tribe can generate its own revenues, it can determine how that money is spent and will no longer have to depend on the federal government to address problems.

There may, however, be disparate views among both tribal and non-tribal members of the local communities. 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. Attitudes toward coal development are complex. The population is largely rural with strong ties to the land and to the small communities. Residents generally value the rural character of their lifestyles, including appreciation of the natural landscapes, fresh air, and solitude. The Crow place high value on natural resources, and hold sacred many landscapes and places. By treating all things in a respectful way, they can continue to survive. Tribal members who have a strong desire to preserve many elements of their heritage often do not wish to become integrated into the non-Indian culture. In addition, those members of the tribe who oppose the Proposed Action may feel that not all tribal members would receive equal benefits of development.

No Action Alternative (Alternative 2)

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal and associated impacts would not occur within either the Tract III Revision area or the South Extension. Mining operations and associated impacts would continue as permitted on the Absaloka Mine's permit area for about 2 years (post 2007), or until about 2009. Under the No Action Alternative, Absaloka Mine would mine its remaining 14 million tons of in-place coal reserves (as of December 2007) by the end of 2009 at the current 6.5 to 7.0 million-ton annual production rate and average employment would be about 171 persons. Revenue to the Crow Tribe from royalties and production taxes on coal would cease after 2009. The mine would close and final reclamation would be complete by approximately 2012. The impacts described in the preceding paragraphs to topography and physiography, geology and minerals, air quality, water resources, AVFs, wetlands, soils, vegetation, wildlife, T&E species, land use, cultural resources, visual resources, noise, transportation, and socioeconomics would occur on the existing Absaloka Mine permit area, but these impacts would not be extended onto the proposed South Extension development area.

Mitigation

Absaloka Mine's currently approved mining permit includes extensive baseline information, ongoing monitoring information and commitments, and mitigation measures that are required by the Surface Mining Control and Reclamation Act of 1977 (SMCRA) and Montana State Law. Compliance, mitigation, and monitoring measures that are required by regulation are considered to be part of the Proposed Action and Alternative 1 considered in this EIS. These regulatory requirements, mitigation measures and monitoring commitments are in place for the No Action Alternative as part of the currently approved mining and reclamation plan for the existing Absaloka Mine and would be included in the MDEQ and OSM permitting processes that would be required to mine the South Extension development area.

Cumulative Impacts

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts can result from individually minor, but collectively significant, actions occurring over time. Several existing NEPA documents discuss the cumulative impacts of energy development in the Montana Powder River Basin (PRB). The Bureau of Land Management (BLM) completed two regional Resource Management Plans (RMPs) (Billings and Powder River) in the mid-1980s and the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* in 2003 evaluating the potential cumulative impacts of surface coal development and coal bed natural gas (CBNG) development. Since the regional RMPs and the Montana Statewide Oil and Gas FEIS were prepared, BLM has prepared a Draft Supplement to the Oil and Gas EIS and a number of NEPA analyses evaluating CBNG development proposals in the northern PRB. Each of these NEPA analyses includes an analysis of cumulative impacts. The BLM is currently merging the Powder River and Big Dry RMPs into one comprehensive plan called the Miles City Field Office RMP, which is scheduled for completion in 2007 or 2008.

The BLM is also completing a regional technical study, called the PRB Coal Review, to help evaluate the cumulative impacts of coal, coal-related, and other industrial development in the PRB. The study evaluates current conditions as a baseline year (2002 or 2003) and projects development levels and potential associated cumulative impacts related to coal and coal-related development, oil and gas and oil- and gas-related development, and other development through 2020. The Wyoming portion of the PRB is the primary focus of the PRB Coal Review reports, but the Montana portion of the PRB is included in some studies. The results of the PRB Coal Review and the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* and the Draft Supplement of that study are summarized in Section 4.0 of this EIS.

Absaloka Mine has operated since 1974, and the associated environmental and socioeconomic impacts are established. With regard to analyses of cumulative impacts of projected energy resource development in the Montana PRB going forward, Absaloka Mine and its associated impacts are thus part of the existing environment. Absaloka Mine is relatively remote from other energy projects in this area; the Rosebud Mine and Colstrip generating units are 20 miles to the east at Colstrip, the Hardin Generating Station is located 30 miles to the west at Hardin, and the nearest CBNG activity is near Decker, 50 miles to the south. Cumulative impacts of the proposed South Extension development are, therefore, largely local in scope and a function of area disturbed and extended mine life related to past and present mining at Absaloka Mine.

Cumulative impacts vary by resource, with potential impacts to air quality, groundwater quantity, surface water quality, wildlife habitat, and socioeconomics generally being the greatest concerns.

The PRB Coal Review air quality study documents the modeled air quality impact of existing operations during 2002 and of projected development activities in 2010. The existing regional air quality conditions generally were very good, but showed some impacts of PM_{10} emissions within the near-field receptors of Montana for the baseline year (2002) and for both coal development scenarios (upper and lower) for 2010. The modeling analysis also showed some impacts on visibility at the nearby Class I and sensitive Class II areas. The modeled visibility impacts for the baseline year and the two production scenarios for 2010 were projected to be greater for the Northern Cheyenne Indian Reservation than for the Crow Indian Reservation.

With respect to the Absaloka Mine, the nearest industrial sources of air emissions are at Colstrip, Montana, 20 miles to the east. Emissions of fugitive dust and vehicle exhaust at Absaloka Mine would continue at current levels, although the locations of such emissions within the mine would change over time. Implementation of the South Extension development plan would not result in cumulative impacts to air quality relative to current impacts from the Absaloka Mine or from other sources.

Surface coal mining and the development of CBNG resources have the potential to produce cumulative impacts to groundwater resources, particularly the Fort Union coal beds, when compared to the existing environment. Dewatering and the resulting drawdown of coal seam aquifer water levels are the unavoidable impacts of mining and CBNG development. Currently, all of the commercially producing CBNG wells in the State of Montana are located near Decker, Montana, approximately 50 miles south of the Absaloka Mine. There are no overlapping groundwater impacts from the Absaloka Mine and CBNG development in the Montana PRB at this time; however, should CBNG production in the Rosebud-McKay coal be developed in the general area to the northeast of the Absaloka Mine sometime in the next 11 to 12 years, dewatering-associated drawdown would be expected to occur. Groundwater impacts from CBNG development and surface coal mining would be additive in nature, and that addition of CBNG development would likely extend the area experiencing drawdown to the east of the mining area.

There are no other active or proposed surface coal mines in the Sarpy Creek drainage basin, and because no other mines share an interconnected groundwater system, there would be no cumulative effects from mining to the post-mining groundwater regimes in the Sarpy Creek watershed. In addition, each surface coal mine must assess the probable hydrologic consequences of mining as part of the mine permitting process. MDEQ and OSM must evaluate the cumulative hydrologic impacts associated with each proposed mining operation before approving the mining and reclamation plan for each mine, and must find that the cumulative hydrologic impacts of all anticipated mining would not cause material damage to the hydrologic balance outside of the permit area for each mine. As a result of these requirements, each existing approved mining permit includes an analysis of the hydrologic impacts of the surface coal mining proposed at that mine. If revisions to mining and reclamation permits are proposed, then the potential cumulative impacts of the revisions must also be evaluated.

The proposed South Extension development area would be an extension of the existing Absaloka Mine and is entirely within the Sarpy Creek watershed. The closest active surface mining disturbance to the Absaloka Mine is approximately 20 miles to the east at the Rosebud Mine. Due to the distance between these operations, and the fact that they are in two different watersheds, there would not be overlapping surface water impacts. No other reasonably foreseeable surface mining developments within the Sarpy Creek watershed have been forecasted. Currently, there is no CBNG production in the Sarpy Creek drainage basin. The development of CBNG resources in the Sarpy Creek watershed could potentially increase surface flow and affect surface water quality in the drainage.

The cumulative impacts on wildlife resulting from the reasonably foreseeable development activities in the Montana PRB include the direct loss of wildlife populations from vehicular collisions, habitat loss, alteration or fragmentation of habitat, or animal displacement by greater human access into previously untraveled areas. Indirect impacts could include disturbance and displacement, noise, stress from human presence, noxious weed invasion, changes in hydrologic or water quality conditions, and increased poaching. Cumulative impacts to most wildlife would increase as additional habitat is disturbed. These impacts would moderate as land is reclaimed. Impacts to wildlife can be classified as short term and long term. Potential short-term impacts are related to habitat disturbance during project development and operation. Potential long-term impacts result from permanent changes to habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects, such as power plant facilities and rail lines.

In 2005, total Montana PRB coal production was approximately 32.6 million tons, which was about 3.5 percent of the coal mined in the United States that year. Total coal production in 2006 from the Absaloka, Rosebud, Spring Creek, and Decker Coal mines was 41.1 million tons. These four surface mines employed a total of 887 people and the estimated payroll was $62,746,000 in 2006. The Absaloka Mine is unique among Montana surface coal mines in that coal reserves being mined are almost entirely held in trust for the Crow Tribe. As a result, all royalties and production taxes from this in-trust coal within the current mine area are paid directly to the tribe, and the majority of workers employed at the mine are Crow tribal members.

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Abbreviations and Acronyms Used in this Report

AAQS	Ambient Air Quality Standards
ac	acre
ac-ft	acre-foot, acre-feet
ac-ft/yr	acre-foot per year, acre-feet per year
ANC	acidification neutralization capacity
ANFO	ammonium nitrate fuel oil
APD	Application for Permit to Drill
APLIC	Avian Power Line Interaction Committee
ARM	Administrative Rules of Montana
ARMB	Air Resources Management Bureau
AUM	animal unit month
AVF	alluvial valley floor
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
bcf	billion cubic feet
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe
B.P.	before present
BTCA	Best Technology Currently Available
Btu	British thermal units
Btu/lb	British thermal units per pound
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CBM	coal bed methane
CBNG	coal bed natural gas
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHIA	Cumulative Hydrologic Impact Assessment
CO	carbon monoxide
CO_2	carbon dioxide
COE	U.S. Army Corps of Engineers
CPC	Climate Prediction Center
CWA	Clean Water Act
dBA	A-weighted decibels
DEIS	Draft Environmental Impact Statement
DNRC	Department of Natural Resources and Conservation
DOE	Department of Energy
DOI	Department of the Interior
dv	deciview, a measure of view impairment
EA	Environmental Assessment
EC	electrical conductivity
EIS	Environmental Impact Statement
EDA	Economic Development Administration
EPA	Environmental Protection Agency
ESA	Endangered Species Act

Abbreviations and Acronyms Used in this Report

F	Fahrenheit
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FIP	Federal Implementation Plan
FR	Federal Register
ft	feet, foot
g	gram
gpm	gallons per minute
HAP	hazardous air pollutant
hr	hour
HRDC	Human Resources Development Council
IEMB	Industrial and Energy Minerals Bureau
IHS	Indian Health Service
IMDA	Indian Minerals Development Act
ITA	Indian Trust Asset
km	kilometers
kV	kilovolts
lb	pounds
LRMP	Land and Resource Management Plan
MAAQS	Montana Ambient Air Quality Standards
MAQP	Montana Air Quality Permit
MBMG	Montana Bureau of Mines and Geology
MBOGC	Montana Board of Oil and Gas Conservation
µeq/L	microequivalents per liter
µg/m^3	micrograms per cubic meter
µmhos/cm	micromhos per centimeter
MCA	Montana Code Annotated
MCC	Montana Coal Council
MCL	maximum contaminant level
MDEQ	Montana Department of Environmental Quality
MEPA	Montana Environmental Policy Act
mg/L	milligram per liter
MFWP	Montana Fish, Wildlife and Parks
MLA	Mineral Leasing Act of 1920
mm	million
mmbo	million barrels of oil
MMS	Minerals Management Service
mmt	million tons
mmtpy	million tons per year
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPDES	Montana Pollutant Discharge Elimination System
mph	miles per hour
MSHA	Mine Safety and Health Administration
MSUMRA	Montana Strip and Underground Mine Reclamation Act
MTNHP	Montana Natural Heritage Program
MW	megawatt
NAA	non-attainment area
NAAQS	National Ambient Air Quality Standards

Abbreviations and Acronyms Used in this Report

NCDC	National Climate Data Center
NDMC	National Drought Mitigation Center
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	new source review
NWI	National Wetlands Inventory
NWSRS	National Wild and Scenic River System
O_3	photochemical oxidants (ozone)
OSHA	Occupational Safety and Health Administration
OSM	Office of Surface Mining Reclamation & Enforcement
Pb	lead
PEC	passive emission control system
PHC	probable hydrologic consequence
$PM_{2.5}$	particulates finer than 2.5 microns in effective diameter
PM_{10}	particulates finer than 10 microns in effective diameter
PMT	postmining topography
POD	Plan of Development
ppm	parts per million
PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
RHR	Regional Haze Rule
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
SAR	sodium absorption ratio
SARA	Superfund Amendment & Reauthorization Act of 1986
SEA	Section of Environmental Analysis
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SIL	Significant Impact Levels
SIP	State Implementation Plan
SMCL	secondary maximum containment level
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO_2	sulfur dioxide
STB	Surface Transportation Board
TCF	trillion cubic feet
TCP	Traditional Cultural Properties
TDS	total dissolved solids
T&E	threatened and endangered
THPO	Tribal Historic Preservation Office

Abbreviations and Acronyms Used in this Report

TMDL	total maximum daily load
tpy	tons per year
TRRC	Tongue River Railroad Company
TSP	total suspended particulates
TSS	total suspended solids
U.S.	United States
USC, U.S.C.	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USEIA	United States Energy Information Administration
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOCs	volatile organic compounds
WAAQS	Wyoming Ambient Air Quality Standards
WDEQ	Wyoming Department of Environmental Quality
WRI	Westmoreland Resources, Inc.
yr	year

1.0 INTRODUCTION

This Environmental Impact Statement (EIS[1]) analyzes the environmental and socioeconomic impacts of advancing surface coal mining operations at the Absaloka Mine, an operating surface coal mine in Big Horn County, Montana. In 2004, Westmoreland Resources, Inc. (WRI), owner of the Absaloka Mine, entered into an Exploration and Option to Lease Agreement with the Crow Tribe under the Indian Mineral Development Act (IMDA) for a coal reserve area encompassing approximately 3,660 acres on the Crow Indian Reservation south of and adjacent to WRI's existing Tract III Coal Lease. Exploration drilling programs were conducted in 2004 and 2005, and tonnage and quality of coal were confirmed. WRI exercised its lease option on June 1, 2006, for this coal reserve within the reservation, which WRI refers to as the proposed Absaloka Mine Crow Reservation South Extension (referred to herein as the South Extension). Figure 1-1 shows the locations of the current Absaloka Mine operation, the Tract III Coal Lease, and the proposed South Extension lease tract.

Absaloka Mine's current permit area is almost entirely within the Tract III Coal Lease, extending to the Crow Indian Reservation boundary (Figure 1-1). However, the Tract III Coal Lease contains coal reserves that are not yet included within the currently approved mining plan. WRI has filed an application with the Montana Department of Environmental Quality (MDEQ) and the Federal Office of Surface Mining Reclamation and Enforcement (OSM) to revise its existing permits to mine these additional reserves. The Tract III South permit revision is referred to herein as the Tract III Revision. Figure 1-1 also shows the location of the Tract III Revision area. WRI wishes to maximize coal recovery and ultimately facilitate an orderly advancement of mining operations into the South Extension. For purposes of this EIS, WRI's proposed Tract III Revision is considered an integral part of the proposed South Extension development plan.

These proposals by WRI would require various approvals and permits by federal and state agencies with Indian trust, coal mine permitting and other regulatory responsibilities. This EIS constitutes compliance with the requirements of both the National Environmental Policy Act of 1969 (NEPA) and the Montana Environmental Policy Act (MEPA) to support those possible approvals and permitting actions. A general background on the project, the purpose and need for the project, regulatory authorities and responsibilities for approval and permitting, and agency consultation and coordination activities are described in the following sections.

1.1 Background

The existing Absaloka Mine is located approximately 30 miles east of Hardin, Montana, in the Sarpy Creek area of northeastern Big Horn County (Figure 1-2). The mine is owned by WRI, which is an 80 percent subsidiary of Westmoreland Coal Company.

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

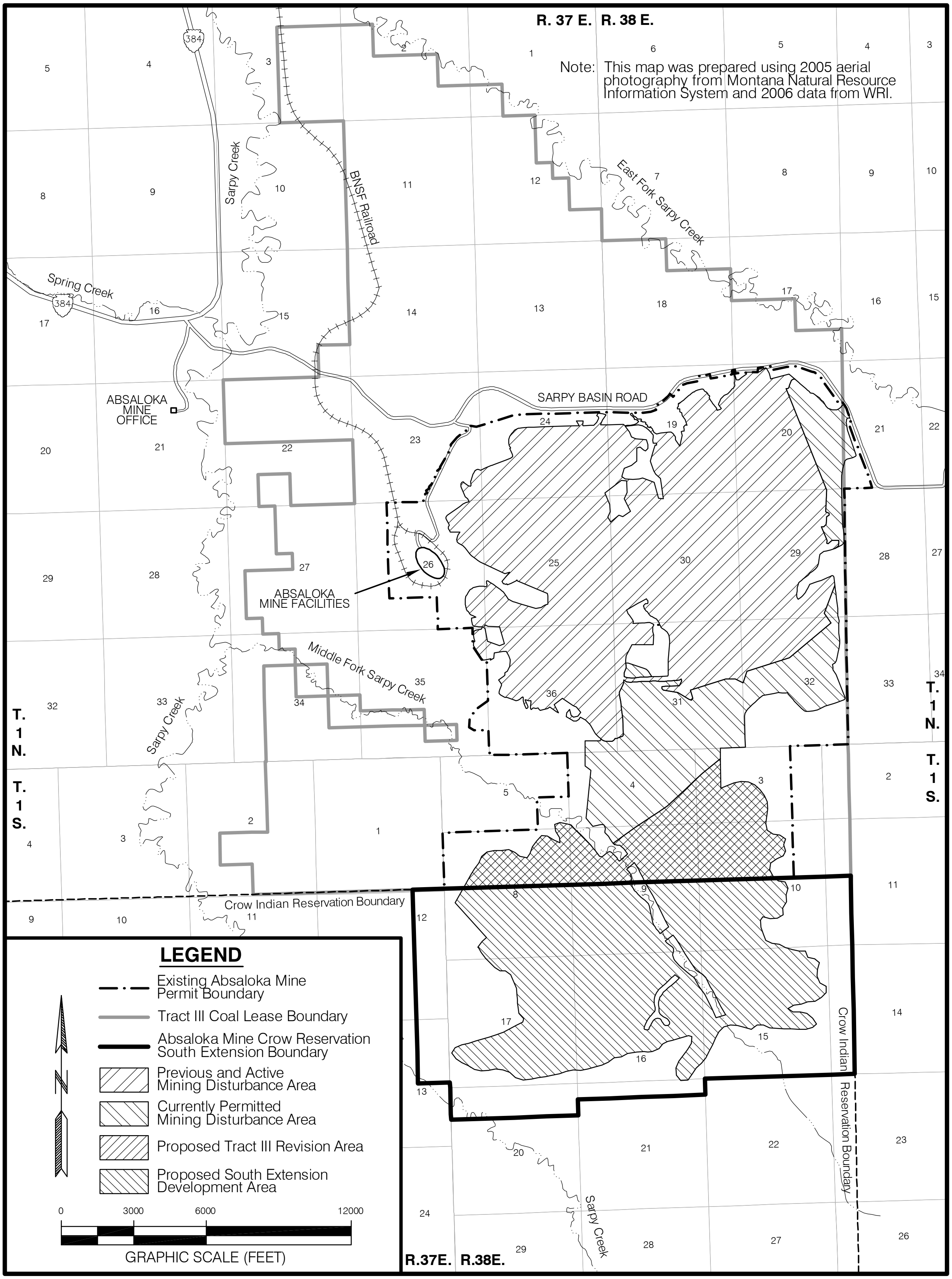


Figure 1-1. Locations of the Current Absaloka Mine Operation, the Tract III Coal Lease, the Tract III Revision Area, and the South Extension.

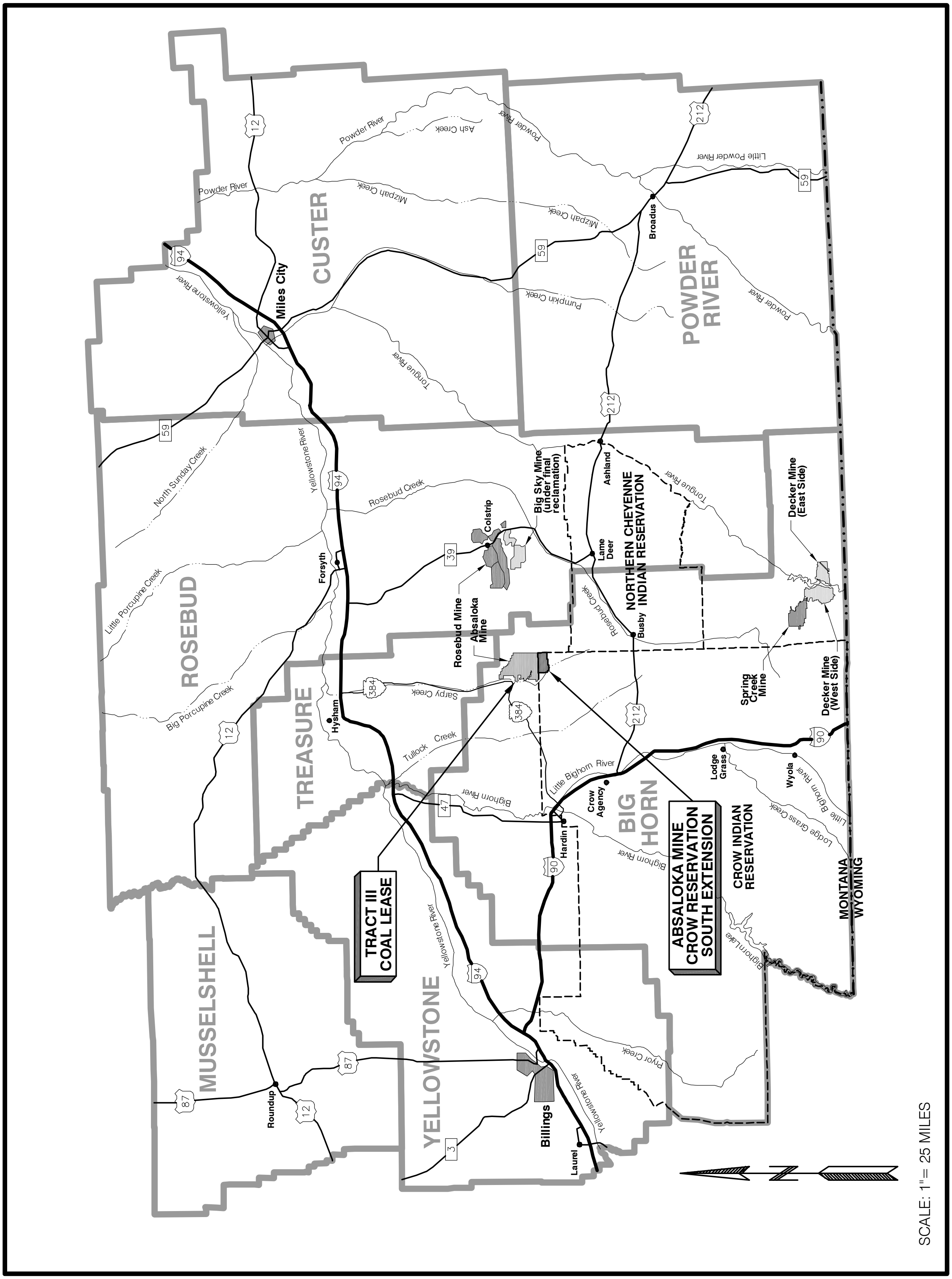


Figure 1-2. General Location Map.

The mine is located in the Crow Ceded Area north of and adjacent to the Crow Indian Reservation on what is known as the Tract III Coal Lease (Figure 1-1). The Crow Ceded Area, or “ceded strip”, is an area of land between the northern boundary of the Crow Indian Reservation and the Yellowstone River that had been a part of the reservation, but was ceded to the United States by an act of Congress in 1904 and opened for settlement (Act of April 27, 1904, Ch. 1624, 33 Stat. 352). The lands in the ceded strip remained Indian lands held in trust by the United States for the Crow Tribe until they were disposed of under the 1904 Act [see *Ash Sheep Co. v. United States*, 252 U.S. 159, 166 (1920)]. The U.S. Geological Survey (USGS) had mapped probable coal reserves in the area and the federal government retained rights to the coal when the land was homesteaded and patented. In 1958, Congress passed the Indian Restoration Act (Pub.L. 85-420, May 19, 1958, 72 Stat.121), which restored to trust status any vacant and undisposed lands remaining in the ceded strip, including all of the retained coal rights. In addition to restoring these lands and minerals to trust status, the 1958 Act also provided that “such lands are hereby added to and made a part of the existing reservation for such tribe[.]”. The courts subsequently confirmed the Reservation status of the Tribe’s trust coal in the ceded strip [see, e.g., *Crow Tribe v. Montana*, 819, F.2d 895, 898, 902 (9th Cir. 1987), *aff’d* 484 U.S. 997 (1988)].

In 1970, the Crow Tribe auctioned coal-prospecting rights within the ceded strip, and Westmoreland Coal Company was the successful bidder on several tracts. A Montana general partnership, Westmoreland Resources, was formed to conduct exploration, and subsequently leased and developed a surface coal mine on the area identified as the Tract III Coal Lease. The history of leasing, permitting, and mine development is complex and is adequately described in earlier environmental impact analyses enumerated below. In 1978, Westmoreland Resources was incorporated and became WRI.

Although the Tract III Coal Lease is held in trust by the United States for the Crow Tribe, and the Tribal mineral estate is actually part of the Reservation, the Absaloka Mine surface is privately held, outside the Crow Indian Reservation in the ceded strip. The majority of the surface estate is currently owned by WRI (subject to the Tribe’s option to purchase these surface lands when they are no longer needed for coal mining operations). Also included within the mine’s permit area is a state-owned section (Section 36, T.1N., R.38E.).

MDEQ has an approved coal mine regulatory program under the Surface Mining Control and Reclamation Act of 1977 (SMCRA), and hence, has attained primacy for regulation of private, state, and federal coal mine operations in Montana. However, OSM considers coal held in trust for the Crow Tribe to be Indian Lands under SMCRA, and therefore subject to federal regulation. Montana asserts that the Absaloka Mine is subject to state regulation. Litigation over state vs. federal jurisdiction in the mid-1980s was settled without either party conceding jurisdiction. Instead, a Memorandum of Understanding (MOU) was developed in 1985 to provide for the cooperative regulation of surface coal mining operations taking place within the ceded strip. Despite later clarifications in the law on federal jurisdiction, the courts reaffirmed the continued validity of the MOU with respect to the lands it covers in the ceded strip in 2001 [*Montana v. Babbitt*, Civ. No. 84-3584 (NHJ) (D.D.C. 2001)]. Under the terms of that MOU, all surface coal mining operations at the Absaloka Mine within the Tract III Coal Lease are regulated by MDEQ as the primary regulatory authority with concurrence on permit decisions by OSM. Absaloka Mine has a state surface mining permit issued by MDEQ (Permit No. 85005), and a federal surface mining permit issued by OSM (Permit No. MT-0007-F). Mine inspections and enforcement are conducted jointly by both agencies.

The Absaloka Mine, as currently permitted, includes 7,122 acres. Mining operations commenced in 1974 and have continued to the present. The Absaloka Mine produced approximately 4.9 million tons of coal in 2000, 5.9 million tons in 2001, 5.2 million tons in 2002, 6.0 million tons in 2003, 6.5 million tons in 2004, 6.5 million tons in 2005, and 6.8 million tons in 2006. The current production rate is 6.0 to 7.0 million tons of coal per year. Through 2006, approximately 147 million tons of coal have been produced at the mine.

The surface of the Tract III Revision area is owned by WRI and the surface of the South Extension is owned by the Crow Tribe (32 percent), allotted Indian owners 12 percent), and non-Indian fee owners (56 percent). Currently, the principal land uses within the tracts are cultivation (farmlands), grazing by domestic animals (primarily cattle), and wildlife habitat. The farmland is used for production of small grains and alfalfa. The grazing lands include agricultural pasturelands and native grasslands.

Open pit strip mining, which is the mining method currently in use at the Absaloka Mine, would be the method of mining the Tract III Revision and South Extension areas. A dragline with assistance from mobile equipment, such as large capacity front-end loaders and haul trucks or scrapers, would be used to remove the overburden to expose the coal seam (Figure 1-3). The coal would be used primarily for electric power generation in the Upper Midwest region of the United States, particularly in Minnesota, Wisconsin, and Michigan. The coal would also be used to supply the Hardin Generating Station, which was recently constructed in Hardin, Montana. After mining, the land would be reclaimed to the premining land use functions, as is the current practice at the Absaloka Mine.

The Absaloka Mine provides substantial benefits to the Crow Tribe in several ways. The Tribe receives income from royalties on the coal production from the Absaloka Mine. 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. Collection of these taxes by the Tribe, instead of the State, is the result of extensive litigation [see, e.g., *Crow Tribe v. Montana*, 819, F.2d 895 (9^{th} Cir. 1987), *aff'd* 484 U.S. 997 (1988)]. These tax payments

Figure 1-3. Photograph of Mining Operations at the Absaloka Mine.

currently comprise the majority of the Tribe's general fund budget. Finally, the majority of the employees of the mine are members of the Crow Tribe, and this mine employment provides some of the best paying jobs in the area.

As of January 1, 2007, an estimated 25 million tons of mineable coal reserves remained under permit at the Absaloka Mine, and WRI estimates that approximately 21 million tons of those remaining reserves are recoverable. Therefore, at the current production rate, the mine would no longer be able to produce coal by the end of 2009 without securing additional reserves.

Descriptions of both the proposed South Extension lease tract and the proposed Tract III Revision area are included in Chapter 2. The Tract III Revision area lies completely within the Absaloka Mine's current mining permit boundary, while the proposed South Extension tract is contiguous to and south of the current mining permit boundary (Figure 1-1). These areas are substantially similar to the adjacent mine for which detailed, site-specific environmental data have been collected and for which environmental analyses have previously been prepared to secure the necessary mining permits. As shown in Figure 1-2, there are no other existing mines in the immediate area.

Past leasing and permitting actions at the Absaloka Mine have been evaluated in several federal and state environmental analyses. These documents described the affected environment and contain analyses of the impacts to be expected as a result of surface coal mining and other development activities in this area. They are incorporated herein by reference. They are available for viewing at MDEQ's office in Helena, Montana, OSM's offices in both Casper, Wyoming and Denver, Colorado, and the Bureau of Indian Affair's (BIA's) offices in Billings and Crow Agency, Montana. The relevant publications are as follows:

- *USDI BIA FES 76-64; Crow Ceded Area Coal Lease Tracts II and III, Westmoreland Resources, December 15, 1976.*
- *USDI U.S. Geological Survey FES 77-17; Proposed 20 Year Plan of Mining and Reclamation, Westmoreland Resources Tract III, Crow Ceded Area, Montana; May 31, 1977.*
- *USDI OSM-EIS-16; Westmoreland Resources; Absaloka Mine Revised Plan, December 1984.*
- *MDEQ EA; Continued Mining and Relocation of Big Horn County Road No. 55, January 31, 1994.*
- *MDEQ EA; Vella Redding Life Estate Amendment, October 18, 2005.*
- *MDEQ EA; Application No. 00170 Tract 3 South Extension, June 16, 20*06

Absaloka Mine has a 32-year history of operation and environmental documentation; therefore, these earlier documents were referred to for background and historical information. In order to approve and permit the various aspects of WRI's development plan for the South Extension and associated Tract III Revision areas, this analysis focuses on the specific environmental and socioeconomic impacts of the proposed federal and state actions. It also addresses issues that may have changed since the above documents were published and/or that arose from scoping performed for this EIS.

1.2 Purpose and Need

The purpose and need for the project is to allow WRI's Absaloka Mine continuing access to coal supplies for the sale of coal to its customers for electric power generation, and associated benefits to the Crow Tribe, including royalty and tax income and employment.

The currently permitted mining area on the existing Tract III Coal Lease will sustain the current production rate of 6.5 to 7.0 million tons of coal per year only through 2009 since the remaining mineable and marketable coal reserves on that portion of Tract III are limited. Within the Tract III Revision area, approximately 13 million additional tons are potentially mineable and recoverable. Permitting this coal would extend the mine life by two additional years, or potentially through 2011. Approval of the Tract III Revision by MDEQ and OSM, IMDA lease approval, and OSM approval of the South Extension permit application would add approximately 94 million tons of in-place coal reserves. WRI estimates that 77 million of these tons are recoverable and marketable. This would enable the mine to extend its productive life to 2020 or 2021 at the current production rate of 6.5 to 7.0 million tons per year.

In response to WRI's proposal, the BIA must decide whether to approve the IMDA lease for the South Extension. In order to approve the lease, the BIA must fulfill the requirements of NEPA by evaluating the environmental impacts of leasing and subsequently mining the coal reserves within the South Extension. Federal agencies must comply with NEPA, which requires preparation of an EIS for major actions determined to have the potential for significant impact on the human environment. BIA has determined that approval of the South Extension coal lease is a major action because it is outside the scope of earlier environmental analyses applicable to the Absaloka Mine. In addition, it exceeds the thresholds of 1,280 acres of potential surface coal mining and an annual production rate of five million tons per year that constitute a major action under the Department of the Interior's policies (DOI 2004a).

Regulations of the Council on Environmental Quality at 40 CFR Part 1500 require use of a single EIS for multiple decisions on a single project, integrating multiple reviews so that procedures can run concurrently rather than consecutively, and eliminating duplication with state procedures by providing for joint EIS preparation. This EIS will serve as the required NEPA document for all current federal actions as well as the required MEPA document for all current State of Montana actions required for the WRI proposal to expand the Absaloka Mine.

With regard to the proposed South Extension development plan, this EIS analyzes the environmental impacts of leasing and mining the coal reserves within the Crow Reservation South Extension lease tract, which is held in trust by the United States for the Crow Tribe, as required by NEPA and associated rules and guidelines. With regard to the proposed Tract III Revision, this EIS analyzes the environmental impacts of mining currently leased Tract III coal reserves within the ceded strip that is held in trust by the United States for the Crow Tribe, as required by NEPA and MEPA and associated rules and guidelines.

The preparation of this EIS is a prerequisite for BIA's approval of the IMDA lease and mining of coal reserves in the Tract III Revision and South Extension areas; however, it is not the enabling action that would allow mining to begin. WRI would not be authorized to conduct mining operations by the preparation of this document and BIA's approval of the lease. Prior to conducting any mining-related activities within these two proposed mine development areas, WRI must obtain an approved mine permit revision from MDEQ and OSM for the Tract III Revision and a separate surface mining permit from OSM for the South Extension. This document serves to provide NEPA analysis for the BIA decision on the South Extension lease, and MEPA and NEPA analyses for the MDEQ and OSM decisions, respectively, on the Tract III Revision. This EIS will also serve as the primary support document and provide NEPA analysis for future OSM actions (e.g., the separate mining permit for the South Extension), any applicable future Environmental Protection Agency (EPA) actions, and future Bureau of Land Management (BLM) decisions (e.g., the federal mining plan approvals).

Authorities and responsibilities of the BIA, OSM, MDEQ, and other concerned regulatory agencies are described in the following section.

1.3 Regulatory Authority and Responsibility

The BIA and the MDEQ are joint lead agencies responsible for the preparation of this EIS under their respective authorities under NEPA and MEPA. OSM, BLM, EPA, and the Crow Tribe are cooperating agencies as entities with a permit decision function and/or with special expertise or interest in the proposed project. Approval and eventual implementation of the WRI development plan for the Absaloka Mine South Extension and Tract III Revision would require a number of actions by multiple federal and state agencies under various regulatory authorities and requirements. These are summarized as follows:

Federal Agencies

- BIA: In its trust responsibility to the Crow Tribe, BIA has approval authority over agreements under IMDA pursuant to 25 CFR Part 225. The IMDA agreement between WRI and the Crow Tribe has been conditionally approved by BIA. The South Extension includes allotted trust lands; therefore, BIA must also approve surface use agreements between the allottee surface owners and WRI.

- OSM: SMCRA gives OSM primary responsibility to administer programs that regulate surface coal mining operations and surface effects of underground coal mining operations. As noted above, OSM is the regulatory authority for surface mining on the Crow Indian Reservation. If the BIA approves the IMDA lease for the South Extension and the surface use agreements, OSM will then have the responsibility for a permit decision on WRI's South Extension mining permit application pursuant to 30 CFR Part 750 under SMCRA. OSM must also concur with the MDEQ permit decision on WRI's Tract III Revision application in order to revise the existing federal mine permit accordingly.

- BLM: By reference in 25 CFR Part 225, 43 CFR Part 3480 is applicable to IMDA coal agreements. Pursuant to 43 CFR Part 3480, the BLM has review and approval responsibility for mining plans to assure maximum economic recovery of coal for the benefit of the Crow Tribe. BLM is also delegated this authority and responsibility under 30 CFR Part 750. This BLM function is a part of the permit review and approval process by OSM.

- EPA: EPA directly implements the federal environmental laws and regulations in Indian country, as defined at 18 USC 1151, including on the Crow Indian Reservation. With regard to the proposed project, EPA is the permitting and regulatory agency for activities on the Crow Indian Reservation that invoke the Clean Air Act, Clean Water Act, Safe Drinking Water Act, and Resource Conservation and Recovery Act, among other laws.

State Agencies

- MDEQ, Industrial and Energy Minerals Bureau: MDEQ has attained primacy for regulation of coal mine operations in Montana under 30 CFR Part 926. An MOU between MDEQ and OSM provides for cooperative regulation of surface coal mining operations in the ceded strip; therefore, operations on Tract III are regulated by MDEQ as the primary regulatory authority with concurrence on permit decisions by OSM. MDEQ has responsibility for the permit decision on the Tract III Revision application under the Montana Strip and Underground Mine Reclamation Act (MSUMRA), which along with the implementing rules of ARM 17.24, constitute Montana's approved program under SMCRA.

- MDEQ, Water Protection Bureau: Under the Montana Water Quality Act, MDEQ is responsible for permitting of discharges to the waters of Montana, which includes all water discharge points from coal mine operations outside of Indian Reservations. Discharges on the Tract III Coal Lease are regulated by MDEQ as the primary regulatory authority within the ceded strip.

Other Interests

- The Crow Tribe: Under the IMDA, and subject to the approval of the Secretary of Interior and any limitations or provisions contained in its constitution, the Crow Tribe may enter into a lease (with WRI in this case) for coal in which the Tribe owns a beneficial or restricted interest.

Surface mining and reclamation have been ongoing in the Powder River Basin (PRB) for over three decades. During this time, effective mining and reclamation technologies have been developed and continue to be refined. Mining and reclamation operations are regulated under SMCRA and Montana statutes. MDEQ technically reviews all mine permit application packages to ensure that the mining and reclamation plans comply with all state permitting requirements and that the proposed coal mining operations comply with the performance standards of the Department of Interior (DOI)-approved Montana program. There are a number of federal and state permit approvals that are required in order to conduct surface mining operations at the Absaloka Mine (Appendix A). There are no local governmental or Crow tribal permitting requirements to operate the Absaloka Mine. The federal and state regulations are designed to ensure that surface coal mining impacts are mitigated.

1.4 Consultation and Coordination

Initial Involvement

In February 2004, WRI entered into an Exploration and Option to Lease Agreement with the Crow Tribe under the IMDA for a coal reserve area on the Crow Indian Reservation south of and adjacent to the Absaloka Mine's existing Tract III Coal Lease. WRI exercised its lease option on June 1, 2006, and subsequently entered into a Cooperative Agreement with the BIA for the preparation of this EIS.

The BIA published a Notice of Intent (NOI) to prepare an EIS and Notice of Scoping in the *Federal Register* for the proposed expansion of the Absaloka Mine onto the Crow Indian Reservation on November 28, 2006. The publication announced the time and location of a public scoping meeting and requested public comment on BIA's proposed approval of the IMDA lease agreement for a coal reserve area on the Crow Indian Reservation and the associated mine permitting process.

Public scoping meetings were held on November 16 and December 14, 2006 in Hardin, Montana. At the public meetings, WRI orally presented information about its mine and its need for additional coal. The presentation was followed by a question and answer period, during which four oral comments were made. The scoping period extended from November 28, through December 26, 2006, during which time BIA and MDEQ received written comments from the Northern Cheyenne Tribe's Air Quality Division and two private individuals. Those comments included the following issues and concerns:

- Impacts to air quality, especially from road dust (particulates) from the mine and the hauling of coal by trucks along unpaved roads.
- Impacts to the air quality on the Northern Cheyenne Indian Reservation.
- Impacts to surface water and groundwater quality and quantity, including treatment of mine site runoff.
- Impacts to aquatic habitat and wetlands.
- Concerns about weed management.
- Concerns about soil erosion.

This EIS was prepared to fulfill the requirements of NEPA and MEPA by addressing these environmental impacts and many others that were not specifically stated during the public scoping period. Chapter 2 describes the Proposed Action and Alternatives to this action. Chapter 3 describes the existing conditions of the physical, biological, cultural, and socioeconomic resources in the affected environment, and analyzes the direct and indirect impacts to those resources that would be associated with implementation of the Proposed Action or alternatives to this action. Chapter 3 also considers regulatory compliance, mitigation, monitoring, residual impacts, the relationship between local and regional short-term uses of man's environment, the maintenance and enhancement of long-term productivity, and the irreversible and irretrievable commitments of resources that would occur with implementation of the Proposed Action or alternatives to this action. Chapter 4 describes the cumulative impacts that are occurring and considers how those impacts would change if this and other proposed developments in the area would occur. Chapter 5 provides a list of persons, firms, and agencies contributing data, analysis, review or guidance to this EIS.

Draft EIS

Parties on the distribution list were sent copies of this Draft EIS (DEIS), and copies are available for review at the BIA offices in Billings and Crow Agency, Montana. The DEIS is also posted on MDEQ's website at: http://www.deq.mt.gov.

Final EIS and Future Involvement

All substantive comments received on the DEIS will be included, with agency responses, in the Final EIS (FEIS). The EPA will publish a Notice of Availability in the *Federal Register* for the FEIS. After at least a 30-day availability period, BIA will make a decision on whether or not to approve the IMDA coal lease in the Crow Indian Reservation for the South Extension tract and the surface use agreements between the allottee surface owners and WRI. OSM and MDEQ will make decisions on whether or not to approve the Tract III Revision, and OSM will make a decision on whether or not to approve the issuance of a new surface mine permit for the South Extension.

The BIA's and MDEQ's public Records of Decision (RODs) will be mailed to all parties on the mailing list including those who commented on this EIS. The public and/or the lease holder can appeal the BIA decision to approve or not approve the IMDA coal lease for the tract. The public and/or the lease holder can also appeal the OSM and MDEQ decisions to approve or not approve the mine permit revision and application. The agencies' decisions must be appealed within 30 days from the date that the Notice of Availability for the ROD is published in the *Federal Register*. The decisions can be implemented after that time if no appeals are received.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and alternatives to this action that are being evaluated in this Environmental Impact Statement (EIS[1]). The Proposed Action is the approval of Absaloka Mine's Tract III South permit revision (referred to herein as the Tract III Revision) and the approval of the Absaloka Mine Crow Reservation South Extension coal lease (referred to herein as the South Extension). Contingent on lease approval, the Proposed Action also includes approval of the surface mining permit for the South Extension. In each case, action may consist of approval, approval with stipulations, or disapproval. The area of interest lies to the south of the existing Absaloka Mine operations and is divided into two distinct proposed disturbance areas, the Tract III Revision and the South Extension. For the purpose of this analysis, the combined areas will be referred to herein as either the South Extension development area or the proposed development area. This alternative assumes that the leased reserves in the southern portion of the Tract III Coal Lease would be added to the existing mine plan and that surface coal mining operations would eventually be allowed to advance on to a new tract of land located entirely within the adjacent Crow Indian Reservation. As described in Chapter 1, this Proposed Action involves multiple decisions by several federal and state agencies.

The National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA) require the consideration and evaluation of other reasonable ways to meet proposal objectives while minimizing or avoiding environmental impacts. Thus, the evaluations of a No Action Alternative and a practical range of other "reasonable" action alternatives are required. These alternatives should represent other means of satisfying the stated purpose and need for the Proposed Action, which is to allow Westmoreland Resources, Inc.'s (WRI's) Absaloka Mine continuing access to coal supplies for the sale of coal for electric power generation, and associated benefits to the Crow Tribe, including royalty and tax income and employment.

Alternative 1 considers the potential impacts if the Bureau of Indian Affairs (BIA) would not approve the Indian Mineral Development Act (IMDA) lease for the South Extension tract. The Montana Department of Environmental Quality (MDEQ) and the Office of Surface Mining Reclamation and Enforcement (OSM) would, however, approve Absaloka Mine's proposed Tract III Revision. Under Alternative 1, the coal contained within the proposed South Extension lease tract on the Crow Indian Reservation would not be mined, although that portion of the economically recoverable coal reserves contained within the Tract III Revision area east of Middle Fork Sarpy Creek would be mined. Mining constraints in the area west of Middle Fork Sarpy Creek on the Tract III Coal Lease prevent the coal reserves contained in that area from being mined unless it is developed in conjunction with the mining of the South Extension.

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

Alternative 2 (the No Action Alternative) considers the potential impacts if the agencies would not approve any portion of Absaloka Mine's South Extension development plan. The BIA would not approve the IMDA lease for the South Extension tract and MDEQ and OSM would not approve Absaloka Mine's application to revise its current mine permit to include mining the coal reserves within the Tract III Revision area. Under the No Action Alternative, the coal contained within both the South Extension tract and the Tract III Revision area would not be mined at this time. Rejection of the South Extension development plan would not affect currently permitted mining activities on the Tract III Coal Lease at the Absaloka Mine.

Another alternative (Alternative 3) was considered but not analyzed in detail. Under Alternative 3, the BIA would approve the IMDA lease for the South Extension and all surface use agreements between WRI and the South Extension tract's allottee surface owners. For the purpose of analysis, this alternative assumes that WRI would eventually receive the necessary permits to mine the South Extension. However, MDEQ and OSM would not approve Absaloka Mine's permit revision to include proposed mining in the Tract III Revision area. Under this alternative, the coal contained within the South Extension could be mined, but the coal contained within the Tract III Revision area would not be mined. Although such a scenario is conceivable, it would result in bypassing important coal reserves on the Tract III Coal Lease with minimal environmental benefit. More importantly, the mine would exhaust its permitted reserves before the South Extension could be developed, resulting in interruption of coal production. In this event, WRI's customers would be lost and a later resumption of mining in the South Extension would be improbable.

Prior to the preparation of this EIS, WRI developed detailed mining and reclamation plans for the South Extension development area. These plans were carefully engineered considering the development area's geologic and hydrologic settings and natural resources, as well as the Surface Mining Control and Reclamation Act (SMCRA) and Montana statutes regulating surface coal mining and reclamation operations. OSM is currently reviewing WRI's mining permit application for the South Extension and the Tract III South permit revision application, and MDEQ is presently reviewing the Tract III South permit revision application. The plans that were developed showing how the lands would be mined and reclaimed, and the specific impacts that would occur during mining and reclamation, are addressed in detail in the permit application and revision packages. Specific mitigation measures for the anticipated impacts are described in detail, and are being analyzed by OSM and MDEQ. The following descriptions of the Proposed Action and alternatives are based entirely upon WRI's permit application and revision packages; therefore, no other alternatives or modifications of the Proposed Action can be given in this EIS without conflicting with the regulatory agencies' reviews.

2.1 Proposed Action

Under the Proposed Action, MDEQ and OSM would approve Absaloka Mine's proposed Tract III Revision. BIA would approve the IMDA lease for the South Extension and all surface use agreements between WRI and the South Extension tract's allottee surface owners, and OSM would approve the mining permit for the South Extension. For the purpose of analysis, under the Proposed Action, all of the mineable and marketable coal reserves contained within both the Tract III Revision area and the South Extension tract on the Crow Indian Reservation would be included in the South Extension development area.

The legal description of the proposed South Extension lease tract, which is located entirely within the Crow Indian Reservation, is as follows:

<u>T.1S., R.37E., Montana Principal Meridan, Big Horn County, Montana</u>

Section 1: Lot 9;	3.34 acres
Section 12: E½E½;	160.00 acres
Section 13: E½NE¼;	80.00 acres

<u>T.1S., R.38E., Montana Principal Meridian, Big Horn County, Montana</u>

Section 8: S½ and Lots 5 through 8;	358.60 acres
Section 9: S½ and Lots 5 through 8;	355.52 acres
Section 10: S½ and Lots 5 through 8;	353.56 acres
Section 11: Lots 3, 4 and 14;	69.17 acres
Section 14: Lots 1 through 4;	120.04 acres
Section 15: all;	640.00 acres
Section 16: all;	640.00 acres
Section 17: all;	640.00 acres
Section 20: N½N½;	160.00 acres
Section 21: N½N½N½;	80.00 acres
Total:	<u>3,660.23 acres</u>

Land descriptions and acreage are based on WRI's 2004 Exploration and Option to Lease Agreement with the Crow Tribe. The coal estate in the tract described above is held in trust by the United States for the Crow Tribe. The ownership of the surface estate is discussed in Section 3.11.

The proposed Tract III Revision area is located entirely within WRI's existing Tract III Coal Lease and the current Absaloka Mine permit area. A legal description of the proposed Tract III Revision area cannot be tabulated as such, because its limits are generally defined by the southern boundary of the Tract III Coal Lease, the projected mining disturbance area boundary on the east side of Middle Fork Sarpy Creek, which is determined by the overburden stripping limit, and the truncation of mineable coal by a northeast-trending geologic fault. The coal estate is held in trust by the United States for the Crow Tribe and, being located within the Crow ceded strip, is part of the Crow Indian Reservation. The ownership of the surface estate is discussed in Section 3.11.

WRI submitted a permit revision package for review and approval to MDEQ and OSM for the Tract III Revision in November 2006 and a permit application package for review and approval to OSM for the South Extension in February 2007. As part of that process, detailed plans were developed showing how the lands would be mined and reclaimed. Specific impacts that would occur during mining and reclamation are addressed in the permit revision and application packages, and specific mitigation measures for anticipated impacts are described in detail.

With respect to the Tract III Revision, MDEQ will review the permit revision package to ensure that it complies with the permitting requirements and the coal mining operation meets the performance standards of the approved Montana program under SMCRA. MDEQ will also use information included in this EIS in considering approval of the permit revision. OSM must concur with the MDEQ decision on the permit revision. If the BIA approves the IMDA lease for the South Extension tract, OSM will use this EIS and information included in the permit application package to formulate a decision on the application for a new surface mine permit for Absaloka Mine's South Extension on the Crow Indian Reservation. OSM, Bureau of Land Management (BLM), and other federal agencies will review this EIS, the Tract III South permit revision package, and the South Extension permit application package to ensure compliance with the terms of the coal lease agreements, the Mineral Leasing Act of 1920 (MLA), NEPA, and other federal laws and their attendant regulations. BLM must approve the mining plan to ensure maximum recovery of coal for the benefit of the Crow Tribe.

On Tract III, MDEQ enforces the performance standards and permit requirements for reclamation during the mine's operation and has primary authority in environmental emergencies. OSM retains joint responsibility for this enforcement. Within the Crow Indian Reservation, BIA has authority in emergency situations if OSM cannot act before environmental harm and damage occurs. In preparing this EIS, BIA 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.

For purposes of environmental analysis, the South Extension development area constitutes the entire area that would be disturbed in order to remove the economically mineable coal reserves within both the Tract III Revision area and the South Extension. In addition, all environmental commitments and associated mitigation measures that would be imposed through the MDEQ and OSM permitting processes would be in effect for the respective proposed mine development areas.

As of December 31, 2006, approximately 147 million tons of coal had been mined from within the currently permitted area for the Absaloka Mine and approximately 25 million tons of mineable coal reserves remained, of which approximately 21 million tons are recoverable. As currently permitted, Absaloka Mine has sufficient coal reserves to sustain the current level of production (6.5 to 7.0 million tons per year) through 2009. WRI estimates that the Proposed Action, involving both the Tract III Revision area and South Extension tract, would add approximately 93.9 million tons of in-place coal reserves, and that approximately 76.6 million tons of those reserves would be recoverable. The Tract III Revision area would provide approximately 17.4 million of these additional tons, while the South Extension tract would provide approximately 59.2 million additional tons. With the additional reserves in the Tract III Revision area and the South Extension tract, mine life would be extended to 2020 or 2021.

Coal reserves within the Tract III Revision area and South Extension would be mined as an integral part of the Absaloka Mine. Since the South Extension development area would be an extension of the existing Absaloka Mine, the existing mine facilities and infrastructure would be the same as those described in the MDEQ Surface Mine Permit 85005 as amended, and the corresponding OSM Surface Mine Permit MT-0007-F, both approved July 5, 2006. No new facility construction, other than necessary roads and sediment control features, has been proposed.

Although the total area of the South Extension lease within the Crow Indian Reservation is 3,660.23 acres and WRI proposes to eventually include nearly all of the lease area within Absaloka Mine's South Extension permit area, not all of the lease area contains coal that is economically recoverable. Of the three major coal seams that occur within the South Extension development area, only the upper two seams (Rosebud and McKay) would be recovered. The Robinson seam, which lies below and is separated from the McKay seam by approximately 80 to 100 feet of interburden, was mined in the early years of the mine's operation; however, due to customer concerns regarding poor combustion characteristics, the Robinson seam is not considered to be marketable. In addition, excessive overburden thickness, faulting, prehistoric coal fires, and other natural geologic factors have rendered some of the lease area uneconomical to develop. The total area of Rosebud and McKay coal seams to be mined under WRI's South Extension development plan, including the Tract III Revision area, is about 1,771 acres and the total estimated area of disturbance would be about 2,637 acres. The area of disturbance would exceed the area of coal removal due to incidental disturbances associated with mining the coal, such as topsoil buffer areas, haul roads, topsoil storage areas, box cut spoils, backsloping for highwall reduction, and matching undisturbed topography to post-mining topography.

2.1.1 Current Operations

Construction of Absaloka Mine's infrastructure began in late 1972. Mine facilities, including the railroad loop, coal handling/processing plant, coal storage areas, warehouse and shops, miscellaneous storage buildings, boiler plant, fresh water supply well and water treatment plant, and sedimentation pond (Dry Coulee Dam) are located in the northwest portion of the existing permit area in Section 26, T.1N., R.37E. (Figure 1-1). The railroad spur connects with the Burlington Northern Santa Fe (BNSF) main rail line at Sanders, Montana, approximately 34 miles north of the mine. Mining operations began in early 1974 and the first unit train of coal was loaded on July 1, 1974.

The first step of the mining process is soil salvage using rubber-tired scrapers. Soil is salvaged in two lifts: the first lift being the "A" horizon topsoil, and the second lift being the "B" horizon subsoil. During initial box cut development, soil is placed in temporary stockpiles for later use in final pit closure and reclamation. Once the pit has advanced far enough to establish room for regrading of dragline spoils, soil is hauled directly from salvage areas and redistributed on regraded areas.

After soil salvage operations are complete, blast holes are drilled down through the overburden to the top of the Rosebud coal seam. The drill holes are then loaded with explosives (ANFO) and detonated to fragment the overburden to facilitate dragline excavation.

Overburden removal is accomplished using a Bucyrus-Erie 2570W dragline with a 115-cubic yard bucket. High-overburden areas generally require pre-stripping to assist the dragline, using front-end loaders and off-highway haul trucks or scrapers. Exposed coal seams are cleaned with a dozer, drilled and blasted to facilitate efficient excavation, and then loaded using front-end loaders into off-highway haul trucks for transport to the coal crushing and storage facilities. As overburden is removed, it is directly placed into the previous empty pit where coal has been removed.

Replaced (backfilled) overburden is graded to approximate the original land surface contour, as required by MDEQ and OSM rules. Elevations consistent with the approved post-mining topography (PMT) plan are established as quickly as possible to construct a stable landscape and restore drainage. Backfilled and recontoured overburden is sampled and analyzed to verify suitability as subsoil. To date, acidic, toxic forming, or other unsuitable backfill materials have not been encountered at Absaloka Mine. Should unsuitable backfill materials be encountered, mitigation by additional soil depth, excavation and burial, or other special handling to remove them from the root zone would occur. Prior to soil redistribution, regraded backfill is scarified to relieve compaction. WRI's monitoring and testing criteria currently used and that would continue to be used to determine suitability/unsuitability for backfill materials are discussed in detail in Chapter 3, Section 3.8 of this document.

Soil is typically redistributed on recontoured backfill using rubber-tired scrapers. Soil is replaced in two lifts with the "B" subsoil over the spoil and the "A" horizon topsoil at the surface. The surface is then tilled to establish a seedbed prior to seeding. Reclaimed areas are revegetated using native grasses, forbs, and shrubs that are consistent with the post-mining land use. As before mining, grazing land is the primary post-mining land use, with pastureland and some areas of cropland being replaced.

Annual coal production rates at Absaloka Mine have varied, but in recent years have stabilized at 6.5 to 7.0 million tons. Coal customers have also varied over the years; however, most of the coal produced has been shipped by rail to electric power generating plants in Minnesota, Wisconsin, and Michigan. Currently, Absaloka Mine's primary markets are power plants in Minnesota and Michigan. In 2006, WRI began supplying coal to the newly constructed Hardin Generating Station located near Hardin, Montana, where coal is delivered by highway truck.

The Tract III Coal Lease is approximately 14,000 acres in area. Based on initial reserve studies, Tract III contained approximately 800 million tons of in-place coal reserves in five separate coal seams. The primary coal seams are referred to as the Rosebud and McKay, which form the basis of the Absaloka Mine operation, and are currently the only seams being mined. In parts of the current mine permit area, the Rosebud and McKay coal seams are joined into a single seam that is referred to as the Rosebud-McKay. The Rosebud-McKay seam has an average aggregate thickness of 32 feet, but it was extensively eroded or burned over much of Tract III Coal Lease and was present in only the southeastern third of the lease area, with the exception of a few small outliers. In the extreme southeastern portion of the lease area, the Rosebud-McKay seam is overlain by more than 150 feet of overburden and is not considered to be economically mineable.

The other major coal seam in the Tract III Coal Lease is the Robinson, which underlies the McKay by 60 to 100 feet. The Robinson is approximately 20 feet thick and underlies most of the Tract III Coal Lease. In the early years of the Absaloka Mine's operation, the Robinson seam was mined, although by the early 1990s, WRI's primary customers refused to accept it due to high sodium and slagging characteristics in conventional pulverized coal boilers. The Tract III Coal Lease holds a large reserve (estimated to be over 200 million tons) of mineable Robinson coal, where the Rosebud-McKay is eroded or burned. The Robinson coal could be suitable for more advanced combustion technologies such as circulating fluidized bed and integrated gasification combined cycle. WRI is optimistic that the Robinson coal may be more marketable as these combustion technologies become commercially utilized.

There are two thin "rider" seams present in the Tract III Coal Lease, each of which is three to five feet thick. The Stray 1 seam occurs within the overburden 15 to 50 feet stratigraphically above the Rosebud coal seam. The Stray 1 is an erratic and often pitching seam that is high in sulfur and ash and considered neither mineable nor marketable. The Stray 2 seam occurs three to five feet stratigraphically below the McKay coal seam and for a time was mined and blended with the major seams. The Stray 2 is also high in ash and sulfur and quality demands of customers dictated that it too be abandoned.

The Rosebud and McKay coals have similar quality with a typical analysis of 8,700 British thermal units per pound (Btu/lb) and 0.65 percent sulfur. The sodium oxide content of the ash is variable however, ranging from less than one to more than four percent. For marketing purposes, sodium is a critical specification due to its ash fouling impact on boilers. Mine operations are planned to minimize the sodium content by blending. WRI contracts with an independent coal-testing laboratory located at the mine site to confirm the accuracy of the blending operations. It is operated by SGS Laboratories.

Absaloka Mine's current permit area encompasses 7,110 acres of the 14,000-acre Tract III Coal Lease. Within this area, 4,177 acres have been disturbed: 455 acres by mine facilities and 3,722 acres by mining operations. It is projected that a total of 4,835 acres would eventually be disturbed within the current permit area. Of the acreage disturbed to date by mining, 2,696 acres (or about 65 percent) have been reclaimed. Phase I (regrading) and Phase II (vegetation establishment) bonds have been released on 2,496.5 acres and 1,813 acres of reclaimed land, respectively. WRI has not yet applied for Phase III (final vegetation) bond release. Under MDEQ rules, Phase IV (final) bond release must be deferred until final mine closure. WRI has had a reclaimed-land grazing program since 1984 to demonstrate sustained utility and as a vegetation management tool.

Employment at Absaloka Mine has varied with production. Current aggregate employment at WRI and SGS Laboratories is 171 people, of which 121, or 71 percent, are Crow tribal members.

2.1.2 Proposed Operations

All necessary mining infrastructure is in place for the proposed expansion into the South Extension development area. Mining methods and equipment would be the same as those currently employed at the mine. There would be no new facilities required, other than haul roads and power lines. Coal would be hauled to, processed by, and loaded at the existing coal processing facilities. Existing employment, royalty and tax payments, noise, air emissions, local mine-related traffic, and other associated effects of mining would continue at current levels as mining progresses to the south.

Mine Plan

The proposed mine plan for the South Extension development area is shown in Figure 2-1. The proposed South Extension permit boundary is also depicted in Figure 2-1. No surface disturbance would occur outside of the proposed South Extension permit area.

Coal would be produced from the Rosebud and McKay seams, which average approximately 17.9 and 12.5 feet thick, respectively, in the South Extension development area. Overburden depths in the South Extension development area is generally controlled by topography. An area of shallow overburden resulting from erosion of Middle Fork Sarpy Creek drainage roughly transects the proposed development area. Overburden depths range from zero at the Rosebud seam's outcrop to over 300 feet at the eastern boundary of the South Extension. Over 75 percent of the South Extension tract lies under less than 150 feet of overburden, and the average overburden depth across the entire proposed development area is approximately 70 feet.

Coal removal is currently permitted to progress up to, but not across, the geologic structural fault (herein referred to as the "Tract III revision fault") that crosses the southern portion of Tract III Coal Lease. Initial development north of the Tract III revision fault occurred in late 2006 and early 2007. The proposed Tract III Revision mine plan involves extending an initial box cut approximately 2,000 feet south-southeast from the Tract III revision fault east of Middle Fork Sarpy Creek, terminating it at the Crow Indian Reservation boundary in 2008. The pit would then advance with subsequent parallel mine cuts toward the east-northeast into increasingly thicker overburden. Mining in the Tract III Revision pit would be completed by 2017.

Mine development in the proposed South Extension tract would initiate on the east side of Middle Fork Sarpy Creek in 2009. This would involve the development of a box cut that parallels the stream channel and extends from the Tract III Revision pit approximately 6,800 feet south-southeastward, terminating at the next structural fault (herein referred to as the "southern fault"). Mine cuts would be aligned with the Tract III Revision mine cuts, which would be contiguous to and north of this pit. The pit would then progress with subsequent parallel mine cuts toward the east-northeast into increasingly thicker overburden. The box cut would be established in relatively shallow overburden, which would enable spoiling inward and then rehandling to maximize recovery and avoid any backfilling into the Middle Fork Sarpy Creek drainage bottom. No mining or disturbance would take place within a corridor approximately 500 feet wide along the Middle Fork Sarpy Creek channel, thereby preserving this natural drainage feature and maintaining surface flows along the stream course through the mine area. Mining this pit, which would be completed by 2015, would incrementally disturb some unnamed ephemeral tributaries of Middle Fork Sarpy Creek.

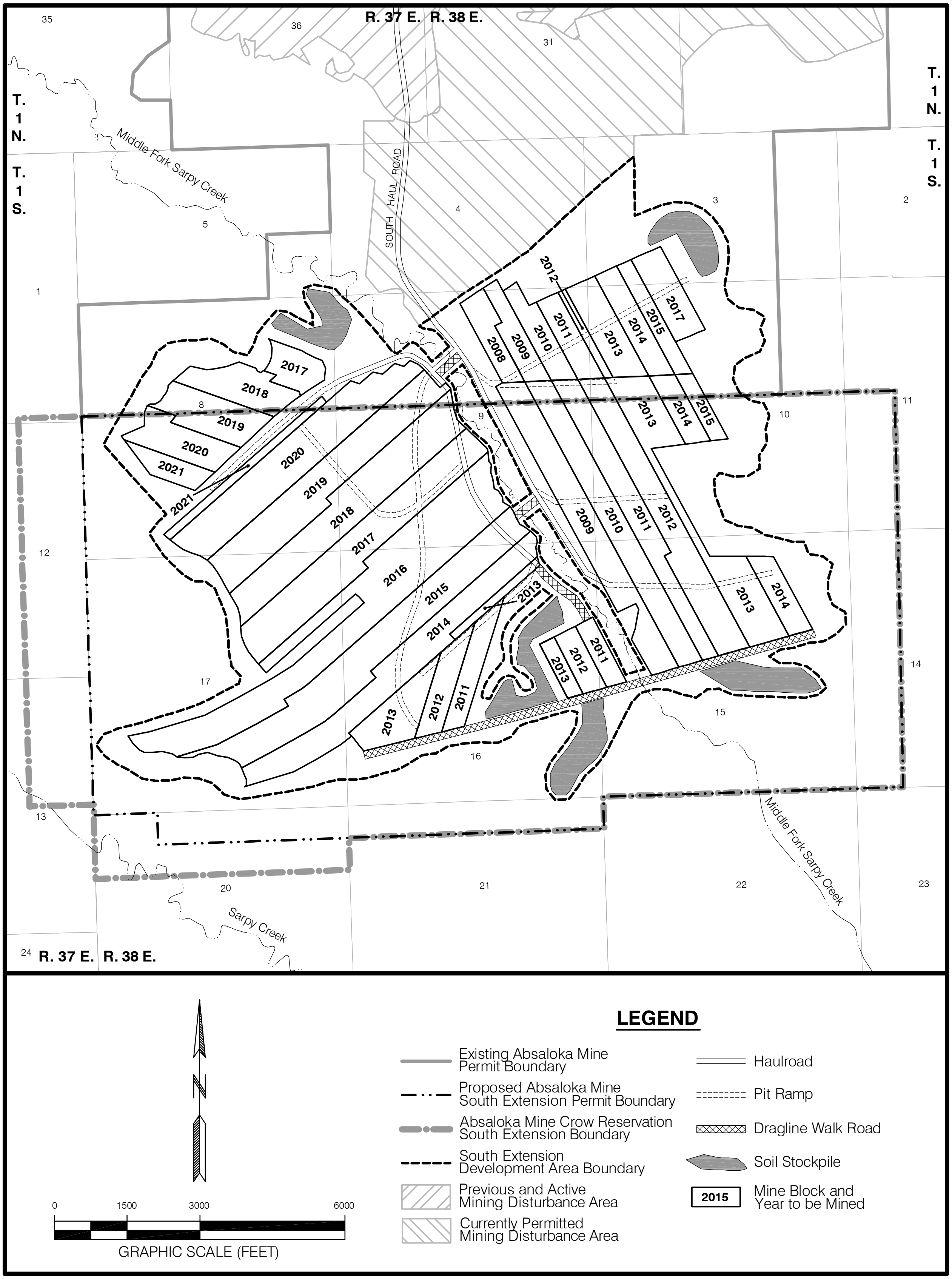


Figure 2-1. Proposed Mine Plan for the South Extension Development Area.

In approximately 2011, a second pit would be developed in the proposed South Extension tract. The mining operation in this pit, located on the west side of Middle Fork Sarpy Creek, would initiate at the southern fault and advance toward the north-northwest. Mine cuts, some of which would be nearly 9,000 feet in length, would advance toward the northwest and would be aligned more or less parallel to the northeast-southwest-trending structural faults in the area. This pit would progress toward and terminate at the Tract III revision fault. Again, no mining or disturbance would take place within a corridor approximately 500 feet wide along the Middle Fork Sarpy Creek channel. Mining this pit, which would be completed by 2021, would incrementally disturb some unnamed ephemeral tributaries of Middle Fork Sarpy Creek and Sarpy Creek.

In approximately 2017, another pit would be established on the up-thrown side of the Tract III revision fault west of Middle Fork Sarpy Creek. The initial box cut for this pit would be established within the Tract III Revision area and subsequent parallel mine cuts ranging in length from approximately 1,000 to 2,000 feet would advance into the South Extension tract toward the southwest. This block of coal in the Tract III Revision area is considered mineable only in conjunction with mining of the South Extension tract. Mining in this pit would be completed by 2021.

<u>Reclamation Plan</u>

Federal and state regulations require that land surface mined for coal be reclaimed to approximate the original land surface contour and revegetated to prescribed standards, and that premining land uses are reestablished. Fish, wildlife, and related environmental values must be protected.

Prior to any mining activity at the Absaloka Mine, soil would be salvaged in two lifts: the darkened “A” horizon “topsoil”, and the “B” horizon “subsoil”. Salvage depths vary with soil series and topographic position. Baseline soil survey data are used to determine the average salvage depth. Section 3.8 addresses the baseline soil survey of the South Extension development area. Initially, soil from box cut areas would be placed in stockpiles for later use in final pit closure. Once established, soil stockpiles would be vegetated to minimize erosion losses.

As the dragline pit advances, soil would be salvaged ahead of the pit prior to initiating drilling and blasting of overburden for the next mine cut. The pit advance allows regrading of the dragline spoils behind the active pit. Regrading typically follows pit advancement by four spoil ridges so that regrading can be accomplished in blocks. Once regraded areas are available, soil salvaged ahead of the pit can be hauled directly to regraded areas behind the pit and redistributed.

To date, no chemical or physical limitations in soil or overburden have been encountered at the Absaloka Mine. Since conditions are similar within the

South Extension development area to the mine's existing permitted mining areas, soil and overburden limitations affecting suitability for use in reclamation are not anticipated; hence, no need for special handling of soil or overburden materials is expected. WRI's monitoring and testing criteria currently used and that would continue to be used to determine suitability/unsuitability of overburden and soil materials are discussed in detail in Chapter 3, Sections 3.3 and 3.8 of this document.

Backfilled overburden would be recontoured according to an engineered plan developed from projected backfill volume and configuration using specialized computer software for mining operations. The reconstructed surface would be designed to achieve approximate original land surface contour, blend with and complement surrounding topography, restore premining drainage, and construct an erosionally stable landscape appropriate for the post-mining land use. Figure 2-2 shows the projected post-mining topography for the South Extension development area.

Redistributed soil would be prepared by tillage with a disk or chisel plow to relieve compaction and create a roughened surface prior to seeding. Drill seeding would normally be utilized, although broadcast seeding may be used in some instances. The seed mix would be comprised of native species and could vary depending on seed availability from year to year. Pastureland is not deliberately seeded, but the predominance of tame pasture grasses prior to mining in some areas is expected to result in volunteer establishment in reclamation. Cropland that is present before mining would be established where reclaimed topography and soils are expected to be suitable. Tree and shrub seedlings would be planted in suitable locations as wildlife habitat enhancement features. Other such habitat features may include rock piles, micro-topographic enhancements, and small topographic depressions to provide seasonal wetland areas. More specific information about the measures taken to reclaim land disturbed by mining and mitigate environmental impacts is included in Chapter 3.

Final reclamation of the entire Absaloka Mine, including the proposed South Extension development area, is projected to be complete by approximately 2023. Final bond release after the required 10-year liability period is projected for 2033.

2.2 Alternative 1

Under Alternative 1, WRI would not implement the South Extension development plan on the Crow Indian Reservation if the BIA does not approve the IMDA lease for the South Extension tract. Furthermore, because the South Extension includes allotted trust lands, the South Extension development plan would not be implemented if the BIA does not approve of all surface use agreements between the allottee surface owners and WRI. WRI would, however, receive approval from MDEQ and OSM to revise Absaloka Mine's existing mine and reclamation plan to include the Tract III Revision area.

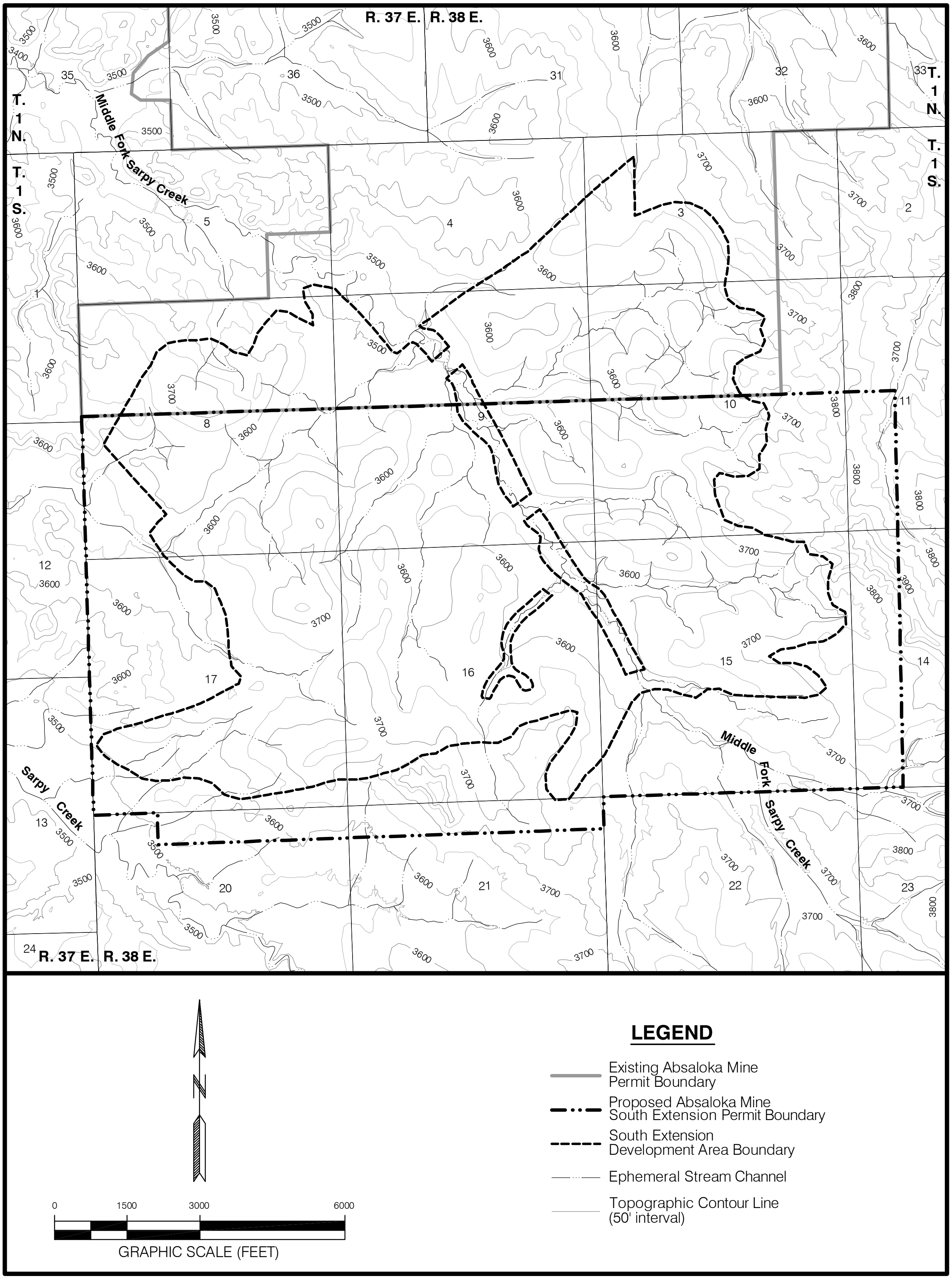


Figure 2-2. Projected Postmining Topography for the South Extension Development Area.

Under Alternative 1, the coal contained within the South Extension tract on the Crow Indian Reservation would not be mined; however, that portion of the coal reserves contained within the Tract III Revision area east of Middle Fork Sarpy Creek would be mined. Other assumptions are the same as for the Proposed Action and are described above in Section 2.1.

WRI estimates that Alternative 1, involving just the Tract III Revision area east of Middle Fork Sarpy Creek, would add approximately 15 million tons of in-place coal and that approximately 13 million tons of those in-place coal reserves would be recoverable. If Absaloka Mine's permit revision is approved to include the Tract III Revision area east of Middle Fork Sarpy Creek, a total of approximately 34 million tons of coal would be mined after January 1, 2007. Under Alternative 1, WRI estimates that annual coal production would continue to be approximately 6.5 to 7.0 million tons per year. At that mining rate, mine life would be extended by about two years to 2011.

The Tract III Revision area lies completely within Absaloka Mine's currently approved mine permit area and the existing Tract III Coal Lease area. The coal reserve within the Tract III Coal Lease is held in trust by the United States for the Crow Tribe and is part of the Crow Indian Reservation, but the existing limits of the Absaloka Mine are outside the Reservation boundary and the majority of the surface estate is currently owned by WRI. The economically mineable coal reserves within the Tract III Coal Lease that are on the west side of Middle Fork Sarpy Creek and north of the Crow Indian Reservation boundary are within Absaloka Mine's currently approved mine permit area. However, as described in the Proposed Action (Section 2.1.2), this block of coal (approximately 4.5 million tons of recoverable coal) is considered mineable only in conjunction with mining the South Extension tract and would not be included in this alternative.

Under Alternative 1, Absaloka Mine's permit area would not change, but the area of permitted coal removal would be increased by approximately 379 acres, and the area of permitted disturbance would be increased by an estimated 385 acres. As described in Section 2.1, the area of surface disturbance would exceed the area of coal removal due to incidental disturbances associated with the mining operation.

2.3 Alternative 2

Under Alternative 2, or the No Action Alternative, WRI would not implement the South Extension development plan if the BIA does not approve the IMDA lease for the South Extension tract and all surface use agreements between WRI and the South Extension tract's allottee surface owners. Alternative 2 also assumes that WRI would not receive approval from MDEQ and OSM to revise the existing mining and reclamation plan to include mining the Tract III Revision area. Under the No Action Alternative, the coal contained within the South Extension development area (Figure 2-1) would not be mined at this time.

Denial of the Crow Reservation South Extension coal lease and the Tract III Revision would not affect the currently permitted mining activities on the Tract III Coal Lease at the Absaloka Mine. The No Action Alternative assumes completion of currently permitted mining at the Absaloka Mine. The Tract III Coal Lease is approximately 14,000 acres in area and the Absaloka Mine, as currently permitted, includes 7,110 acres. A total of approximately 4,835 acres will eventually be affected by mining the Tract III Coal Lease within the currently approved permit area. Under the No Action Alternative, Absaloka Mine would mine its remaining 25 million tons of in-place coal reserves by the end of 2009 at the current 6.5 to 7.0 million-ton annual production rate. The mine would close and final reclamation would be complete by approximately 2012.

2.4 Alternatives Considered but Not Analyzed in Detail

2.4.1 Alternative 3

Under this alternative, as under the Proposed Action, the BIA would approve the IMDA lease for the South Extension tract. The BIA would also approve all surface use agreements between the South Extension tract's allottee surface owners and WRI. For the purpose of analysis, this alternative assumes that WRI would eventually receive the necessary permits that would allow surface coal mining operations to occur on a new tract of land located entirely within the Crow Indian Reservation. Alternative 3 assumes, however, that WRI would not receive approval from MDEQ and OSM to revise Absaloka Mine's existing mining and reclamation plan to include the Tract III Revision area and the coal contained within the Tract III Revision area would not be mined.

Geologic factors (e.g., overburden thickness and faulting) and Absaloka Mine's current mine plan dictate that the Tract III Revision area be mined as part of the South Extension development plan in order to achieve the most efficient recovery of the coal resource and avoid bypassing approximately 17.5 million tons of recoverable coal from both the east and west sides of Middle Fork Sarpy Creek.

If the Tract III Revision area could not be mined as proposed, the mineable coal reserves in the South Extension tract would be uneconomical to mine. The existing mining operation could not advance into the South Extension via the Tract III Revision area. Without the timely addition of the Tract III Revision area to Absaloka Mine's mine plan, the mine would soon run out of mineable reserves and be forced to close. There are not enough economically mineable reserves for a stand alone mine plan or a new start mine within just the South Extension tract. In view of these issues, development of an efficient and economically viable mine plan is considered unlikely without including the Tract III Revision area. Therefore, this alternative is not analyzed in detail in this EIS.

2.5 Regulatory Compliance, Mitigation and Monitoring

Absaloka Mine's currently approved mining permit includes extensive baseline information, ongoing monitoring information and commitments, and mitigation measures that are required by SMCRA and Montana State Law. Compliance, mitigation, and monitoring measures that are required by regulation are considered to be part of the Proposed Action and Alternative 1 considered in this EIS. These regulatory requirements, mitigation measures and monitoring commitments are in place for the No Action Alternative as part of the currently approved mining and reclamation plan for the existing Absaloka Mine and would be included in the MDEQ and OSM permitting processes that would be required to mine the South Extension development area. The Tract III South permit revision package and the South Extension permit application package would have to be approved before mining could occur on the respective portions of South Extension development area. The major mitigation and monitoring measures that are required by state or federal regulation are summarized in Table 2-1. In general, the levels of mitigation and monitoring required for surface coal mining by SMCRA and Montana State law are more extensive than those required for other surface disturbing activities. More specific information about some of these mitigation and monitoring measures and their results at the Absaloka Mine are described in Chapter 3.

2.6 Hazardous and Solid Waste

Wastes produced by current mining activities at the Absaloka Mine are handled according to the procedures described in the approved mine permit (WRI 2003). Under the Proposed Action and Alternative 1, the procedures and requirements for handling of hazardous and solid wastes would be the same as the procedures and requirements for the existing mining operation and in accordance with MDEQ/OSM-approved waste disposal plans. Under U.S. Environmental Protection Agency (EPA) regulations, Absaloka Mine is a conditionally exempt small quantity hazardous waste generator, which means that no more than 220 pounds may be generated within any calendar month, and no more than 2,200 pounds may be accumulated at any one time.

Solid waste that is produced at the existing Absaloka Mine consists of floor sweepings, shop rags, lubricant containers, welding rod ends, metal shavings, worn tires, packing material, used filters, and office and food wastes. Non-hazardous solid waste, which is similar to domestic or municipal solid waste, is removed from the mine site by a contractor for disposal in a regulated landfill near Hardin. A portion of the solid wastes produced at the mine is disposed of within the mine's permit boundary in accordance with MDEQ-approved solid waste disposal plans. For example, ash from the coal-fired heating boilers is hauled to a mined out area of the pit where it is blended with backfilled overburden during regrading. Similarly, waste material from the secondary crusher feed is transported to a mined out area of the pit where it is buried during the backfilling operation. Haulroad surfaces are periodically scraped

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives.

Resource	**Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]**	**Monitoring[1]**
Topography & Physiography	Restoring to approximate original contour or other approved topographic configuration.	Check as-built vs. approved topography with each annual report.
Geology & Minerals	Identifying & selectively placing or mixing chemically or physically unsuitable overburden materials to minimize adverse effects to vegetation or groundwater.	Monitoring in advance of mining to detect unsuitable overburden.
Air Quality	Dispersion modeling of mining plans for annual average particulate pollution impacts on ambient air; Using particulate pollution control technologies; Using work practices designed to minimize fugitive particulate emissions; Using state-mandated Best Available Control Technology (BACT), including: Enclosed coal storage, or water or equivalent dust suppression on open coal storage as necessary, Watering or using chemical dust suppression on haul roads and mine access roads, Primary and secondary coal crushers shall be enclosed, Feed points to crushers shall be screened, Covering of conveyors, Prompt revegetation of exposed soils, Truck and train loadout – minimize free fall distance by use of retractable loading chute, Watering of active work areas, Reclamation plan to minimize surface disturbances subject to wind erosion, Use of water injection on coal and overburden drilling, Haul truck speed limits, Limited material drop heights for loaders, shovels and draglines, Minimizing blast sizes, Topsoil removal to precede mining as closely as practicable, Bottom dump coal haulers to minimize drop heights.	Ambient air quality monitoring requirements were removed by MDEQ in 1998, but could be reinstated in future if necessary; On-site air quality monitoring for PM_{10} to determine baseline conditions; Monitoring on-site weather and atmospheric conditions; On-site compliance inspections.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Absaloka Mine in its current approved mining and reclamation plan (the No Action Alternative). If the IMDA lease for the South Extension is approved by the BIA, and the Tract III South permit revision package is approved by MDEQ and OSM concurs, and the South Extension permit application package is approved by OSM, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan for the South Extension development area that must be approved before mining can occur under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Surface Water	Mining and reclamation plan would minimize disturbances to the hydrologic balance and employ groundwater protection measures to prevent material damage outside permit areas; Disturb smallest practicable area at any one time; Control of surface drainage utilizes Best Technology Currently Available (BTCA) to prevent, to extent possible, additional contributions of suspended solids to streamflow or runoff outside permit area; Surface drainage within disturbance area controlled and sediment contained using a combination of Best Management Practices (BMPs) and capturing runoff within pits to extent possible; Building and maintaining sediment control ponds or other devices during mining, consistent with EPA's Final Effluent Limitations Guidelines and Standards for the Western Alkaline Coal Mining Subcategory and alternate sediment control regulations; BMPs used during reclamation to ensure sediment transport from reclaimed lands does not exceed baseline conditions; Restoring approximate original drainage patterns during reclamation, such that surface water flow, quality, and sediment discharge would approximate premining conditions.	Monitoring storage capacity in sediment control facilities/measures; Monitoring quality of discharges; Monitoring streamflow and water quality; Compliance with Montana Pollutant Discharge Elimination System (MPDES) permit to meet effluent limits after treatment; Storm water discharge points regulated under MPDES permit north of Crow Reservation boundary, while storm water outfalls on Crow Reservation regulated by EPA storm water discharge permit.
Groundwater Quantity	Mining and reclamation plan would minimize disturbances to the hydrologic balance and employ groundwater protection measures to prevent material damage outside permit areas; Evaluating cumulative impacts to water quantity associated with proposed mining; Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quantity.	Monitoring wells track water levels in overburden, coal, interburden, underburden, and backfill.
Groundwater Quality	Mining and reclamation plan would minimize disturbances to the hydrologic balance and employ groundwater protection measures to prevent material damage outside permit areas; Evaluating cumulative impacts to water quality associated with proposed mining; Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quality.	Monitoring wells track water quality in overburden, coal, interburden, underburden, and backfill.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Absaloka Mine in its current approved mining and reclamation plan (the No Action Alternative). If the IMDA lease for the South Extension is approved by the BIA, and the Tract III South permit revision package is approved by MDEQ and OSM concurs, and the South Extension permit application package is approved by OSM, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan for the South Extension development area that must be approved before mining can occur under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Alluvial Valley Floors	Identifying all AVFs that would be affected by mining; Determining significance to agriculture of all identified AVFs affected by mining (MDEQ and OSM); Protecting downstream AVFs during mining; Restoring essential hydrologic function of all AVFs affected by mining.	Monitoring to determine restoration of essential hydrologic functions of any declared AVF.
Wetlands	Identifying all wetlands that would be affected by mining; Identifying jurisdictional wetlands (U.S. Army Corps of Engineers); Replacing all jurisdictional wetlands that would be disturbed by mining; Replacing functional wetlands as required by surface mining regulatory authorities (MDEQ or OSM) and surface landowner.	Monitoring of reclaimed wetlands using same procedures used to determine restoration of essential functions.
Soils	Salvaging soil suitable to support plant growth for use in reclamation; Protecting soil stockpiles from disturbance and erosional influences; Special handling some soils for tree planting areas; Selectively placing unsuitable overburden materials under adequate fill prior to soil distribution on graded backfill surface to meet guidelines for vegetation root zones.	Monitoring of erosion to determine need for corrective action during establishment of vegetation; Sampling regraded backfill for compliance with root zone criteria.
Vegetation	Permanently revegetating reclaimed areas according to a comprehensive revegetation plan using approved permanent reclamation seed mixtures approved by MDEQ and/or OSM to reflect premine land uses; Woody plant density goals established to provide vertical structure and vegetation diversity in association with post-mining land uses of grazing land, pastureland, and cropland; Controlling erosion on reclaimed lands prior to seeding with final seed mixture using mulching, cover crops, or other approved measures; Chemically and mechanically controlling weed (Montana Category I or Category II) infestations per Big Horn County Weed Board-Noxious Weed Management Plan; Direct hauling of topsoil; Selectively planting trees and shrubs to reflect site characteristics; Wetland species would be seeded or planted if necessary; Creating depressions and rock piles; Using special planting procedures for woody plant establishment; Posting reclamation bond covering the cost of reclamation.	Monitoring of revegetation growth & diversity until release of final reclamation bond (minimum 10 years following seeding with approved seed mixture); Monitoring of erosion to determine need for corrective action during establishment of vegetation; Use of controlled grazing during revegetation evaluation to determine suitability for post-mining land uses.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Absaloka Mine in its current approved mining and reclamation plan (the No Action Alternative). If the IMDA lease for the South Extension is approved by the BIA, and the Tract III South permit revision package is approved by MDEQ and OSM concurs, and the South Extension permit application package is approved by OSM, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan for the South Extension development area that must be approved before mining can occur under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]	Monitoring[1]
Wildlife	Restoring pre-mining topography to the maximum extent possible; Restoring a diverse habitat and wildlife habitat enhancement features such as ponds, brush piles, snags and rock piles; Designing fences to permit wildlife passage; Raptor-proofing power transmission poles; Creating nest habitat through enhancement efforts (e.g., tree plantings); Reestablishment of ground cover necessary for the return of a suitable prey base after mining; Restoration of stream channels and surface water quantity and quality to approximate premining conditions; Restoration of habitat provided by seasonal wetlands and small depressions; Reducing vehicle speed limits to minimize mortality; Instructing employees not to harass or disturb wildlife; Following approved raptor mitigation plans; Water impounded in sediment control structures is accessible to wildlife; Wildlife access to livestock watering tanks in reclaimed areas.	Baseline and annual wildlife monitoring surveys; Provide information to support final bond release applications.
Threatened, Endangered, and other Plant and Animal Species of Concern	Surveying for Ute ladies'-tresses; Surveying for animal species of concern; USFWS does not anticipate impacts to T&E plant or animal species or critical habitat.	Monitoring for Montana Animal Species of Concern; Baseline and annual wildlife monitoring surveys.
Land Use	Suitably restoring reclaimed area for historic uses (grazing, pasture, and crop land); Steps to control weedy plant species.	Monitoring of controlled grazing prior to bond release evaluation.
Cultural Resources	Conducting Class I, II and III surveys to identify cultural properties on all lands affected by federal undertakings or with federal oversight; Consulting with SHPO and THPO to evaluate eligibility of cultural properties for the NRHP; Avoiding or recovering data from significant cultural properties identified by surveys, according to an approved plan; Notifying appropriate federal personnel if historic or prehistoric materials are inadvertently uncovered during mining operations.	Monitoring of mining activities during topsoil stripping; cessation of activities and notification of authorities if unidentified sites are encountered during topsoil removal.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Absaloka Mine in its current approved mining and reclamation plan (the No Action Alternative). If the IMDA lease for the South Extension is approved by the BIA, and the Tract III South permit revision package is approved by MDEQ and OSM concurs, and the South Extension permit application package is approved by OSM, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan for the South Extension development area that must be approved before mining can occur under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	**Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]**	**Monitoring[1]**
Native American Concerns	Notifying Native American tribes with known interest in this area of leasing action and request for help in identifying potentially significant religious or cultural sites (Native American Heritage or traditional cultural properties).	Crow tribal representatives participated in the cultural resource inventory and site evaluations; Crow Tribe will continue to be consulted as mitigation plans are developed.
Paleontological Resources	Notifying appropriate federal personnel if potentially significant paleontological sites are discovered during mining.	No specific monitoring program.
Visual Resources	Restoring landscape character during reclamation through return to approximate original contour and revegetation with native species, except for cropland and pastureland areas.	No specific monitoring program.
Noise	Protecting employees from hearing loss.	MSHA inspections.
Transportation Facilities	Relocating existing pipelines and utility lines, if necessary, in accordance with specific agreement between pipeline and utility owner and coal lessee.	No specific monitoring program.
Socioeconomics	Paying royalty and taxes as required by tribal lease agreements and by state and local regulations; Bureau of Land Management is delegated to approve mining plans to assure maximum economic recovery of coal for the benefit of the Crow Tribe.	Surveying and reporting to document volume of coal removed.
Hazardous & Solid Waste	Disposing of solid waste and sewage within permit boundaries according to approved plans in mine permit; Storing and recycling used oil; Materials classified as hazardous by EPA under the Resource Conservation and Recovery Act are recycled where practicable or disposed of off-site at EPA-permitted hazardous waste facility; Maintaining of files containing Material Safety Data Sheets for all chemicals, compounds, and/or substances used during course of mining; Ensuring that all production, use, storage, transport, and disposal of hazardous materials, including fuels, is in accordance with applicable existing or hereafter promulgated federal and state government requirements;	No specific monitoring other than required by these other regulations and response plans.

1 These requirements, mitigation plans, and monitoring plans are in place for the existing Absaloka Mine in its current approved mining and reclamation plan (the No Action Alternative). If the IMDA lease for the South Extension is approved by the BIA, and the Tract III South permit revision package is approved by MDEQ and OSM concurs, and the South Extension permit application package is approved by OSM, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan for the South Extension development area that must be approved before mining can occur under the Proposed Action or Alternative 1.

Table 2-1. Regulatory Compliance, Mitigation and Monitoring Measures for Surface Coal Mining Operations Required by SMCRA and State Law for all Alternatives (Continued).

Resource	**Regulatory Compliance or Mitigation Required by Stipulations, State or Federal Law[1]**	**Monitoring[1]**
Hazardous & Solid Waste (continued)	Complying with emergency reporting requirements for releases of hazardous materials as established in Comprehensive Environmental Response, Compensation, and Liability Act, as amended; Preparing and implementing spill prevention control and countermeasure plans, spill response plans, inventories of hazardous chemical categories pursuant to Section 312 of Superfund Amendment and Reauthorization Act, as amended; Preparing emergency response plans.	No specific monitoring other than required by these other regulations and response plans.

[1] These requirements, mitigation plans, and monitoring plans are in place for the existing Absaloka Mine in its current approved mining and reclamation plan (the No Action Alternative). If the IMDA lease for the South Extension is approved by the BIA, and the Tract III South permit revision package is approved by MDEQ and OSM concurs, and the South Extension permit application package is approved by OSM, these requirements, mitigation plans, and monitoring plans would be part of a mining and reclamation plan for the South Extension development area that must be approved before mining can occur under the Proposed Action or Alternative 1.

and the materials are then hauled and dumped into mined out portions of the pit areas where it is buried during regrading.

Materials that may be classified as hazardous or are handled as hazardous are recycled where practicable or disposed of at an off-site EPA-permitted hazardous waste facility. WRI is responsible for ensuring that all production, use, storage, transport, and disposal of hazardous and extremely hazardous materials as a result of mining are in accordance with all applicable existing or hereafter promulgated federal and state government rules, regulations, and guidelines. All mining activities involving the production, use, and/or disposal of hazardous or extremely hazardous materials are and would continue to be conducted so as to minimize potential environmental impacts.

Sewage is handled by sewage systems present on the existing mine facilities, in compliance with the requirements of the Big Horn County sanitarian. Portable toilets are maintained in work areas remote from the mine facilities.

Maintenance and lubrication of most equipment takes place at existing shop facilities at the mine, where used oil and grease are currently contained and deposited in storage tanks. All of the collected used oils and grease are then beneficially recycled off site or used for energy recovery, including blending with diesel fuel oil for use as equipment fuel.

WRI has reviewed the EPA's Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Re-authorization Act (SARA) of 1986 (as amended) and EPA's List of Extremely Hazardous Substances as defined in 40 CFR 355 (as amended) for hazardous substances. No such substances are utilized or produced by the Absaloka Mine.

WRI maintains files containing Material Safety Data Sheets for all chemicals, compounds, and/or substances that are or would be used during the course of mining.

WRI must comply with emergency reporting requirements for release of hazardous materials. Any release of hazardous substances in excess of the reportable quantity, as established in 40 CFR 117, is reported as required by Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. The materials for which such notification must be given are the extremely hazardous substances listed in Section 302 of the *Emergency Planning and Community Right to Know Act* and the hazardous substances designated under Section 102 of CERCLA, as amended. If a reportable quantity of a hazardous or extremely hazardous substance is released, immediate notice must be given to the MDEQ and all other appropriate federal and state agencies. There have been no such releases of hazardous or extremely hazardous substances at the Absaloka Mine to date.

Each mining company is expected to prepare and implement several plans and/or policies to ensure environmental protection from hazardous and extremely hazardous materials. These plans/policies include:

- Spill Prevention Control and Countermeasure Plans;
- Spill Response Plans;
- Stormwater Pollution Prevention Plans;
- Inventories of Hazardous Chemical Categories Pursuant to Section 313 of SARA, as Amended; and
- Emergency Response Plans.

All mining operations are also required to be in compliance with regulations promulgated under the Resource Conservation and Recovery Act, Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act, Toxic Substances Control Act, Mine Safety and Health Act, Department of Transportation, and the Federal Clean Air Act. In addition, mining operations must comply with all attendant state rules and regulations relating to hazardous material reporting, transportation, management, and disposal.

Compliance with these rules at the Absaloka Mine would not change, nor would the type and quantity of any wastes generated and disposed of by the mine under the Proposed Action or Alternative 1.

2.7 Summary of Alternatives and Environmental Consequences

This proposal by WRI will require various approvals and permits by federal and state agencies with Indian trust and coal mine permitting responsibilities. In response to WRI's proposal, the BIA must decide whether to approve the IMDA lease for a coal reserve on the Crow Indian Reservation. Prior to making a decision on the lease, the BIA must fulfill the requirements of NEPA, which requires the federal agency to involve interested persons and parties in their decision making, consider reasonable alternatives to the Proposed Action, develop measures to mitigate environmental impacts, and prepare an environmental document that discloses the impacts of the Proposed Action and alternatives.

This EIS, which is the required NEPA document for all federal actions and the required MEPA document for all State of Montana actions, analyzes three different alternatives for the South Extension development plan for WRI's Absaloka Mine described in the discussion above. The Proposed Action and Alternative 1 are considered to be the Action Alternatives of this EIS. The No Action Alternative assumes only the completion of currently permitted mining activities at the Absaloka Mine.

The preparation of this EIS is a prerequisite for mining, but it is not the enabling action that would allow mining to begin. WRI submitted a permit revision package for review and approval to MDEQ and OSM for the Tract III Revision in November 2006 and a permit application package for review and approval to OSM for the South Extension in February 2007. The following federal and state agency actions would be taken under the respective alternative:

Proposed Action

- BIA would approve WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract.
- BIA would approve all surface use agreements between the allottee surface owners in the South Extension tract and WRI.
- MDEQ would use this EIS and information included in WRI's permit revision package to approve the advancement of surface mining operations at Absaloka Mine into the Tract III Revision area.
- OSM would use this EIS and information included in WRI's permit revision package to concur with MDEQ approval of WRI's permit revision package for the Tract III Revision.
- OSM would use this EIS and information included in WRI's permit application package to approve the advancement of surface mining operations at the Absaloka Mine from the Tract III Coal Lease into the South Extension tract.
- BLM and other federal and state agencies could use this EIS, the Tract III South permit revision package, and the South Extension permit application package to ensure compliance with the terms of the coal lease agreements, MLA, NEPA, the Clean Water Act, and other federal laws and their attendant regulations.

Alternative 1

- MDEQ would use this EIS and information included in WRI's permit revision package to approve the advancement of surface mining operations at Absaloka Mine into the Tract III Revision area.
- OSM would use this EIS and information included in WRI's permit revision package to concur with MDEQ approval of WRI's permit revision package for the Tract III Revision.
- BLM and other federal and state agencies could use this EIS and the Tract III South permit revision package to ensure compliance with the terms of the coal lease agreements, MLA, NEPA, and other federal laws and their attendant regulations.
- BIA would not approve WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract.
- OSM would not approve the advancement of surface mining operations at Absaloka Mine from the Tract III Coal Lease into the South Extension tract on the Crow Indian Reservation.

No Action Alternative

- MDEQ would not approve the advancement of surface mining operations at Absaloka Mine into the Tract III Revision area.

- OSM would concur with MDEQ's decision not to approve the advancement of surface mining operations at Absaloka Mine into the Tract III Revision area.
- BIA would not approve WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract.
- OSM would not approve the advancement of surface mining operations at Absaloka Mine from the Tract III Coal Lease into the South Extension tract.

A summary comparison of projected mine permit and surface disturbance areas, coal production, and mine life for the No Action, Proposed Action, and Alternative 1 for the South Extension development plan is presented in Table 2-2.

Table 2-2. Summary Comparison of Permit Area, Surface Disturbance, Coal Production, and Mine Life for the Absaloka Mine and the South Extension Development Plan.

Item	**No Action Alternative (Existing Absaloka Mine)**	**Added by Proposed Action**	**Added by Alternative 1**
Permit Area	7,110 ac	3,316.9 ac	0 ac
Lease Area	≈ 14,000 ac	3,660.2 ac	0 ac
Surface Disturbance Area	4,835 ac	2,637 ac	385 ac
Coal Removal Area	3,850 ac	1,771 ac	268 ac
Recoverable Coal (Post-2006)	21 mmt	76.6 mmt	13 mmt
Coal Mined Through 2006	147 mmt	—	—
Average Annual Post-2006 Coal Production	6 – 7 mmt	6 – 7 mmt	6 – 7 mmt
Remaining Life of Mine (Post-2006)	3 yrs	11 – 12 yrs	2 – 3 yrs
Average Number of Employees	171	0	0

Table 2-3 presents a comparative summary of the direct and indirect environmental impacts of implementing the Proposed Action and Alternative 1 as compared to the No Action Alternative. The No Action Alternative assumes completion of currently permitted mining at the Absaloka Mine for comparison to anticipated mining. Table 2-4 presents a comparative summary of cumulative environmental impacts of implementing each alternative.

The environmental consequences of the Proposed Action, Alternative 1 and the No Action Alternative are analyzed in Chapter 3. NEPA and MEPA require all agencies of the federal and state government to include, in every recommendation or report on proposals for legislation and other major federal and state actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on:

i.) the environmental impact of the Proposed Action,

Table 2-3. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative[2].

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
TOPOGRAPHY & PHYSIOGRAPHY		
Lower surface elevation	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Permanent topographic moderation, which could result in:		
Microhabitat reduction	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Habitat diversity reduction	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Big game carrying capacity reduction	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in water runoff and peak flows	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Increased precipitation infiltration	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Reduction in erosion	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Potential enhanced vegetative productivity	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Potential acceleration of groundwater recharge	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
GEOLOGY AND MINERALS		
Removal of coal	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Removal and replacement of topsoil and overburden	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Physical characteristic alterations in replaced overburden	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Loss of access for development of sub-coal oil and gas resources and other minerals	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Destruction of paleontological resources that are not exposed on the surface	Moderate, permanent on the existing mine area	Same as No Action on expanded mine area
AIR QUALITY		
Particulate Emissions:		
Elevated concentrations associated with average production of 6.5 to 7 mmtpy in compliance with ambient standards	Moderate, short term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area for 11 to 12 additional years
Potential for human health impacts as a result of exposure to particulate emissions	Minor to moderate, short term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area for 11 to 12 additional years
NOx Emissions from Machinery:		
Elevated concentrations associated with average production of 6.5 to 7 mmtpy in compliance with ambient standard	Moderate, short term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area for 11 to 12 additional years
NOx Emissions from Blasting:		
Potential for public exposure and human health impacts as a result	No reported events	No events projected
Visibility:		
Elevated concentrations of fine particulate matter associated with average production of 6.5 to 7 mmtpy	Moderate, short term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area for 11 to 12 additional years

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-3. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
WATER RESOURCES		
Groundwater:		
Removal of coal and overburden aquifers	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Replacement of existing coal and overburden with unconsolidated backfill material	Moderate, permanent on existing mine area	Same as No Action on expanded mine area
Depressed water levels in overburden and coal aquifers adjacent to mine	Negligible, 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	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Increase in TDS concentrations in backfilled areas	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Use of subcoal aquifers for water supply	Negligible, short term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area
Decrease in water supply for groundwater-right holders within the five-foot drawdown area	Negligible, long term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area
Surface Water:		
Diversion and disruption of surface drainage systems	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Reconstruction of surface drainage systems	Permanent on existing mine areas	Same as No Action on expanded mine area
Increased runoff and erosion rates on disturbed lands due to vegetation removal	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased infiltration on reclaimed lands due to topographic moderation	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Increased runoff on reclaimed lands due to loss of soil structure	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Potential for adverse downstream effects as a result of sediment produced by large storms	Moderate, long term for existing approved mining operation	Same as No Action on expanded mine area
Reduced flow rates from, or physical removal of springs	Moderate, permanent on existing mine area and negligible, short to long term on surrounding area	Same as No Action on expanded mine and surrounding area
Decrease in water supply for surface water-right holders within the disturbance area and downstream	Negligible, short term on existing mine and surrounding area	Same as No Action on expanded mine and surrounding area
ALLUVIAL VALLEY FLOORS		
(While final determinations have not been made by MDEQ, it is believed that there are no AVFs significant to agriculture on the proposed lease tract)		
Removal and restoration of AVFs determined non-significant to farming	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Disruptions to streamflows supplying downstream AVFs	Negligible, short term on existing mine and surrounding area	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-3. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION AND ALTERNATIVE 1**
WETLANDS		
Removal of jurisdictional wetlands and loss of wetland function until reclamation occurs	Negligible, short term on existing mine area; jurisdictional wetlands would be replaced as required under Section 404 of the Clean Water Act	Same as No Action on expanded mine area
Removal of non-jurisdictional wetlands and loss of wetland function until reclamation occurs	Negligible, short term on existing mine area; non-jurisdictional wetlands would be replaced as required by MDEQ and OSM	Same as No Action on expanded mine area
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 area	Same as No Action on expanded mine area
More uniformity in soil type, thickness, and texture	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Decreased runoff due to topographic modification	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
Changes in biological properties in soils that are stockpiled before reclamation would include:		
Reduction in organic matter	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in microorganism population	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction in seeds, bulbs, rhizomes and live plant matter	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Changes in chemical properties would include:		
More uniform soil nutrient distribution	Moderate, beneficial, long term on existing mine area	Same as No Action on expanded mine area
VEGETATION		
During mining:		
Progressive removal of existing vegetation	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased erosion	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Livestock grazing and wildlife habitat loss	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Potential invasion of non-native plant species	Moderate, short term on existing mine area	Same as No Action on expanded mine area
After revegetation:		
Changes in vegetation patterns	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Reduction in vegetation diversity	Negligible, long term on existing mine area	Same as No Action on expanded mine area
Reduction in shrub density	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Decreased big game habitat carrying capacity	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Decreased habitat for shrub dependent species	Moderate, long term on existing mine area	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-3. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
WILDLIFE		
Big game displacement from active mining areas	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased competition on adjacent undisturbed or reclaimed lands, especially big game	Moderate, short term on adjacent area	Same as No Action on adjacent area
Restriction of wildlife movement, especially big game	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Increased mortality of small mammals	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Displacement of small and medium-sized mammals	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Surface and noise disturbance of active sharp-tailed grouse leks	Moderate, short to long term on existing mine area	Same as No Action on expanded mine area
Disturbance of sharp-tailed grouse nesting habitat during mining	Moderate, short term on existing mine area	Same as No Action on expanded mine area
Loss of sharp-tailed grouse nesting habitat after reclamation	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Abandonment of raptor nests	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Loss of foraging habitat for raptors	Negligible, short to long term on existing mine area	Same as No Action on expanded mine area
Loss of nesting and foraging habitat for other passerine birds of concern	Negligible, short to long term on existing mine area	Same as No Action on expanded mine area
Reduction in waterfowl resting and feeding habitat	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Loss of habitat for aquatic, amphibian and reptile species during mining	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Road kills by mine-related traffic	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Alteration of plant and animal communities after reclamation	Negligible, short term on existing mine area	Same as No Action on expanded mine area
Reduction in habitat carrying capacity and habitat diversity on reclaimed lands	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Potential reduction in microhabitats on reclaimed lands	Moderate, long term on existing mine area	Same as No Action on expanded mine area
THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES		
(See Appendices B and C)		
Black-footed ferret Least tern	No impact on existing mine area	USFWS has acknowledged that the Proposed Action would have no effect
LAND USE AND RECREATION		
Reduction of livestock grazing	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction of cropland	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Reduction of wildlife habitat	Moderate, long term on existing mine area	Same as No Action on expanded mine area
Restricted access to land for ranching and recreational activities	Moderate, short term on existing mine area	Same as No Action on expanded mine area
CULTURAL RESOURCES		
Sites that are not eligible for NRHP	Ineligible sites may be destroyed without further work	Same as No Action on expanded mine area
Sites that are eligible for NRHP	Impacts to sites that are eligible for the NHRP are not permitted; eligible sites would be avoided or mitigated through data recovery prior to mining	Same as No Action on expanded mine area
Sites that are unevaluated for eligibility	Impacts to unevaluated sites are not permitted; unevaluated sites would be evaluated prior to mining	Same as No Action on expanded mine area

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-3. Summary Comparison of Magnitude[1] and Duration of Direct and Indirect Impacts for the Proposed Action, Alternative1, and the No Action Alternative[2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
NATIVE AMERICAN CONCERNS	No impact identified on existing mine area	Same as No Action on expanded mine area
VISUAL RESOURCES		
<u>During mining:</u>		
Alteration of landscape by mining facilities and operations	Moderate, short term on existing mine area	Same as No Action on expanded mine area
<u>Following reclamation:</u>		
Smoother sloped terrain	Negligible, long term on existing mine area	Same as No Action on expanded mine area
NOISE		
Increased noise levels	Moderate to substantial, short term on existing mine, surrounding area and occupied dwellings within 2,500 feet of existing mine area	Same as No Action on expanded mine area, no occupied dwellings within one mile of expanded mine area
TRANSPORTATION FACILITIES		
Use of railroad to ship coal	Moderate, for duration of existing approved mining operations	Same as No Action for additional 11 to 12 years
Use of roads and highways to transport coal to power plant near Hardin, Montana	Moderate, for duration of existing approved mining operations	Same as No Action for additional 11 to 12 years
Employees and service contractors use of roads and highways to and from mine site	Moderate, for duration of existing approved mining operations	Same as No Action for additional 11 to 12 years
HAZARDOUS AND SOLID WASTE		
Waste generated by mining operation	Negligible for duration of existing mining operations	Same as No Action for additional 11 to 12 years
SOCIOECONOMICS		
Employment	Moderate, beneficial short term for existing approved mining operations	Same as No Action for additional 11 to 12 years
Revenues from royalties and production taxes to the Crow Tribe	Moderate, beneficial short term on existing mine area	Same as No Action for additional 11 to 12 years
Revenues from WRI income taxes to the state government	Moderate, beneficial short term on existing mine area	Same as No Action for additional 11 to 12 years
Revenues from property taxes to the county government	Moderate, beneficial short term on existing mine area	Same as No Action for additional 11 to 12 years
Economic development	Moderate, beneficial short term on existing mine area	Same as No Action for additional 11 to 12 years
Additional housing and infrastructure needs	No new impact related to existing mine area	Same as No Action for additional 11 to 12 years

[1] Refer to Chapter 3 for a discussion on magnitude of impacts.
[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2].

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE, TYPE, AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
TOPOGRAPHY & PHYSIOGRAPHY		
Alteration of topography following reclamation of coal disturbance areas	Permanent topographic moderation following reclamation	Same as No Action
Alteration of topography to accommodate coal mining, coal-related, oil and gas, and oil- and gas-related facilities	Long term to permanent, limited changes in discrete scattered areas	Same as No Action
GEOLOGY AND MINERALS		
Recovery of coal resulting in reduction in coal resources and disturbance and replacement of overburden and topsoil	Moderate, long term to permanent	Same as No Action
Surficial disturbance and reclamation on oil and gas well sites and associated facilities	Moderate, long term to permanent	Same as No Action
PALEONTOLOGY		
Coal, coal-related, oil and gas, and oil- and gas-related development disturbance of Fort Union Formation	Permanent potential adverse effects to scientifically significant fossils that are present but not visible prior to disturbance	Same as No Action
AIR QUALITY		
Impacts to Montana near-field receptors:		
24-hour PM_{10}	A maximum modeled impact in one area above NAAQS for the baseline year and both coal production scenarios for 2010	Same as No Action
All other parameters	Modeled impacts in compliance with NAAQS and Montana AAQS	Same as No Action
Impacts to Wyoming near-field receptors:		
24-hour PM_{10}	Modeled impact above NAAQS at some receptors for both coal production scenarios for 2010	Same as No Action
Annual PM_{10}	Maximum modeled impact above NAAQS at one receptor for the upper production scenario for 2010	Same as No Action
All other parameters	Modeled impacts in compliance with NAAQS and Wyoming AAQS	Same as No Action

[1] Cumulative impact discussion in this table and in Chapter 4 is based on BLM's PRB Coal Review analyses (BLM 2005d, 2006b) and Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a).

[2] All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	*MAGNITUDE, TYPE, AND DURATION OF IMPACT*	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
AIR QUALITY (Continued)		
Non-regulatory PSD Impacts at Class I and Sensitive Class II Areas:		
Class I Northern Cheyenne Indian Reservation	Modeled impacts above Class I increment levels for 24-hour PM_{10}, annual PM_{10}, 24-hour SO_2, 3-hour SO_2 for baseline year and both coal production scenarios for 2010; above Class I increment for annual NO_2 for upper coal production scenario for 2010	Same as No Action
Class I Washakie Wilderness Area and Wind Cave National Park and Class II Crow Indian Reservation	Modeled impacts above Class I increment levels for 24-hour PM_{10} for baseline year and both coal production scenarios for 2010	Same as No Action
All other Class I and Sensitive Class II modeled receptors	Modeled impacts within Class I increment levels for baseline year and both coal production scenarios for 2010	Same as No Action
Visibility Impacts	199 or more days with a change of 1.0 dv or greater at three Class I areas and seven sensitive Class II areas for the baseline year and both coal productions scenarios for 2010	Same as No Action
GROUNDWATER RESOURCES		
Removal of coal aquifer and replacement with backfill material	Moderate, permanent for mining areas	Same as No Action
Lowering of water levels in aquifers around the mine	No cumulative impacts anticipated	Same as No Action
Water level decline in sub-coal aquifers as a result of all development	No cumulative impacts anticipated	Same as No Action
Change in groundwater quality as a result of all development	No cumulative impacts anticipated	Same as No Action
Overlapping drawdown in the coal aquifer caused by surface mining and CBNG development	No cumulative impacts anticipated	Same as No Action

1 Cumulative impact discussion in this table and in Chapter 4 is based on BLM's PRB Coal Review analyses (BLM 2005d, 2006b) and Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a).
2 All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SURFACE WATER RESOURCES		
Surface disturbance of intermittent and ephemeral streams and scattered ponds and reservoirs as a result of coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Discharge of coal mining and CBNG produced waters into intermittent and ephemeral streams	Moderate, short to long term impacts through potential increase in discharge quantity and water salinity depending on discharge water quality and quantity and method of disposal	Same as No Action
Sediment input into intermittent and ephemeral streams and scattered ponds and reservoirs as a result of coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
ALLUVIAL VALLEY FLOORS		
Coal mining disturbance of AVFs determined to be significant to agriculture	Not permitted by regulation	Same as No Action
Coal mining disturbance of AVFs determined not to be significant to agriculture	AVFs disturbed by mining must be restored to essential hydrologic function (No cumulative impacts anticipated)	Same as No Action
SOILS		
Coal mining, coal-related, oil and gas, and oil- and gas-related disturbance and replacement of soil resources	Moderate, short term and long term impacts through accelerated wind or water erosion, declining soil quality factors through compaction, reduced microbial populations and organic matter, and potential mixing of soil zones	Same as No Action
CBNG water disposal impacts to soil resources	Potential short and long term impacts through increase in soil alkalinity depending on SAR levels in water and method of water disposal	Same as No Action
VEGETATION		
Coal mining, coal-related, oil and gas, and oil- and gas-related removal and replacement of native vegetation	Moderate, short to long term impacts due to potential differences in species composition and presence and size of woody species on reclaimed lands	Same as No Action
Coal mining, coal-related, oil and gas, and oil- and gas-related impacts to Special Status Plant Species	Potential incremental loss or alteration of potential or known habitat	Same as No Action

1 Cumulative impact discussion in this table and in Chapter 4 is based on BLM's PRB Coal Review analyses (BLM 2005d, 2006b) and Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a).
2 All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
VEGETATION (Continued)		
Coal mining, coal related, oil and gas, and oil- and gas-related dispersal of noxious and invasive species	Potential displacement of native species and changes in species composition	Same as No Action
WETLAND AND RIPARIAN VEGETATION		
Discharge of produced water from mining and CBNG development	Moderate, short to long term creation of wetlands in areas that previously supported upland vegetation	Same as No Action
WILDLIFE		
Direct and indirect coal mining, coal-related, oil and gas, and oil- and gas-related development impacts to game and non-game species, including direct mortality, habitat fragmentation, animal displacement, noise and increased human presence	Moderate, short term	Same as No Action
Coal mining, coal-related, oil and gas, and oil- and gas-related disturbance of game and nongame species habitat during project development and operation	Moderate, short term loss of all types of habitat present in disturbed areas	Same as No Action
Coal mining, coal related, oil and gas, and oil- and gas-related habitat changes after reclamation	Moderate, long term change in habitat with potential changes in associated wildlife populations	Same as No Action
FISHERIES		
Alteration or loss of habitat due to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Changes in water quality as a result of surface disturbance or introduction of contaminants into drainages caused by coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Changes in available habitat as a result of water withdrawals or discharges related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
SPECIAL STATUS SPECIES		
Direct and indirect coal mining, coal-related, oil and gas, and oil- and gas-related development impacts, including direct mortality, breeding area, nest or burrow abandonment, noise and increased human presence	Moderate, short term	Same as No Action

1 Cumulative impact discussion in this table and in Chapter 4 is based on BLM's PRB Coal Review analyses (BLM 2005d, 2006b) and Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a).
2 All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SPECIAL STATUS SPECIES (Continued)		
Coal mining, coal-related, oil and gas, and oil- and gas-related disturbance of habitat during project development and operation	Moderate, short term loss of all types of special status species habitat present in disturbed areas	Same as No Action
Coal mining, coal related, oil and gas, and oil- and gas-related habitat changes after reclamation	Moderate, long term change in habitat with potential changes in associated populations of special status species	Same as No Action
LAND USE AND RECREATION		
Loss of forage and range improvements and restriction of livestock movement due to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
Disturbance of developed recreation sites by coal mining, coal-related, oil and gas, and oil- and gas-related development	Negligible, short term	Same as No Action
Reduction or degradation of opportunities for dispersed recreation activities related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term on existing mine area	Same as No Action
CULTURAL RESOURCES		
Disturbance of cultural resource sites	Moderate, permanent	Same as No Action
TRANSPORTATION AND UTILITIES		
Movement of segments of existing highways, pipelines, or utility transmission lines to accommodate coal mining development	Moderate, long term to permanent, disruptive effects would be minimized	Same as No Action
Increased vehicular traffic on roads and highways due to coal mining, coal-related, oil and gas, and oil- and gas-related development, and associated impacts including traffic accidents, road wear, air emissions, dust, noise, and vehicle collisions with wildlife and livestock	Moderate, short term	Same as No Action
Construction and operation of additional railroad and pipeline facilities and transmission lines to transport coal, oil and gas, and electricity	Moderate, short to long term	Same as No Action

1 Cumulative impact discussion in this table and in Chapter 4 is based on BLM's PRB Coal Review analyses (BLM 2005d, 2006b) and Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a).
2 All impacts are assumed to be adverse unless noted otherwise.

Table 2-4. Summary Comparison of Magnitude and Duration of Cumulative Impacts[1, 2] (Continued).

DESCRIPTION OF POTENTIAL IMPACT BY RESOURCE	***MAGNITUDE, TYPE, AND DURATION OF IMPACT***	
RESOURCE NAME	**NO ACTION ALTERNATIVE**	**PROPOSED ACTION and ALTERNATIVE 1**
SOCIOECONOMICS		
Increases in employment related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, short to long term	Same as No Action
Increases in personal income due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, beneficial, short to long term	Same as No Action
Increase in population due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, short to long term	Same as No Action
Expansion of housing supply due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, short to long term	Same as No Action
Increases in school enrollment due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short term	Same as No Action
Need for additional local government facilities and services due to employment increases related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Moderate, short to long term	Same as No Action
Increased federal state and local revenues related to coal mining, coal-related, oil and gas, and oil- and gas-related development	Significant, beneficial, short to long term	Same as No Action

[1] Cumulative impact discussion in this table and in Chapter 4 is based on BLM's PRB Coal Review analyses (BLM 2005d, 2006b) and Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a).
[2] All impacts are assumed to be adverse unless noted otherwise.

ii.) any adverse environmental effects which cannot be avoided should the proposal be implemented,

iii.) alternatives to the Proposed Action,

iv.) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented [42 USC § 4332(C)].

Impacts can be beneficial or adverse, and they can be a primary result of an action (direct) or a secondary result (indirect). They can be permanent, long-term (persisting beyond the end of mine life and reclamation) or short-term (persisting during mining and reclamation and through the time the reclamation bond is released). Impacts also vary in terms of significance. The basis for conclusions regarding significance are the criteria set forth by the Council on Environmental Quality (40 CFR 1508.27), MEPA and its implementing rules, and the professional judgment of the specialists performing the analyses. Impact significance may range from negligible to substantial; impacts can be significant during mining but be reduced to insignificant following completion of reclamation.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources in the general analysis area (the affected environment) and analyzes the direct and indirect impacts to those resources that would be associated with implementation of the Proposed Action or Alternative 1 as they relate to Westmoreland Resources Inc.'s (WRI's[1]) South Extension development plan (the environmental consequences).

The probable environmental consequences of the No Action Alternative (Alternative 2) with respect to each of the environmental resources are also considered in this analysis.

This chapter also considers regulatory compliance, mitigation, monitoring, residual impacts, the relationship between local and regional short-term uses of man's environment, the maintenance and enhancement of long-term productivity, and the irreversible and irretrievable commitments of resources that would occur with implementation of the Proposed Action or Alternative 1. As discussed in Chapter 2, regulatory compliance and mitigation and monitoring measures that are required by federal and/or state law are considered to be part of the Proposed Action and Alternative 1.

The National Environmental Policy Act (NEPA) requires that all critical elements of the human environment must be considered in all Environmental Assessments (EAs) and Environmental Impact Statements (EISs). Critical elements of the human environment (BLM 1988) that could potentially be affected by the Proposed Action or Alternative 1 include air quality, cultural resources, Native American religious concerns, Threatened and Endangered (T&E) species, migratory birds, hazardous or solid wastes, water quality (both surface and ground), wetlands/riparian zones, floodplains, invasive non-native species, and environmental justice. Four other critical elements of the human environment (areas of critical environmental concern, prime or unique farmlands, wild and scenic rivers, and wilderness) are not present in the general analysis area and are not addressed further. In addition to the critical elements that are potentially present in the general analysis area, this EIS discusses the status and potential effects of mining the South Extension development area on topography and physiography, geology and mineral resources, soils, water quantity, alluvial valley floors, vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics.

Figure 3-1 shows the general analysis area for most environmental resources. The general analysis area includes the lands within and adjacent to Absaloka Mine's current permit area that contain both the Tract III Revision area and the South Extension area. The study area for most environmental resources is generally

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

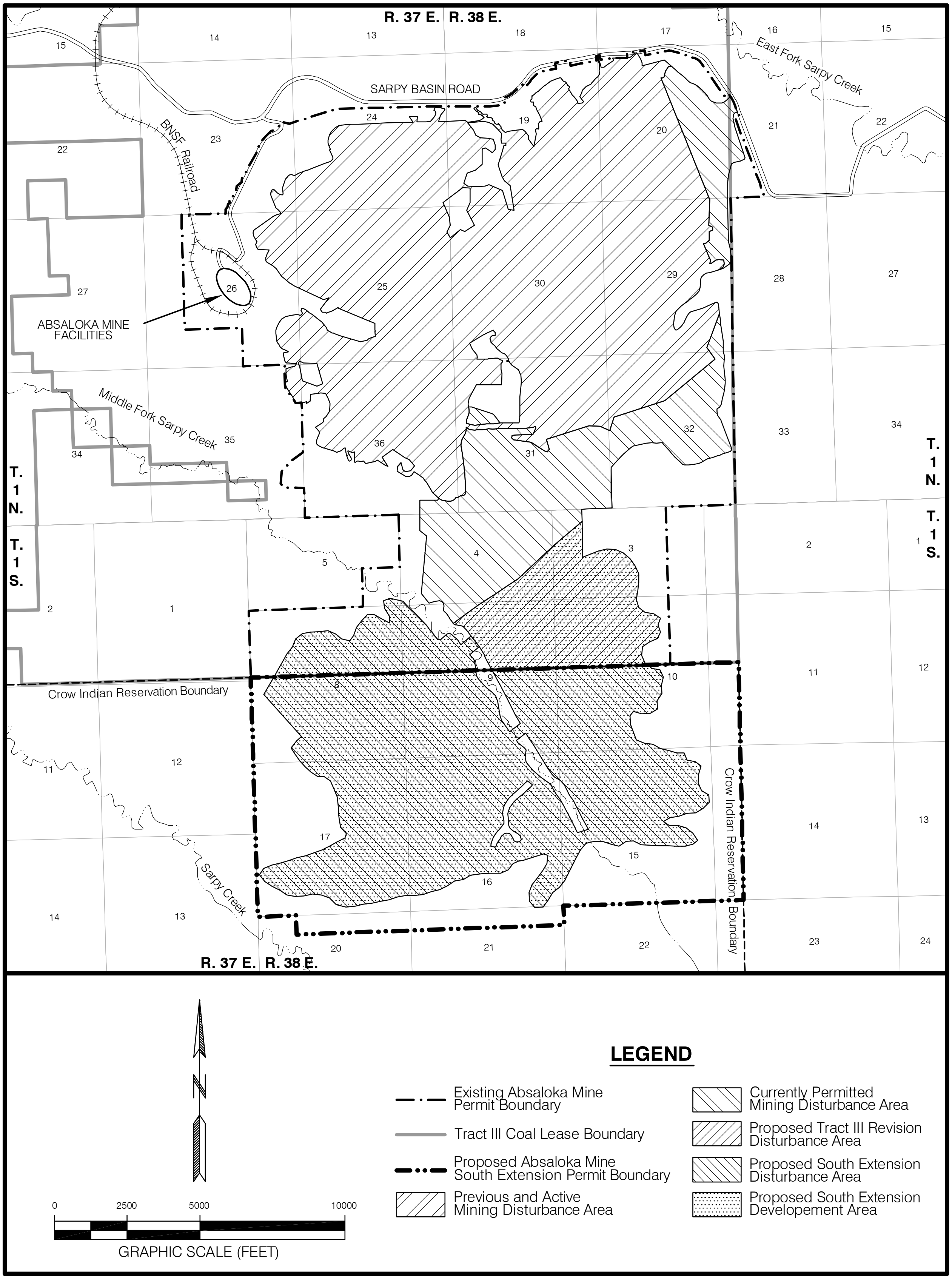


Figure 3-1. General Analysis Area.

defined as those lands within Absaloka Mine's current permit area that contain the Tract III Revision area and those lands adjacent to and outside Absaloka Mine's current permit area that WRI anticipates would be contained within the Office of Surface Mining Reclamation and Enforcement's (OSM's) South Extension mine permit.

For purposes of environmental analysis, the South Extension development area is essentially the area that would be disturbed by removal of the economically mineable coal reserves within the Tract III Revision area and the South Extension area.

Table 3-1 shows the acreage leased and disturbance area for the existing Absaloka Mine (which represents the No Action Alternative), and how the leased area and disturbance area would change under the Proposed Action and Alternative 1. A portion of the South Extension development area lies inside the current mine permit area (Figure 2-1). Under the Proposed Action, the area that would be added to the existing mine permit area would be nearly all of the South Extension lease area. The South Extension is contiguous to Absaloka Mine's existing mine permit area. No portions of the South Extension would be disturbed by either the currently approved mining plan or the proposed Tract III Revision mining plan in order to recover the coal in the existing Tract III Coal Lease. The proposed disturbance area includes the area of coal removal plus an adjacent strip of land that would be used for highwall reduction after mining and such mine-related activities as construction of sediment control structures, roads, and stockpiles. The environmental consequences of implementing the Proposed Action or Alternative 1 would be similar in nature, but selection of Alternative 1 would disturb a smaller area of land surface. Table 2-3 presents a brief summary of the probable environmental impacts of implementing the Proposed Action and Alternative 1 as compared to the No Action Alternative. The magnitude of those impacts and the regulatory compliance, mitigation and monitoring measures required by federal and/or state law are detailed in the following analysis.

3.1 General Setting

The general analysis area is located in the Powder River Basin (PRB), a part of the Northern Great Plains that includes most of northeastern Wyoming and a smaller portion of southeastern Montana. Vegetation is primarily a mixture of native grassland, a variety of shrub communities, ponderosa pine trees, and improved grass pasture.

3.1.1 Climate and Meteorology

Climatic conditions in the area around the Absaloka Mine are typical of the semiarid high plains. Evaporation greatly exceeds precipitation, with relatively short warm summers and longer cold winters, and relatively large seasonal and diurnal variations in temperature and precipitation. Precipitation averages

Table 3-1. Comparison of Existing and Proposed Absaloka Mine Disturbance Area and Mining Operations.

	No Action Alternative	**Proposed Action**	**Alternative 1**
Additional Lease Area (Acres)	0.0	3,660.2	0.0
Total Lease Area (Acres)	≈ 14,000	≈ 17,660	≈ 14,000
Increase in Lease Area (Percent)	0.0	26.1	0.0
Additional Mine Permit Area (Acres)	0.0	3,316.9	0.0
Total Mine Permit Area (Acres)	7,110.0	10,426.9	7,110.0
Increase in Mine Permit Area (Percent)	0.0	46.7	0.0
Estimated Additional Mine Disturbance Area (Acres)	0.0	2,637.0	385.0
Estimated Total Mine Disturbance Area (Acres)[1]	4,835.0	7,472.0	5,220.0
Increase in Estimated Disturbance Area (Percent)	0.0	54.5	8.0
Estimated Additional Recoverable Coal (Million Tons)	0.0	76.6	13.0
Estimated Recoverable Coal for Mine as of 1/07 (Million Tons)	21.0	97.6	34.0
Increase in Estimated Recoverable Coal as of 1/07 (Percent)	0.0	364.8	61.9
Remaining Life of Mine (Post 2006)	3 yrs	11-12 yrs	2-3 yrs

[1] Total Disturbance Area = area to be mined + area disturbed for mine facilities, access roads, haul roads, highwall reduction, railroad facilities, stockpiles, etc.

around 14 to 15 inches per year and the wettest months are normally May and June. Prevailing winds in this area of Montana are generally from the southeast and north. The local, somewhat rugged terrain affects wind, precipitation, and temperature patterns.

A new meteorological station was established at the Absaloka Mine in September 2005 and has been in constant operation since that time (Bison Engineering 2006a). The on-site meteorological monitoring station was located, as recommended by OSM, at the same location originally recommended by the Montana Department of Environmental Quality (MDEQ) in 1978. Land surface elevation at the site, which is located within the mine facilities area, is 3,550 feet above sea level.

Precipitation

The average monthly precipitation measured at the Absaloka Mine over the entire period of record (1976 through 2006) ranges from 0.59 inches during the month of February to 2.17 inches during the month of May. The total annual precipitation measured at the mine site ranged from 8.95 inches in 1980 to 23.66 inches in 1978, and the average annual precipitation is 14.06 inches. Precipitation in the 2005 water year (October 2004 through September 2005) was 20.36 inches, approximately 45 percent above the average annual amount for the mine site.

Spring precipitation is commonly associated with major weather systems, while summer precipitation is typically from thunderstorms. Thundershowers can vary greatly in intensity and duration and may occasionally be accompanied by hail and strong winds. Measurable amounts of snow are not uncommon as early as September and as late as June. Total snowfall generally is greatest in December and January, when it is around 7 inches. Total annual snowfall is about 45 inches. Snow does not ordinarily accumulate due to occasional periods of thawing throughout the winter months. Snowmelt runoff typically begins in March, although occasional warm chinook conditions in January and February can quickly melt the snow pack.

Droughts are not uncommon in eastern Montana, and this area has suffered from a moderate to severe drought cycle that has persisted since 2000. The total annual precipitation amounts recorded at the Absaloka Mine from 2000 through 2005 were 12.50 inches, 12.17 inches, 11.63 inches, 15.83 inches, 10.84 inches, and 22.07 inches, respectively. Examination of the National Oceanic and Atmospheric Administration (NOAA) drought and precipitation monitors (NCDC 2006) indicates that the intensity of broad-scale drought conditions in this area of Montana, as of December 12, 2006, was moderate. Moderate drought intensity is defined as having some damage to crops and pastures; high fire risk; low streamflows, reservoir levels, or groundwater levels; some water shortages developing or imminent; and voluntary water use restrictions are requested. Above normal rainfall in conjunction with unseasonably cool temperatures during the spring of 2007 improved drought conditions, and the National Drought Mitigation Center's drought monitor map for Montana, as of July 10, 2007, indicated that drought impacts are no longer present in this area (NDMC 2007). The U.S. Climate Prediction Center forecasts drought conditions would not be present through September 2007 for this area, the eastern half of Montana, and the entire northern plains (CPC 2007).

Evaporation

Evaporation data at the Absaloka Mine were collected from 1975 through 1989 and in 1992. These data show an average of 37.2 inches of evaporation during May through September, nearly triple the average annual precipitation amount.

Temperature

The average monthly temperatures measured at the Absaloka Mine over the entire period of record (1975 through 2006, except for January 1983 through September 1986) range from 24.5 degrees Fahrenheit (F) during January to 71.9 degrees F during August. The average high temperatures range from about 33 degrees F in January to around 88 degrees F in July. Average low temperatures are around 10 degrees F in January and about 55 degrees F in July (Bison Engineering 2006a).

Wind

No long-term wind data exist for the general analysis area. According to the most recent year of data (October 2005 through September 2006), the average monthly surface wind speeds were highest in May, June, July, and September at 6.0 to 6.3 miles per hour (mph). The average monthly wind speed was calmest in October, at about 4.5 mph. The average wind speed over the period of record is approximately 5.8 mph, and the prevailing winds are from the southeast and north (Bison Engineering 2006a). These data were processed into a wind rose diagram, which is included in Section 3.4 of this EIS.

The area experiences extreme wind gusts, especially during thunderstorms in the spring and blizzards in the winter. Distinct diurnal changes occur, with average wind velocities increasing during the day and decreasing during the night. Local variations in wind conditions reflect channeling (mountain and valley) flow due to the region's complex terrain (USGS 1977).

3.2 Topography and Physiography

3.2.1 Affected Environment

The general analysis area is within the unglaciated Missouri Plateau subregion of the Great Plains Province, near the northwestern edge of the PRB, which is an elongated asymmetrical structural downfold that is bounded by the Black Hills Uplift on the east; the Bighorn Mountains on the west; the Hartville Uplift, Casper Arch, and Laramie Mountains on the south, and the Miles City Arch and Yellowstone River on the north. Elevations in the PRB range from less than 2,500 feet to greater than 6,000 feet above sea level. The regional dip in this area of the PRB is to the south-southeast.

This area of the PRB has been highly dissected by tributaries of the Yellowstone River. Mature broad valleys have been developed along the major watercourses. Streambeds formed through erosion of the soft sedimentary rocks as intermittent or ephemeral surface water flowed across the land surface. The smaller stream channels are commonly not well defined and do not have distinct beds and banks throughout their length. Other characteristic landforms of the area consist of dissected rolling hills, plateaus, and ridges of moderate to low relief that formed in the near-flat lying sedimentary strata of the Fort Union Formation. Resistant sandstone and clinker beds cap most of the upland areas and form steep cliff escarpments and isolated knobs.

The general analysis area (Figure 3-1) is drained by Sarpy Creek and its tributary, Middle Fork Sarpy Creek. Middle Fork Sarpy Creek flows north-northwest, roughly through the central portion of the general analysis area, to its confluence with Sarpy Creek about 3 miles downstream. Sarpy Creek and its tributaries drain the entire Tract III Coal Lease area (Figure 1-1). Sarpy Creek flows generally northward about 36 miles from the Absaloka Mine site to its confluence with the Yellowstone River (Figure 1-2).

Sarpy Creek and its tributaries have their headwaters in the Little Wolf and Sarpy Mountains to the east and south of the general analysis area. The Little Wolf Mountains dominate the eastern horizon. Elevations in the Little Wolf Mountains are in excess of 4,500 feet and they are highly dissected by ephemeral streams (or coulees). Steep cliffs and canyons have developed in these upland areas where rapid erosion and mass wasting are currently ongoing. After the streams leave the rugged terrain at their headwaters, their channel gradients become more gentle and uniform. The Middle Fork Sarpy Creek channel elevation ranges from approximately 3,570 feet to 3,500 feet within the South Extension development area, and is at approximately 3,330 feet at the stream’s confluence with the main stem of Sarpy Creek, which is roughly 3 miles downstream of the proposed development area.

The most prominent topographic feature of the general analysis area is the relatively narrow, somewhat flat valley floor of Middle Fork Sarpy Creek. The valley is flanked on both sides by gently rolling to moderately rugged uplands that are covered with frequent groves of ponderosa pine interspersed with open range and fields used for dryland agriculture. The ridge that forms the drainage divide between Middle Fork Sarpy Creek and Sarpy Creek dominates the western portion of the general analysis area, while the ridge that forms the drainage divide between Middle Fork Sarpy Creek and East Fork Sarpy Creek dominates the eastern portion of the general analysis area. Surface-mined lands, both active and reclaimed, dominate the landscape immediately north of the South Extension development area. The steepest terrain in the general analysis area is the cliffs and escarpments of resistant bedrock exposed near the tops of the ridgelines that form the headwaters of Sarpy Creek’s tributaries.

Land surface elevations within the South Extension development area range from 3,500 to 3,790 feet above sea level, and slopes range from nearly flat on the valley bottoms and ridge tops to around 40 and 50 percent on the flanks of the surrounding ridges and hilltops. Approximately 61 percent of the surface has a slope of 10 percent or less; 94 percent of the surface has a slope of 20 percent or less; and 99 percent has a slope of 30 percent or less. The average slope for the entire South Extension development area is 9.8 percent. Elevations within just the Tract III Revision area range from 3,500 to 3,750 feet above sea level, slopes range from nearly flat to 46 percent, and roughly 96 percent of the surface has a slope of 20 percent or less. A topographic contour map of the present topography of the South Extension development area and adjacent lands is shown on Figure 3-2.

Overall, the topography and physiography of the South Extension development area is very similar to that of the existing Absaloka Mine permit area.

3.2.2 Environmental Consequences

3.2.2.1 Proposed Action and Alternative 1

During mining, the existing topography on the proposed development area would be substantially changed. Topsoil would be removed and stockpiled or placed directly on recontoured areas. Overburden would be blasted and directly placed into the already mined pit, and coal would be removed. A highwall with a vertical height equal to overburden plus coal thickness would exist in the active pits.

Typically, a direct permanent impact of coal mining and reclamation is topographic moderation. After reclamation, the postmining topography would be similar to the premining topography, but somewhat gentler and more uniform, and would blend with the undisturbed surroundings. The original topography of the South Extension development area ranges from the relatively flat bottomland to the somewhat rugged uplands. Slopes range from around flat to nearly 50 percent, as discussed above, and the average slope is about 10 percent. Following reclamation, the average surface elevation on the proposed development area would be approximately 5.5 feet lower due to coal removal. The removal of the coal would be partially offset by the swelling that occurs when the overburden and interburden are blasted, excavated, and backfilled. Table 3-2 presents the approximate postmining surface elevation changes under the Proposed Action and Alternative 1. These figures represent the estimated average change in surface elevation over the entire area of coal removal. After the coal is removed, highwalls would be eliminated and the land surface would be restored to the approximate original contour or to a configuration approved by MDEQ and OSM during the mine permitting processes.

Direct adverse impacts resulting from topographic moderation include a reduction in microhabitats (e.g., steep bedrock bluffs and escarpments) for some wildlife species and a reduction in habitat diversity, particularly a reduction in shrub communities and associated habitat. Absaloka Mine's existing reclamation plan, and the reclamation plan for the proposed development area, includes measures, to the extent possible, to establish wildlife enhancement features, including micro-topographic features (refer to Sections 3.9 and 3.10). These impacts, which would be greater in those areas characterized as rough breaks, may result in a long-term reduction in the carrying capacity for some species. A direct beneficial impact of

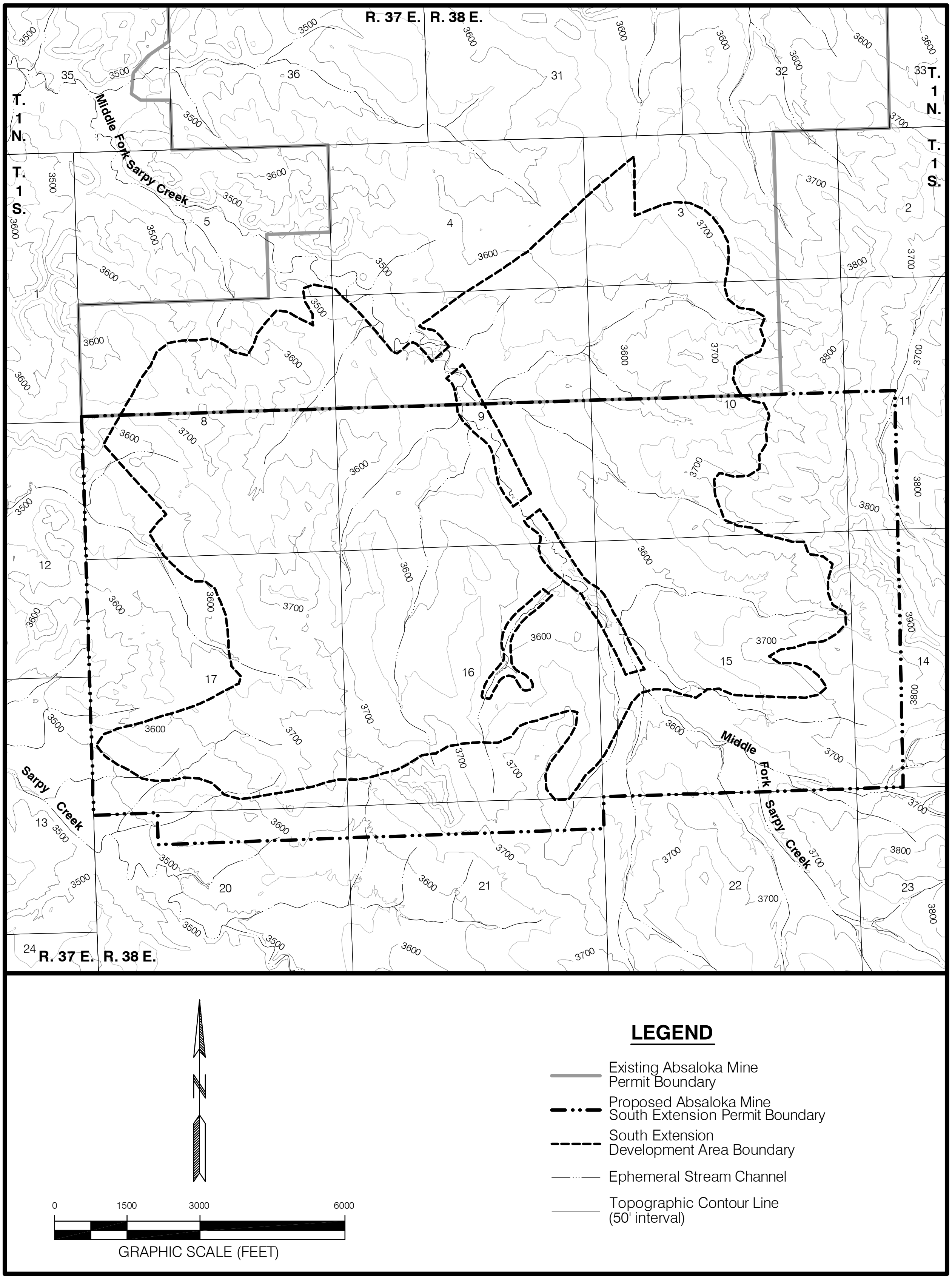


Figure 3-2. Topographic Contour Map of the Present Topography of the South Extension Development Area.

Table 3-2. Comparison of Average Overburden, Interburden, and Coal Thicknesses and Approximate Postmining Surface Elevation Changes Under the No Action and Action Alternatives.

	No Action Alternative (Existing Mine Permit Area)	**Proposed Action (South Extension Development Area)**	**Alternative 1 (Tract III Revision Area Only)**
Average Overburden Thickness (ft)	80.0	70.0	92.4
Average Interburden Thickness (ft)	2.0	11.7	6.8
Average Coal Thickness (ft)	32.0	30.4	32.4
Overburden Swell Factor (percent)	19.3	19.3	19.3
Coal Recovery Factor (percent)	80.0	79.0	79.0
Postmining Elevation Change[1]	9.8 ft lower	8.3 ft lower	6.5 ft lower

[1] Reclaimed (postmining) surface elevation change calculated as: (overburden + interburden thickness) + (overburden swell) – (coal thickness × coal recovery factor).

the lower and flatter terrain would be reduced water runoff, which would allow increased infiltration and result in a minor reduction in peak flows and potentially accelerate recharge of groundwater. This may help counteract the potential for increased erosion that could occur as a result of higher near-surface bulk density of the reclaimed soils (refer to Section 3.8). It may also increase vegetative productivity, which would result in a benefit to livestock grazing.

As discussed in Section 2.1.2, no mining would take place within a corridor approximately 500 to 600 feet wide along the Middle Fork Sarpy Creek channel, thereby preserving this natural drainage feature. The approximate original drainage pattern of all other tributary streams would be restored (refer to Figure 2-2 and Section 3.5.2). No major changes in the average overland slope are predicted. Any topographic changes would not conflict with regional land use, and the post-mining topography would adequately support anticipated land use. These measures are required by state and federal regulations and are therefore considered part of the Proposed Action and Alternative 1.

These impacts are occurring on the existing Absaloka Mine Tract III Coal Lease as the coal is mined and mined-out areas reclaimed. Under the Proposed Action or Alternative 1, the areas that would be permanently topographically changed would increase as shown in Table 3-1.

3.2.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would be not be permitted and coal removal and associated impacts would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to topography and physiography would continue as permitted on the Absaloka Mine's permit area for about 3 years (post 2006), or until about 2009. Table 3-2 presents the approximate postmining surface elevation change for the existing mine. No portion of the proposed development area adjacent to the Absaloka Mine would be disturbed to recover the coal in the existing approved mine and reclamation plan.

3.2.3 Regulatory Compliance, Mitigation and Monitoring

The mined-out area must be restored to approximate original contour or other topographic configuration approved by MDEQ and OSM. The topographic configuration would be developed and approved as part of the required mining and reclamation plan to be approved by state and federal regulatory agencies. MDEQ and OSM monitor topographic restoration during monthly mine inspections and by checking the as-built topography in the annual reports filed by the mine to see if it conforms to the approved topography.

3.2.4 Residual Impacts

Topographic moderation is a permanent consequence of mining. The indirect impacts of topographic moderation on wildlife habitat diversity would also be considered permanent.

3.3 Geology, Mineral Resources and Paleontology

3.3.1 General Geology and Coal Resources

3.3.1.1 Affected Environment

Geology in the proposed development area is typical of that found throughout the Tract III Coal Lease. If the South Extension development plan is approved and mining advances into the Tract III Revision and South Extension areas, the stratigraphic units that would be impacted include recent (Quaternary age) alluvial and colluvial deposits and the Paleocene age Tongue River Member of the Fort Union Formation (which contains the target coal seams). Additional information about these units is included in Section 3.5 of this EIS.

Surficial deposits within the proposed development area include recent alluvial and colluvial deposits and residuum of the Tongue River Member of the Fort Union Formation bedrock. The alluvial and lower stream terrace deposits occupy the Middle Fork Sarpy Creek valley, while the colluvial deposits generally flank the alluvial deposits, existing on the side slopes of the bordering highlands and may interbed with the alluvial deposits. The alluvial and colluvial deposits generally form a continuity of unconsolidated sediments that extend from the bordering highland areas onto the valley floor. Tributary drainages have deposited small fans of alluvial/colluvial material that intersect with and grade into the Middle Fork valley fill. Shallow alluvial and colluvial deposits are also present in the valley bottom of a tributary to Sarpy Creek, located in the western portions of Sections 8 and 17, T.1S., R.38E. Lithologies of these unconsolidated deposits represent materials eroded locally from the Fort Union Formation and reflect relatively near-source deposition. The alluvial deposits consist of poorly sorted, sub-rounded to angular sand and gravel that contains higher percentages of fines with decreasing depth. Overall, basal gravel deposits tend to be better sorted and coarser grained.

In the Absaloka Mine area, the Fort Union Formation is approximately 600 feet thick and divided into three members: the Tongue River, the Lebo Shale, and the Tullock, in descending order. In the Montana portion of the PRB, most of the mineable coal seams occur within the Tongue River Member, while the Lebo and Tullock Members are predominantly shale and shaley sand (McLellan et al. 1990). The Tongue River Member is composed mainly of very fine- to medium fine-grained sandstone; siltstone; shale; carbonaceous shale; and thick to thin, persistent coal beds (Robinson and Van Gosen 1986).

The two lowermost coal seams of the Tongue River Member are the Rosebud-McKay and the Robinson. All younger, stratigraphically higher coal seams have been removed by erosion in this area. In parts of the current mine area, the Rosebud and McKay seams are joined into a single seam referred to as the Rosebud-McKay, which averages 32 feet in thickness. Proposed mining within the Tract III Revision and South Extension development area would be limited to the Rosebud and McKay coal seams. A claystone parting of variable thickness separates the Rosebud and McKay seams throughout the proposed development area. The parting thickness ranges from less than one foot to over 40 feet, averaging 11.7 feet across the proposed development area. The Robinson seam, which averages just over 20 feet in thickness, would not be mined in the development area. The Robinson seam lies below and is separated from the McKay seam by approximately 80 to 100 feet of interburden. The Robinson seam was mined in the early years of the mine's operation, but is no longer being mined primarily due to customer concerns regarding poor combustion characteristics. There are two thin "rider" seams, each of which is only a few feet thick and not considered to be economic to mine. The Stray 1 seam occurs in portions of the Tract III Coal Lease area and is approximately 15 to 50 feet stratigraphically above the Rosebud seam, and the Stray 2 seam occurs 5 to 10 feet stratigraphically below the McKay coal seam.

Another geologic unit that is a part of the Fort Union Formation is scoria, also called clinker or burn. It consists of sediments that were baked, fused, and melted in place when the underlying coal burned. These burned sediments then collapsed into the void left by the burned coal, leaving a fractured and relatively resistant red or varicolored rock. The occurrence of scoria is site specific, occurring in areas where coal seams crop out at the surface. In the Absaloka

Mine area, scoria occurs where the Rosebud, McKay, and/or Robinson coal beds have burned back from their outcrops. Scoria outcrop areas occur primarily within the northern and western portion of the Absaloka Mine's current permit area and have, for the most part, determined the extent of mining in those directions. The Rosebud and McKay seams are burned in the western portion of the Tract III Revision and South Extension areas and the seams' burn lines largely determine the western limit of mining in the proposed development area.

Overburden depth is generally controlled by topography. An area of shallow overburden cover resulting from erosion by the Middle Fork Sarpy Creek drainage roughly transects the development area. Overburden depths range from zero at the Rosebud seam's outcrop to over 300 feet at the eastern boundary of the South Extension tract. Over 75 percent of the South Extension lies under fewer than 150 feet of overburden. Across the entire proposed development area, overburden depth averages approximately 70 feet.

All or parts of the Rosebud and McKay coal seams have been removed by erosion in the Middle Fork Sarpy Creek drainage bottom. Colluvial and/or alluvial deposits have replaced the coal in these areas, and both seams subcrop beneath these recent unconsolidated deposits. This feature effectively separates the proposed development area into western and eastern coal reserve blocks.

Where not affected by erosion or oxidation, the Rosebud and McKay seams are relatively consistent in thickness throughout the proposed development area. The minimum seam thicknesses occur in proximity to their burn lines and alluvial/colluvial subcrop areas. The Rosebud coal seam thickness ranges up to 22.3 feet and averages 17.9 feet. The McKay coal seam thickness ranges up to 16.6 feet and averages 12.5 feet.

Geologic strata in the northern part of the PRB generally dip gently to the south-southeast. However, localized folding and faulting in the proposed development area mask the regional structure. The structure of the development area exhibits shallow dips, typically less than 3 degrees, to the north with gentle folds forming shallow domes and basins (Norwest 2006). The local folds and faults trend northeast. Four northeast-trending structural faults occur in the proposed development area. All four faults are high-angle, normal, and downthrown on the southern side. The proposed development area is bound on the north and south sides by the two larger faults, the Tract III revision fault and the southern fault (as described in Chapter 2, Section 2.1.2), both of which extend completely across the proposed development area. Displacements on the southern fault range from 100 to 200 feet (Norwest 2006). The two smaller faults are on the west side of the South Extension tract and are of limited length.

Figures 3-3 and 3-4 depict three geologic cross sections drawn through the South Extension development area. These cross sections are representative of the geology in the vicinity of the proposed development area.

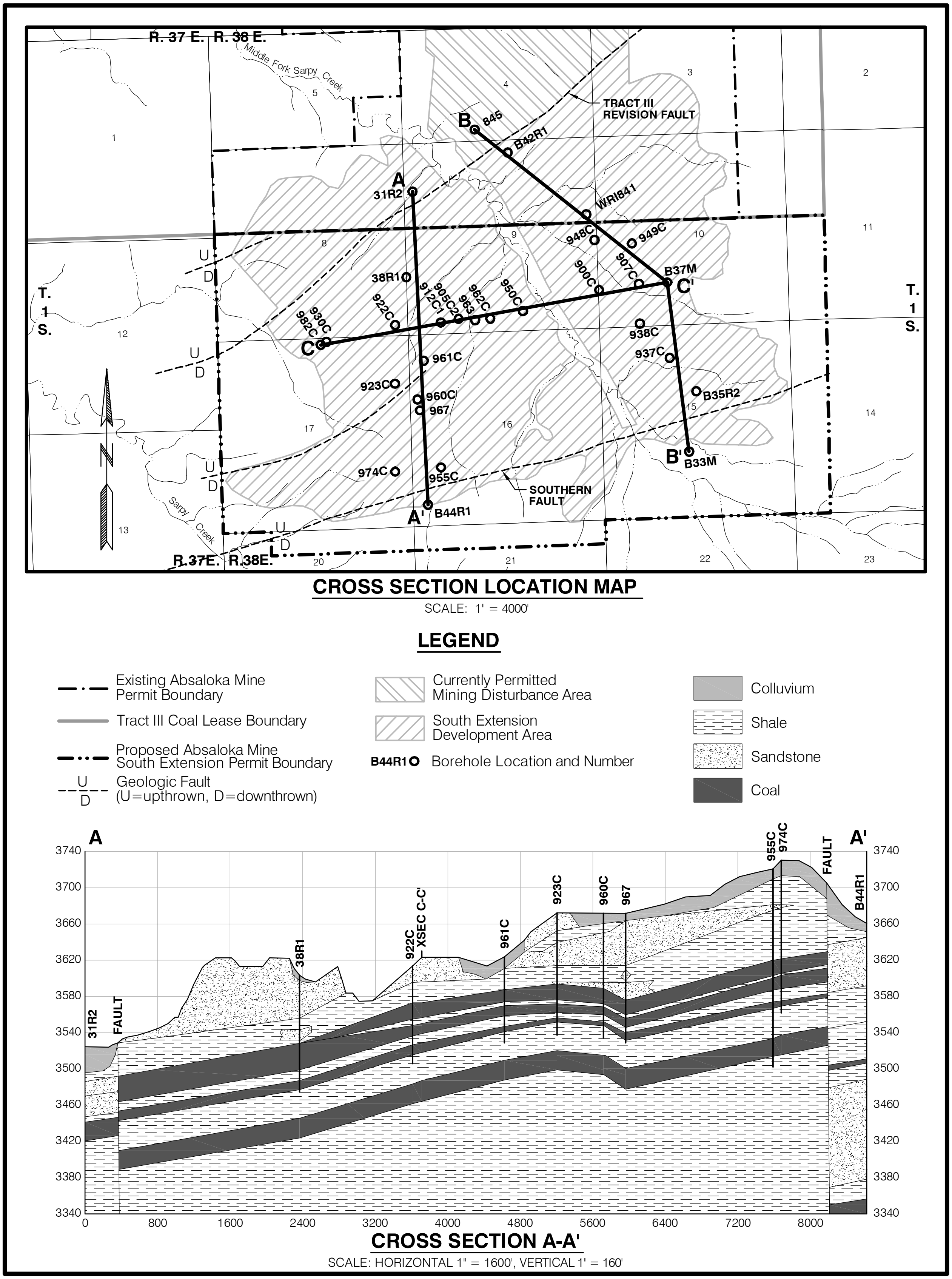


Figure 3-3. Geologic Cross Sections Within the South Extension Development Area.

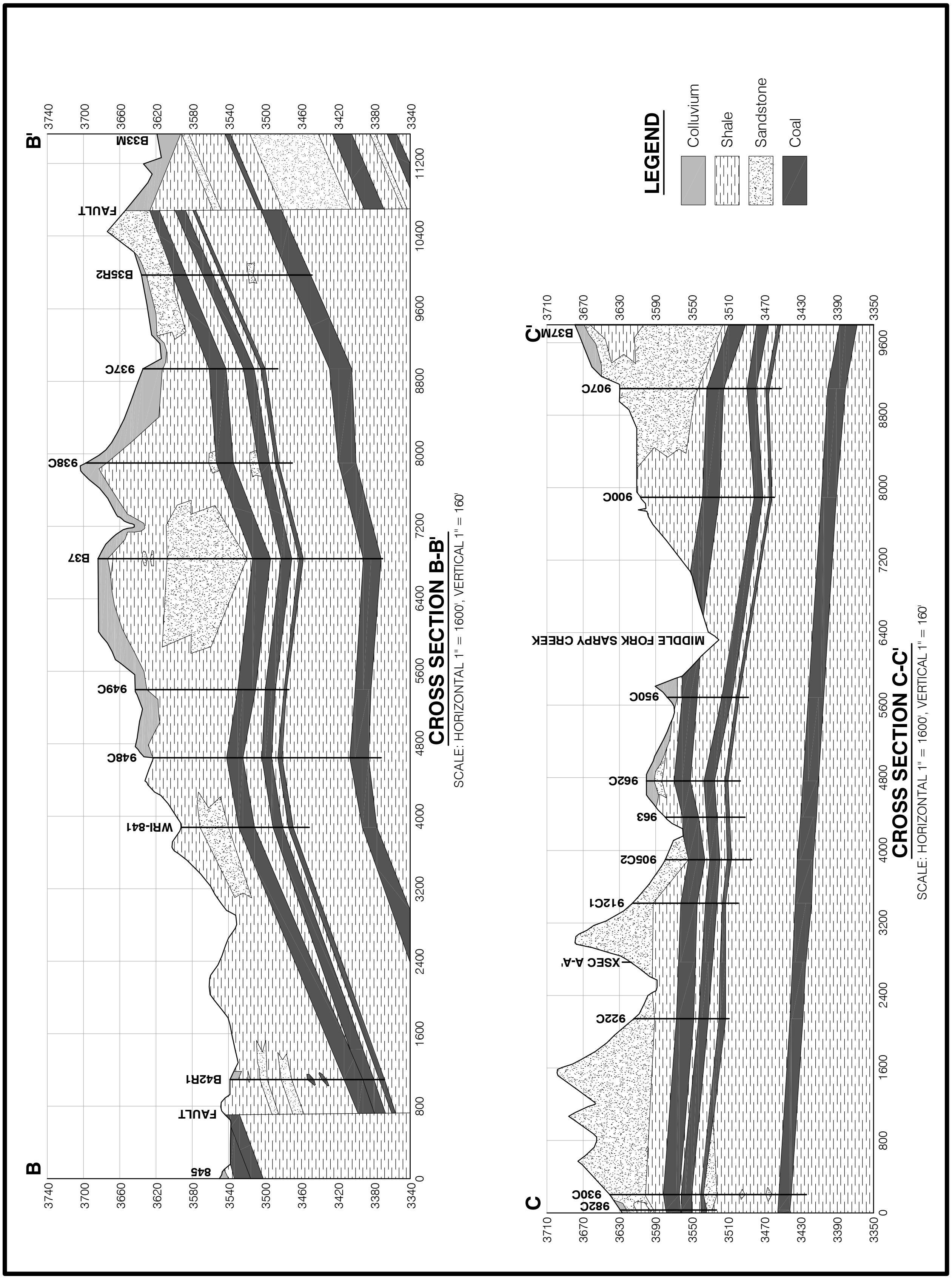


Figure 3-4. Geologic Cross Sections Within the South Extension Development Area.

The Fort Union coal seams are subbituminous and are generally low-sulfur, low-ash coals. In the Absaloka Mine area, the Rosebud and McKay seams have similar quality. According to the analyses (which were done on an as-received basis and adjusted to a 26.4 percent moisture basis to provide an estimate of run-of-mine product quality) of exploration drilling samples collected in 2004 in the proposed development area, the average heating value is 8,393 Btu/lb, with an average of 0.85 percent sulfur, 0.35 percent sodium oxide, and 10.99 percent ash. These run-of-mine quality values represent the average full seam quality. A characteristic of both the Rosebud and McKay seams, as with other seams in the northern PRB, is a pronounced degradation of quality at their top and base. The overall quality of the seams becomes more uniform through selective removal of seam tops and bases. Therefore, by removing an average of 19 percent of the full seam, the mineable seam, run-of-mine quality values are adjusted to an average heating value of 8,703 Btu/lb, with an average of 0.58 percent sulfur, 0.45 percent sodium oxide, and 8.56 percent ash (Norwest 2006).

Overburden geochemistry samples were collected from 13 drill holes and analyzed during the South Extension exploration drilling activities in 2004. Each drill hole's samples were composited to represent the major lithologic units encountered in the Rosebud overburden, the Rosebud to McKay interburden, and the floor material immediately beneath the McKay seam. Table 3-3 presents summary data from the results of the overburden geochemical analyses. In those few cases where individual strata exceed suitability criteria, mixing of the overburden and interburden column during the excavation and backfilling process would effectively mitigate any potential adverse effects. In general, overburden in the existing Absaloka Mine permit area is well within suitability standards listed in current regulatory guidelines, and the results of the 2004 sampling substantiate the suitable nature of the overburden in the proposed South Extension development area (Norwest 2006).

Table 3-3. Geochemical Analyses of Composited Samples of Rosebud-McKay Overburden, Interburden, and Floor Materials.

Sample Composite	**SAR**	**pH**	**Conductivity (µmhos/cm)**	**Saturation Percent**	**Boron (ppm)**	**Selenium (ppm)**
Overburden	0.729	8.245	1.254	34.900	0.624	0.027
Interburden	0.535	7.437	1.302	30.423	0.573	0.049
Floor	5.152	8.462	1.385	40.046	0.654	0.074
Acceptable Limits[1]	<20.0	5.5-8.5	<4.0 or <8.0[2]	25 - 90	<5.0	≤0.10

[1] MDEQ 1998
[2] The maximum will depend on the plant species proposed for revegetation and the potential for upward salt movement.

According to the 2004 geochemical analyses, the pH values of all overburden and interburden samples are within the acceptable limits range. Slightly elevated pH values were encountered in the McKay floor material in three of the 13 exploration holes. Saturation percentages of all the samples are within the acceptable ranges. None of the weighted average electrical conductivity values exceed the suitability threshold value. All of the sodium adsorption ratios (SARs) were found to be uniformly low in the overburden and interburden, but the highest SAR values encountered were in the McKay floor material. The weighted average boron concentration is low and the highest level is well below the unsuitability threshold. Weighted average selenium values are low, but higher values were encountered in the McKay floor material, three holes having values slightly over the allowable suspect value (Norwest 2006).

3.3.1.2 Environmental Consequences

3.3.1.2.1 Proposed Action and Alternative 1

The geology from the base of the Rosebud-McKay to the land surface would be subject to permanent change after the coal is removed under the Proposed Action or Alternative 1. Mining would radically alter the subsurface characteristics of these lands. The replaced overburden and interburden (backfill) would be a relatively homogeneous mixture compared to the premining geologically distinct layers of sandstone, siltstone, shale, and waste coal.

Mining would remove an average of 70 feet of overburden, 11.7 feet of interburden, and 30.4 feet of coal from about 1,781 acres under the Proposed Action and an average of 92.4 feet of overburden, 6.8 feet of interburden, and 32.4 feet of coal from about 268 acres under Alternative 1. These acreage figures represent the estimated area of actual coal removal.

The backfill would be a partly recompacted mixture of overburden and interburden materials averaging about 98 feet in thickness under both the Proposed Action and Alternative 1. Approximately 77 million additional tons of coal would be recovered under the Proposed Action and up to an estimated 13 million tons would be recovered under Alternative 1.

3.3.1.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted, and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and coal removal would continue as permitted on the Absaloka Mine's permit area for about 3 years (post 2006), or until about 2009.

3.3.1.3 Regulatory Compliance, Mitigation and Monitoring

State and federal regulations require that drilling and sampling programs be conducted on existing leases 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, the mine operator develops a management plan to ensure that this unsuitable material is not placed in areas where it may affect groundwater quality or revegetation success. The mine operator also develops backfill monitoring plans as part of the mine permitting process to evaluate the quality of the replaced overburden. These plans are in place for the existing Absaloka Mine and those procedures would be continued for the South Extension development plan.

The portions of the Rosebud and McKay seams that are not recovered for sale (seam tops and bases) are similar with respect to low sulfur content (pyritic sulfur is about 0.3 percent in both seams). With such low pyritic sulfur, the potential for acid formation is minimal, and any acid formed would be neutralized by alkaline overburden (Norwest 2006). The waste coal from the mineable seams remains in the pit to be mixed with and covered by backfilled overburden and interburden materials. Any unsuitable materials in the backfill would be buried under adequate fill so as to be below the replaced soil to meet regulatory guidelines for vegetation root zones. Regraded overburden would be sampled to verify suitability as subsoil.

As discussed in Section 3.3.1.1, mixing of the overburden and interburden column during dragline stripping, backfill dumping, and regrading will mitigate potential adverse effects from those few cases where individual strata exceed suitability criteria. In addition, any effects of the elevated geochemical parameters in the McKay floor materials would be mitigated through mining practices, whereby approximately 1 to 3 feet of the McKay coal seam would not be mined so as to buffer the floor materials from direct contact with backfilled overburden. The silty material underlying the McKay coal seam would remain undisturbed and in contact with the unmined coal. Therefore, groundwater that resaturates the backfill and the bottom 1 to 3 feet of McKay coal seam would come into contact with the underburden only at their interface, having no greater effect on groundwater quality than it does at the present.

3.3.1.4 Residual Impacts

Geology from the base of the coal to the surface would be permanently changed from layered stratigraphy to a mixture of unconsolidated backfill material.

3.3.2 Other Mineral Resources

3.3.2.1 Affected Environment

3.3.2.1.1 Oil and Gas, Including Coal Bed Natural Gas (CBNG)

The following information on oil and gas resources on or near the Crow Indian Reservation and Big Horn County, Montana is taken from the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* (BLM 2003). Big Horn County has a total of nine conventional oil and gas fields, some of which are now inactive (e.g., the Hardin gas field). There are six fields that have produced oil and gas on or near the reservation. These fields produce from the Fort Union, Shannon, Tensleep, Amsden, and Madison formations. Of these conventional oil and gas fields, the Snyder and the Gray Blanket Fields are located closest to the proposed development area, although they are approximately 20 miles to the west and 35 miles to the south, respectively. A total of 172 exploratory and production wells have been drilled on the reservation. These wells have been drilled by non-Indian interests through leases with the Crow Tribe. In 1985, 20 companies had 709 oil and gas leases with the Crow Tribe (EDA 1996). Production has declined in Big Horn County and the reservation, and only a few new oil and conventional gas exploration wells have been proposed or drilled in recent years.

The Montana Board of Oil and Gas Conservation (MBOGC) database indicates that there have only been about 12 wildcat exploratory wells drilled within Ts.1N. and 1S., Rs.37E. and 38E., and that they were all dry holes and subsequently plugged and abandoned without any reported production (MBOGC 2006). No conventional oil and gas wells have been drilled within the proposed development area.

The only CBNG development that currently exists in Big Horn County is at the CX Ranch field located near Decker, which is approximately 50 miles south of the proposed development area. To date, no CBNG development has occurred within the Tract III Coal Lease or the Crow Indian Reservation.

3.3.2.1.2 Other Minerals

Other minerals of economic interest on the Crow Indian Reservation and the ceded land north of the reservation include bentonite, claystone and shale, uranium, pumice, limestone, gypsum, silica sand, building stone, and scoria (Mapel et al. 1975).

Layers of bentonite (decomposed volcanic ash) of commercial quality and mineable thicknesses are widespread in Upper Cretaceous rocks on the Crow Indian Reservation. The bentonite beds occurring within the reservation generally range from less than an inch to more than 15 feet thick, although one bed (the Soap Creek bed) is locally 45 feet thick. The eastern part of the reservation may contain an estimated 108 million tons of bentonite in mineable thickness of more than 3 feet underlying less than 30 feet of overburden. Bentonite appears to have the greatest potential of the nonfuel minerals on the reservation; however, there is no record of bentonite having been mined or sold from the reservation (Mapel et al. 1975). No mineable reserves of bentonite have been identified in the proposed development area.

A large fraction of the rocks within the Crow Indian Reservation younger than the Madison Formation Limestone are comprised of claystone and shale. Claystones and shales in the Tongue River Member of the Fort Union Formation in the eastern part of Big Horn County are generally poor to unsuitable for making common brick, but are fair to excellent for light-weight aggregate material. Sampling and testing of shale and clay deposits by MBMG in the Crow Indian Reservation indicate that there is a potential for light-weight aggregate production from eastern Big Horn County (Mapel et al. 1975). No claystone or shale from the proposed development area has ever been sold for use as an aggregate or any other uses.

No known uranium reserves exist within the Crow Indian Reservation. The closest deposits occur in the Pryor Mountains, immediately south of the reservation (Mapel et al. 1975). There are no mineable reserves of pumice, limestone, gypsum, silica sand, or building stone within the proposed development area. Major sand and gravel deposits in the Crow Indian Reservation occur in the stream terrace deposits along the Bighorn River, Little Bighorn River, and Pryor Creek.

Scoria has been and continues to be a major source of aggregate for road-surfacing and railroad ballast in the area due to the shortage of more competent materials. There are numerous small scoria excavations that are utilized by the local ranching community for road surfacing. Extensive scoria deposits exist within the Tract III Coal Lease area, and scoria is present within the northern and western portion of the Absaloka Mine's current permit area. Scoria is also abundant within the proposed development area, although no scoria has ever been mined and sold for use as an aggregate for road construction or any other uses from this area.

3.3.2.2 Environmental Consequences

3.3.2.2.1 Proposed Action and Alternative 1

During mining, other minerals present in the proposed development area could not be developed. Some of these minerals could, however, be developed after mining.

Although the Absaloka Mine and South Extension development area appear generally unfavorable for conventional oil and gas discoveries, the entire area has not been exhaustively tested. The formations that could be targeted for production of conventional oil and gas in the general area occur at much greater depths than would be affected by surface coal mining.

The Absaloka Mine and proposed development area have not been tested for the occurrence of CBNG. Due to the coal seams' shallow depths and consequent low hydrostatic pressures, CBNG production potential in this area of the PRB is low. However, CBNG resources, if present, would be lost from the Rosebud and McKay coal seams when the coal is mined. CBNG production requires withdrawal of water from the coal seams to reduce hydrostatic pressure and enable methane desorption from the coals. Mine-related dewatering of the coal seams reduces hydrostatic pressure and allows the methane to escape in the same way that CBNG well dewatering of the coal seam does. Depletion of the hydrostatic pressures and methane resources starts to occur adjacent to mining areas a short time after mining begins. Coal mining operations have been ongoing for more than 20 years and are continuing at the Absaloka Mine. The reduction of hydrostatic pressure and the methane resources, if present, in the Rosebud-McKay coal within the affected area beyond the backfilled pits would be ongoing until groundwater levels recover following reclamation. The underlying Robinson seam, which is separated from the McKay seam by approximately 80 – 100 feet of interburden, would not be mined within the South Extension development area. Groundwater levels in the Robinson seam are not being affected and are not expected to be affected by the mining – associated dewatering of the Rosebud-McKay seams. Therefore, the methane resources, if present, in the Robinson coal seam would not be affected.

3.3.2.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal and associated impacts would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to development of other mineral resources described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.3.2.3 Regulatory Compliance, Mitigation and Monitoring

No conventional oil and gas reservoirs containing producible quantities of oil and gas or recoverable CBNG resources are known to underlie the proposed development area. Little, if any, potential exists for conflicts between coal operations and oil and gas resource development.

3.3.2.4 Residual Impacts

CBNG resources, if present and not recovered from the Rosebud and McKay coal seams prior to mining, would be vented to the atmosphere and permanently lost. The Robinson coal seam would not be mined or dewatered; therefore, CBNG resources associated with the Robinson, if present, would not be affected.

3.3.3 Paleontology

3.3.3.1 Affected Environment

The bedrock unit exposed on the surface of the proposed development area is the sedimentary Paleocene age Tongue River Member of the Fort Union Formation. This formation contains locally abundant fossil vertebrates, invertebrates, and plants, and displays an important time interval during the early Tertiary evolution of mammals (BLM 2005b). The cyclic transgression and regression of the shallow seas and the fluvial systems, flood plains, and peat swamps resulted in a variety of depositional environments during the Tertiary time. Within Montana, the Fort Union Formation is known to yield various non-marine mammals, reptiles, amphibians, fish, plant, and invertebrate fossils (BLM 2003).

Fossil plant material is common in the Fort Union Formation. The fossil plants inventoried are primarily leaves and fossilized wood. The leaves usually occur as lignitic impressions in sandstone and siltstone and as compact masses in shale. Leaves are the most abundant fossils found and are frequently encountered during mining operations. 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 collected in the PRB.

Detailed paleontological field surveys have not been conducted within the Crow Indian Reservation; therefore, the specific nature of the fossil record and locations within the reservation are unknown. An on-line search of the American Museum of Natural History's fossil collection (http://paleo.amnh.org/fossil/seek.html) found no fossils collected from the Fort Union Formation within Big Horn County, Montana. No paleontological resource localities have been recorded on lands within the Absaloka Mine's existing permit area.

3.3.3.2 Environmental Consequences

3.3.3.2.1 Proposed Action and Alternative 1

The rock outcrops present on the proposed development area have not been examined for the presence of fossils, and no scientifically significant fossils are known to occur within the Tongue River Member of the Fort Union Formation in the general Absaloka Mine area. The lack of localities within the Tongue River

Member in the general area does not mean that scientifically significant fossils are not present. Fossils with scientific significance could be present on the proposed development area but not exposed at the surface. If the South Extension development plan is approved as proposed, paleontological resources located within the mine area that are not exposed on the surface would be destroyed when the overburden is removed.

3.3.3.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to paleontological resources described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.3.3.3 Regulatory Compliance, Mitigation and Monitoring

If the South Extension development plan is approved, OSM could attach a stipulation to the mine permit requiring the operator to report significant paleontological finds to the authorized federal agency and suspend production in the vicinity of the find until an approved paleontologist can evaluate the paleontological resource. This has not been the practice at the Absaloka Mine in the past however, as there have been no scientifically significant fossils discovered within the permit area during mining operations.

3.3.3.4 Residual Impacts

Paleontological resources that are not identified and removed prior to or during mining operations would be lost.

3.4 Air Quality

3.4.1 Background

Montana can be characterized as having a combination of both highland and mid-latitude semiarid climates. The dominant factors that affect the climate of the area are elevation, local relief, and the mountain barrier effect. This barrier effect can produce marked temperature and precipitation differences between windward and leeward slopes. Generally, temperatures decrease and precipitation increases with increasing elevation. Refer to Section 3.1.1 for additional information about the climate in the general analysis area.

The general analysis area, shown in Figure 3-1, is located in the northwestern portion of the PRB, a part of the Northern Great Plains that includes most of southeastern Montana. As discussed in Section 3.2.1, the topography consists of poorly defined smaller stream channels and dissected rolling hills, plateaus, and ridges of moderate to low relief. Resistant sandstone and clinker beds cap most of the upland areas and form steep cliff escarpments and isolated knobs. Elevations within the South Extension development area range from about 3,500 feet to 3,790 feet above sea level. The local, somewhat rugged terrain affects the local wind flow patterns to a certain extent. The local prevailing winds average 5.8 mph from the southeast and north (Figure 3-5). The Little Wolf Mountains are approximately 6 miles to the east, the Wolf Mountains approximately 30 miles to the south, and the Bighorn Mountains lie approximately 60 miles to the southwest. There are no climatic conditions that would worsen air quality or visibility problems.

Bison Engineering, Inc. of Billings, Montana prepared estimates of air quality impacts resulting from the Proposed Action, Alternative 1, and the No Action Alternative.

3.4.1.1 Regulatory Framework

Air pollution impacts are limited by local, state, tribal, and federal air quality regulations and standards, and implementation plans established under the federal Clean Air Act (CAA) and the Clean Air Act Amendments (CAAA) of 1990. A fundamental requirement of both federal and state air quality regulations is that ambient concentrations for specific criteria pollutants not exceed allowable levels deemed necessary to preclude adverse impacts on human health and welfare, referred to as the National Ambient Air Quality Standards (NAAQS) and the Montana Ambient Air Quality Standards (MAAQS). The U.S. Environmental Protection Agency (EPA) has established NAAQS for six pollutants (also known as "criteria pollutants"). These six pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10}), ozone (O_3), and sulfur dioxide (SO_2). The State of Montana MAAQS for those pollutants are as stringent as or more stringent than the NAAQS, and are enforceable under Montana Air Quality Regulations (ARM Title 17-Chapter 8, Air Quality). The NAAQS and MAAQS are health-based criteria for the maximum acceptable concentrations of criteria pollutants at all locations to which the public has access. Table 3-4 lists the Montana and federal ambient air quality standards, as well as measured or estimated background concentrations.

The southern portion of the South Extension development area is within the Crow Indian Reservation and is therefore under the management jurisdiction of the Crow Tribe. The CAAA (Section 301(d)) provided tribes the authority to implement CAA programs for their reservations. The Crow Tribe does not have an EPA-approved program, so the EPA administers the air quality program for the Crow Tribe.

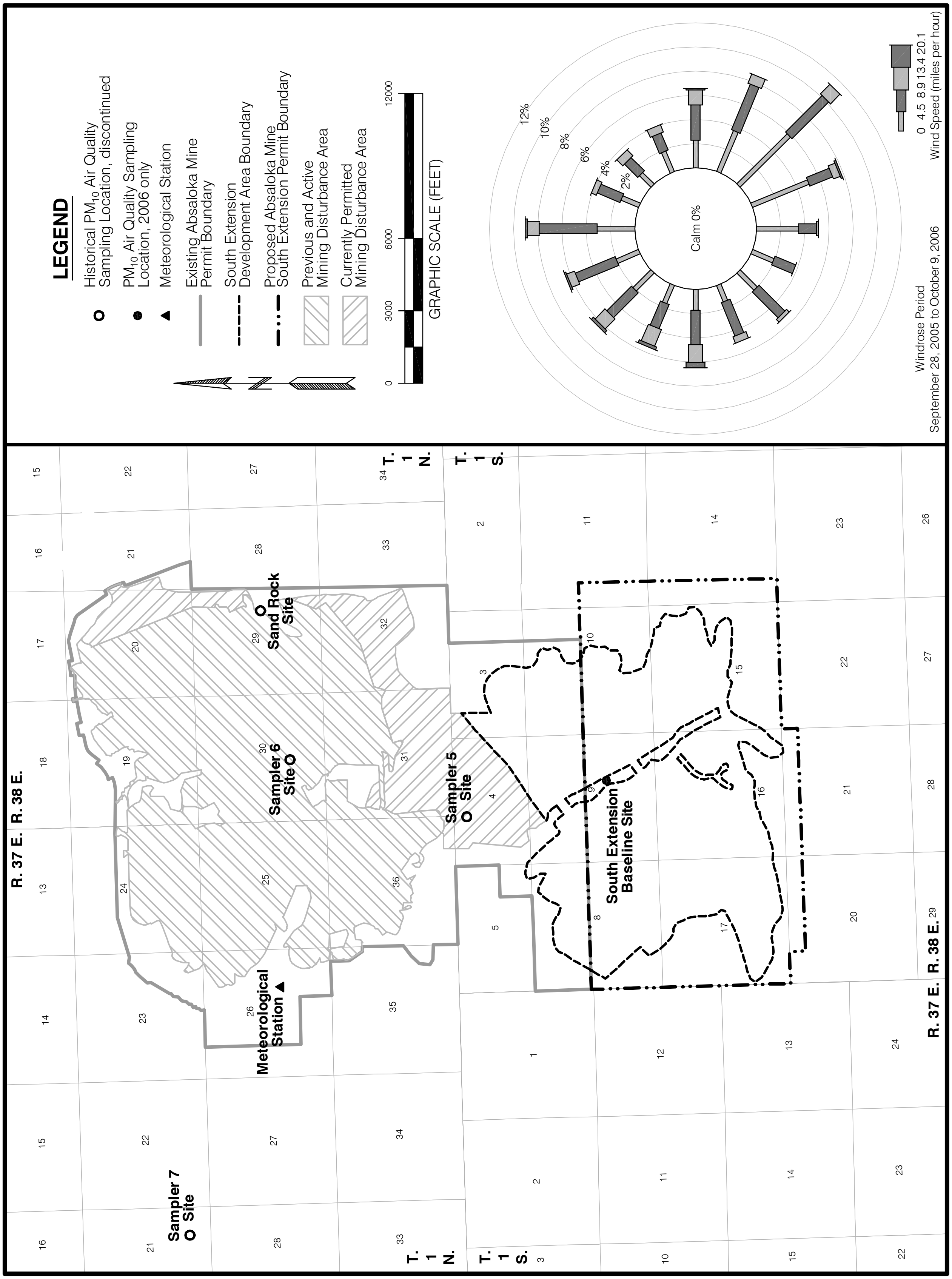


Figure 3-5. Windrose, Meteorological, and Air Quality Stations at the Absaloka Mine.

Table 3-4. Assumed Background Air Pollutant Concentrations, Applicable AAQS, and PSD Increment Values (in µg/m³).

Criteria Pollutant	Averaging Time[1]	Background Concentration MDEQ	Background Concentration Absaloka Mine	Primary NAAQS[2]	Secondary NAAQS[2]	MAAQS	PSD Class I Increments[3]	PSD Class II Increments[3]
Carbon monoxide	1-hour	1,750[4]	1,750[4]	40,000	40,000	26,450	---	---
	8-hour	1,150[4]	1,150[4]	10,000	10,000	10,000	---	---
Nitrogen dioxide	1-hour	---	---	---	---	564	---	---
	Annual	6[4]	6[4]	100	100	94	2.5	25
Ozone	1-hour	---	---	235	235	196	---	---
	8-hour	---	---	157	157	---	---	---
Sulfur dioxide	1-hour	35[4]	35[4]	---	---	1,300	---	---
	3-hour	26[4]	26[4]	---	1,300	---	25	512
	24-hour	11[4]	11[4]	365	---	262	5	91
	Annual	3[4]	3[4]	80	---	60	2	20
PM_{10}[7]	24-hour	30[5]	41[5]	150	150	150	8	30
	Annual	8[5]	13[5]	---	---	50	4	17
$PM_{2.5}$[7]	24-hour	30[6]	15[6]	35	35	---	---	---
	Annual	8[6]	10[6]	15	15	---	---	---

1 Annual standards are not to be exceeded; short-term standards are not to be exceeded more than once per year. 1-hour SO_2 standard not to be exceeded more than 18 times in one year.
2 Primary standards are designed to protect public health; secondary standards are designed to protect public welfare.
3 All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PDS Increment Consumption Analysis.
4 Background concentrations were determined from MDEQ modeling guidelines.
5 Background concentrations were estimated from one year of monitoring data collected within the South Extension.
6 Background concentrations were estimated from monitoring conducted at Lame Deer, Montana.
7 On October 17, 2006, EPA published final revisions to the NAAQS for particulate matter that took effect on December 18, 2006. The revision strengthens the 24-hour $PM_{2.5}$ standard from 65 to 35 µg/m³ and revokes the annual PM_{10} standard of 50 µg/m³.

Pursuant to the CAA, the EPA has developed air quality classifications for distinct geographic areas. An area is classified as in "attainment" if the air quality concentration is below the NAAQS for that pollutant, or is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant. Areas for which sufficient ambient monitoring data are not available are designated as "unclassified" for those particular pollutants. Lame Deer, Montana, is a non-attainment area (NAA) for particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}). This NAA is located 21.3 miles southeast of the Absaloka Mine.

A company initiating a project must go through the MDEQ and/or EPA New Source Review (NSR) permitting process to obtain a construction or modification permit or a permit waiver. The NSR process consists of two programs: The Prevention of Significant Deterioration (PSD) program for permitting sources in attainment areas, and the NAA program for permitting sources in non-attainment areas.

The PSD regulation is intended to prevent deterioration of air quality in areas that are in attainment with the NAAQS. The CAA requires EPA to place each airshed within the U.S. into one of three PSD area classifications (40 CFR 52.21(c)). PSD Class I is the most restrictive air quality category. Mandatory federal Class I areas were designated by Congress and include national wilderness areas greater than 5,000 acres in size and national parks greater than 6,000 acres in size that were in existence on August 7, 1977 [40 CFR 52.21(e)]. These classifications may not be redesignated. In addition to these mandatory Class I areas, Congress provided in Section 164 of the CAA a mechanism by which Indian tribes may "redesignate" their lands. The Northern Cheyenne Tribe designated their reservation as a non-mandatory (voluntary) PSD Class I area under the PSD program in 1977. All areas not established as Class I were designated as Class II areas, which allow a relatively greater deterioration of air quality over that in existence in 1977, although still within the NAAQS.

The western edge of the Northern Cheyenne Indian Reservation is approximately 4 miles southeast of the South Extension development area. During the scoping period for this EIS, the Northern Cheyenne Air Quality Division submitted a letter to the MDEQ expressing their concerns for potential air quality impacts on the reservation related to the South Extension coal lease approval and proposed development plan. The letter emphasized that Best Available Control Technology (BACT) be utilized to control dust emissions.

Table 3-5 is a list of mandatory federal Class I areas, tribal non-mandatory Class I areas, and federal Class II areas that are of special interest in the region and their distance from the South Extension development area. The Northern Cheyenne Indian Reservation (non-mandatory), UL Bend Wilderness Area (mandatory), and North Absaroka Wilderness Area (mandatory), are the closest Class I areas to the

Table 3-5. Approximate Distances and Directions from the South Extension Development Area to PSD Class I and Class II Sensitive Receptor Areas (Within a 200-Mile Radius).

Receptor Area	**Distance (miles)**	**Direction to Receptor**
Mandatory Federal PSD Class I		
North Absaroka Wilderness Area	135	WSW
Teton Wilderness Area	171	SW
Theodore Roosevelt National Park (South Unit)	185	ENE
UL Bend Wilderness Area	123	NNW
Washakie Wilderness Area	150	SW
Yellowstone National Park	151	WSW
Tribal Federal PSD Class I		
Fort Peck Indian Reservation	160	NNE
Northern Cheyenne Indian Reservation	4	SE
Federal PSD Class II		
Absaroka-Beartooth Wilderness Area	123	WSW
Bighorn Canyon National Recreation Area	66	SW
Cloud Peak Wilderness Area	81	S
Crow Indian Reservation	0	--
Devils Tower National Monument	139	SE
Fort Belknap Indian Reservation	159	NNW

South Extension development area. Most of the Montana PRB is designated as PSD Class II with less stringent requirements.

The PSD regulation prevents deterioration of air quality in attainment areas by establishing increments, or maximum allowable increases, in the ambient concentration of PM_{10}, nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) for Class I and Class II areas. As shown in Table 3-4, the allowable incremental impacts for NO_2, PM_{10}, and SO_2 within PSD Class I areas are very limited. Future development projects that have the potential to emit more than 250 tons per year (tpy) of any criteria pollutant (or certain listed sources that have the potential to emit more than 100 tpy) would be required to undergo a regulatory PSD increment consumption analysis under the federal New Source Review permitting regulations.

To date, there are no coal mines within the State of Montana that have been subject to PSD review in the permitting process. Existing surface coal mining operations in the PRB, including the Absaloka Mine, are not subject to PSD regulations for two reasons: 1) surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation [40 CFR 52.21 (b)(1)(i)(a)]; and 2) point-source emissions from individual mines have not exceeded the PSD emissions threshold.

All sources permitted within the State of Montana must utilize BACT, not just sources subject to PSD review. During the New Source Review permitting process, a BACT analysis is performed for the proposed construction or modification. The BACT process evaluates possible control technologies for the proposed action on the basis of technical feasibility and economic reasonability. Decisions about which technology should be applied are made on a case-by-case basis and are mandated through the air quality permit. For example, refer to Section 3.4.2.3 for a discussion of BACT measures that are applied at the Absaloka Mine to control mine-wide particulate emissions.

The New Source Performance Standards (NSPS) were established by the CAA and adopted by reference into MDEQ air quality rules. The NSPS apply to specific processes that are listed in the standards. For surface coal mining, this includes certain activities at coal preparation plants. The requirements applicable to these existing units can be found in 40 CFR Part 60, Subpart Y (Standards of Performance for Coal Preparation Facilities).

Major sources of air pollutants in Montana must obtain an operating permit from MDEQ's Air Quality Operating Permit Program (also known as a Title V Operating Permit) or from the EPA (for sources within Indian country). A "major source" is, generally, a facility that emits over 100 tpy of any criteria pollutant, 25 tpy of combined Hazardous Air Pollutants (HAPs) or 10 tpy of an individual HAP.

According to MDEQ Air Quality Permit #1418-04, the MDEQ has determined that the Absaloka Mine will be a minor source of emissions as defined under Title V (WRI 2005). At this time, there is no federal minor source permitting program. Consequently, EPA cannot regulate minor sources in Indian country directly unless the EPA decides to implement a Federal Implementation Plan (FIP) (BLM 2003).

A new coal mine or a modification to an existing mine must be permitted by MDEQ/Air Resources Management Bureau (MDEQ/ARMB) under ARM 17.8.743 and must demonstrate compliance with all applicable aspects of MDEQ's Air Quality Operating Permit Program. The following summarizes the construction/modification permitting analysis for a surface coal mine applying for a Montana air quality permit (MAQP), which does not require a Title V Operating Permit.

A surface coal mining application would include the standard MAQP application form, BACT measures that would be implemented, an inventory of fugitive sources in the area, and any necessary modeling analyses.

If PM_{10} modeling analysis is required, an applicant must assemble a PM_{10} emission inventory for its facility and surrounding sources. For PM_{10}, both point sources and fugitive dust emissions are quantified. The emissions are based on the facility's emission potential in the highest production year.

Potential emissions corresponding to the maximum production level from the coal mine undergoing permitting and other coal mines in the area are added to a background inventory. The resulting particulate levels are then compared to the applicable MAAQS and NAAQS to demonstrate predicted compliance.

Coal mines in Montana are also required to quantify NO_2 emissions from their facilities. Dispersion modeling may be required to demonstrate compliance with MAAQS and NAAQS for NO_2. Potential emissions from diesel-powered mining equipment and blasting are modeled. Train locomotive engine emissions are also quantified and included in the NO_2 modeling analysis, if appropriate.

The application is reviewed by MDEQ to determine compliance with all applicable air quality standards and regulations. This includes review of compliance with emission limitations established by NSPS, review of compliance with ambient standards through modeling analyses, and establishment of control measures to meet BACT requirements. Any MDEQ-proposed permit conditions are placed on public notice for a 15-day comment period followed by a 15-day appeals period. After the comment and appeals periods have ended, a final decision on the permit is made.

3.4.1.2 Emission Sources

The major types of emissions that come from surface coal mining activities are in the form of fugitive dust and tailpipe emissions from large mining equipment. Activities such as blasting, excavating, loading and hauling of overburden and coal, and the large areas of disturbed land all produce fugitive dust. Stationary or point sources are associated with coal crushing, storage, and handling facilities. In general, particulate matter is the major significant pollutant from coal mine point sources.

A secondary emission consists of gaseous, orange-colored clouds containing NO_2 that sometimes follow overburden blasts. Exposure to NO_2 may have adverse health effects, as discussed in Section 3.4.3. NO_2 is one of several products resulting from the incomplete combustion of explosives used in the blasting process. Montana's ambient air standards for NO_2 are shown in Table 3-4.

Other existing air pollutant emission sources within the region include:

- Exhaust emissions (primarily CO and NO_X) from existing natural gas-fired compressor engines used in production of natural gas; gasoline and diesel vehicle tailpipe emissions of combustion pollutants (VOCs, CO, NO_X, PM_{10}, $PM_{2.5}$, and SO_2);

- Dust (particulate matter) generated by vehicle travel on unpaved graded roads, windblown dust from neighboring areas, agricultural activities such as plowing, and sanding of paved roads during the winter months;

- Transport of air pollutants from emission sources located outside the region;
- Emissions from railroad locomotives used to haul coal (primarily NO_2 and PM_{10}); and
- SO_2 and NO_X from power plants. The closest coal-fired power plants to the Absaloka Mine are the Hardin Generating Station, located about 30 miles west of the South Extension development area, and the PPL Montana and Colstrip Energy Limited Partnership plants, located about 23 miles northeast of the South Extension development area.

3.4.2 Particulate Emissions

Until 1989, the federally regulated particulate matter pollutant was measured as total suspended particulates (TSP). This measurement included all suspendable dust (generally less than 100 microns in diameter). In 1989, the federally regulated particulate matter pollutant was changed from a TSP-based standard to a PM_{10}-based standard. PM_{10} is particulate matter that can potentially penetrate into the lungs and cause health problems. Montana added PM_{10}-based standards to match the federal standards in 1989. Federal and Montana ambient air standards for PM_{10} are shown in Table 3-4. The EPA promulgated the air quality standards for fine particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) on July 18, 1997 based on its link to serious health problems, and issued official designations for the $PM_{2.5}$ standard on December 17, 2004. On October 17, 2006, EPA published final revisions to the NAAQS for particulate matter that took effect on December 18, 2006. The revision strengthens the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter (μg/m^3) to 35 μg/m^3 and revokes the annual PM_{10} standard of 50 μg/m^3. EPA retained the existing annual $PM_{2.5}$ standard of 15 μg/m^3 and the 24-hour PM_{10} standard of 150 μg/m^3. Montana has not yet adopted a $PM_{2.5}$ standard, and EPA has not yet adopted $PM_{2.5}$ PSD Class I or Class II Increment Standards for evaluating particulate emissions.

3.4.2.1 Affected Environment for Particulate Emissions

Absaloka Mine monitored particulate matter levels from 1975 through 1998. TSP were monitored from 1975 through September 1991 and PM_{10} monitoring was conducted from October 1991 through December 1998, at which time the air monitoring program was discontinued with MDEQ approval. Suspension of PM_{10} monitoring was based on the success of the past monitoring effort and the fact that monitoring conducted to comply with ARM 17.24.311(1)(a) demonstrated a clear expectation that operations at the Absaloka Mine would not result in an exceedance of current air quality standards (Bison Engineering 2005).

Recorded annual PM_{10} values for the seven years of the original monitoring averaged 8.8 μg/m^3. This average concentration was approximately 16 percent of the annual standard of 50 µg/m³. During the same time period, the maximum 24-hour PM_{10} concentrations ranged from 1 to 60 µg/m³. Thus, the maximum 24-hour PM_{10} concentrations ranged from about 1 to 40 percent of the 24-hour standard of 150 µg/m³. The available data indicate that the PM_{10} contribution made by WRI mining activity to PM_{10} concentrations outside of the permit area was so small as to be difficult to quantify (Bison Engineering 2005).

WRI reinstated air monitoring to record baseline air quality conditions at the proposed development area to support the OSM mine permit application. This baseline analysis consisted of a new meteorological station sited at the same location originally recommended by the MDEQ in 1978 for monitoring meteorology at the mine and a PM_{10} monitoring site (Figure 3-5). The meteorological station was established in September 2005 and has been in constant operation since that time, and PM_{10} data were collected from late January 2006 through mid-October 2006 for baseline analysis.

Recorded 24-hour average PM_{10} values for monitoring conducted in 2006 averaged 15 µg/m³. During the same time period, the maximum 24-hour concentrations ranged from 2 to 119 µg/m³ (1 to 79 percent of 24-hour standard of 150 µg/m³) (Bison Engineering 2006b).

3.4.2.2 Environmental Consequences Related to Particulate Emissions

Particulates include solid particles and liquid droplets that can be suspended in air. Particulates, especially fine particles, have been linked to numerous respiratory-related illnesses and can adversely affect individuals with pre-existing heart or lung diseases. Particulates are also a major cause of visibility impairment in many parts of the United States. While individual particles cannot be seen with the naked eye, collectively they can appear as black soot, dust clouds, or gray hazes. The amount of particulate matter produced by a mine is highly dependent upon the type of operation, the types of equipment, and the mining sequence.

3.4.2.2.1 Proposed Action and Alternative 1

The South Extension development area would be mined as an integral part of the Absaloka Mine. The average coal production is anticipated to remain at the projected post-2006 rate of 6.5 to 7.0 million tons per year (mmtpy), with or without the South Extension development area. Absaloka Mine's current MDEQ air quality permit limits coal production to 11 mmtpy. If the South Extension development plan is permitted, the Absaloka Mine would continue to produce at an average rate of 6.5 to 7.0 mmtpy for a longer period of time (up to 12 years).

Under the Proposed Action and Alternative 1, the air quality impacts would be similar to those expected from the existing mining operation. 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.

MDEQ issued air quality permit #1418-04 for the Absaloka Mine on December 15, 2005. This current air quality permit approved the construction of a covered conveyor and increased the vehicle miles traveled on the access roads (Bison Engineering 2005). The air quality permit may not need to be modified by MDEQ under the Proposed Action or Alternative 1 for mining within the existing permit boundary. There are no proposed changes in mining methods or rates from the existing approved mine plan. At this time, EPA does not have a minor source permitting program for new sources (refer to Section 3.4.1.1), and as such, an EPA administered permit would not be required for mining within the Crow Reservation.

As part of the South Extension mining permit application, WRI contracted with Bison Engineering, Inc. to prepare an air quality impact analysis. This analysis (Bison Engineering 2007) was conducted using air quality dispersion modeling to predict the effects of the mine expansion on nearby air quality. The air quality impact analysis was performed using AERMOD, an EPA approved air dispersion model for steady-state plumes (40 CFR 51, Appendix A of Appendix W). OSM's Technical Adequacy Review Report (OSM 2007) states "this modeling effort is reasonably comprehensive, and includes use of the EPA recommended AERMOD model" and "the application describes the probable changes in air quality resulting from the surface coal mining operation proposed for the South Extension area." The air quality impact analysis is included in WRI's South Extension permit application package (WRI 2007a) and is therefore on file and available for public review at OSM's offices in Denver, Colorado and Casper, Wyoming.

OSM stated in its Technical Adequacy Review Report of the air quality impact analysis that "all emissions associated with mining [the South Extension area] are fugitive emissions which, under EPA regulations, do not constitute a major source requiring a permit and which are not applicable to PSD increments" (OSM 2007).

Annual particulate emissions for the mining activities at the South Extension development area were modeled for the life of the mine. The modeled scenarios included emissions from mining activities, mobile activities, and wind erosion from stockpiles. The mining activities included drilling in overburden and coal, blasting, topsoil handling, overburden removal, coal removal, bulldozing of spoil, bulldozing to clean the top of the coal seam, and portable diesel generators. These sources contribute particulate and/or gaseous emissions. The mobile activities include road dust entrainment for particulate emissions and vehicle exhaust for gaseous emissions. Wind erosion from soil stockpiles contributes particulate emissions.

Receptor grids were used to model potential ambient impacts in the area surrounding the South Extension development area. Receptors were placed at 50-

meter intervals along the mine permit boundary and the South Extension development area; a 200-meter receptor grid was used in the immediate area around the permit boundary; 1,000-meter receptor grids were used on an extended area around the proposed development area and on the Northern Cheyenne Reservation (Figures 3-6 and 3-7). The receptor grids were separated in order to identify impacts on the Northern Cheyenne Reservation.

The maximum impacts from the NAAQS and MAAQS modeling analyses are shown in Tables 3-6 and 3-7 along with the national and Montana ambient standards. The MAAQS are effective in the area around the Absaloka Mine permit area that is north of the reservation boundary, and the NAAQS are effective on the Crow Indian Reservation and the Northern Cheyenne Indian Reservation. Long-term and short-term modeling results indicate that the projected mining activities would be in compliance with all the annual and short-term NAAQS and MAAQS for the life of the Absaloka Mine. The summary data for both Table 3-6 and 3-7 are the maximum for the mining period, which occurred for mining year 2020 near the Crow Indian Reservation and year 2011 on the Northern Cheyenne Indian Reservation.

Table 3-8 summarizes the highest modeled PM_{10}, NO_X, and SO_2 concentrations along with the Class II PSD increment standards for the receptors on and near the Crow Indian Reservation. The highest model-predicted concentrations occurred in mining year 2020 near the Crow Indian Reservation. The locations of the maximum modeled Class II PSD increment concentrations on and near the Crow Indian Reservation for year 2020 are shown on Figure 3-6. As depicted by Figure 3-6, the Class II PSD increment analysis predicted that the locations for all peak concentrations, including the 24-hour PM_{10} concentration that exceeded the increment standard, are inside the existing Absaloka Mine permit boundary, about 200 meters north of the Crow Indian Reservation boundary.

Table 3-9 presents a comparison of the Class I PSD increment standards to the highest modeled PM_{10}, NO_X, and SO_2 concentrations along with the Class I PSD increment standards for the receptors on the Northern Cheyenne Indian Reservation. The highest model-predicted concentrations (for PM_{10}) occurred in mining year 2011 on the Northern Cheyenne Indian Reservation. The locations of the maximum-modeled Class I PSD increment concentrations on the Northern Cheyenne Indian Reservation for year 2011 are shown on Figure 3-7.

Public exposure to particulate emissions from surface mining operations is most likely to occur along publicly accessible roads and highway that pass near the area of the mining operations. Occupants of dwellings in the area could also be affected. There are just two occupied dwellings on or within one mile of the South Extension development area and one non-mine related business within 4.6 miles of the proposed development area (Figure 3-8). The two dwellings are located within the South Extension development area and the occupants of those dwellings would relocate prior mining.

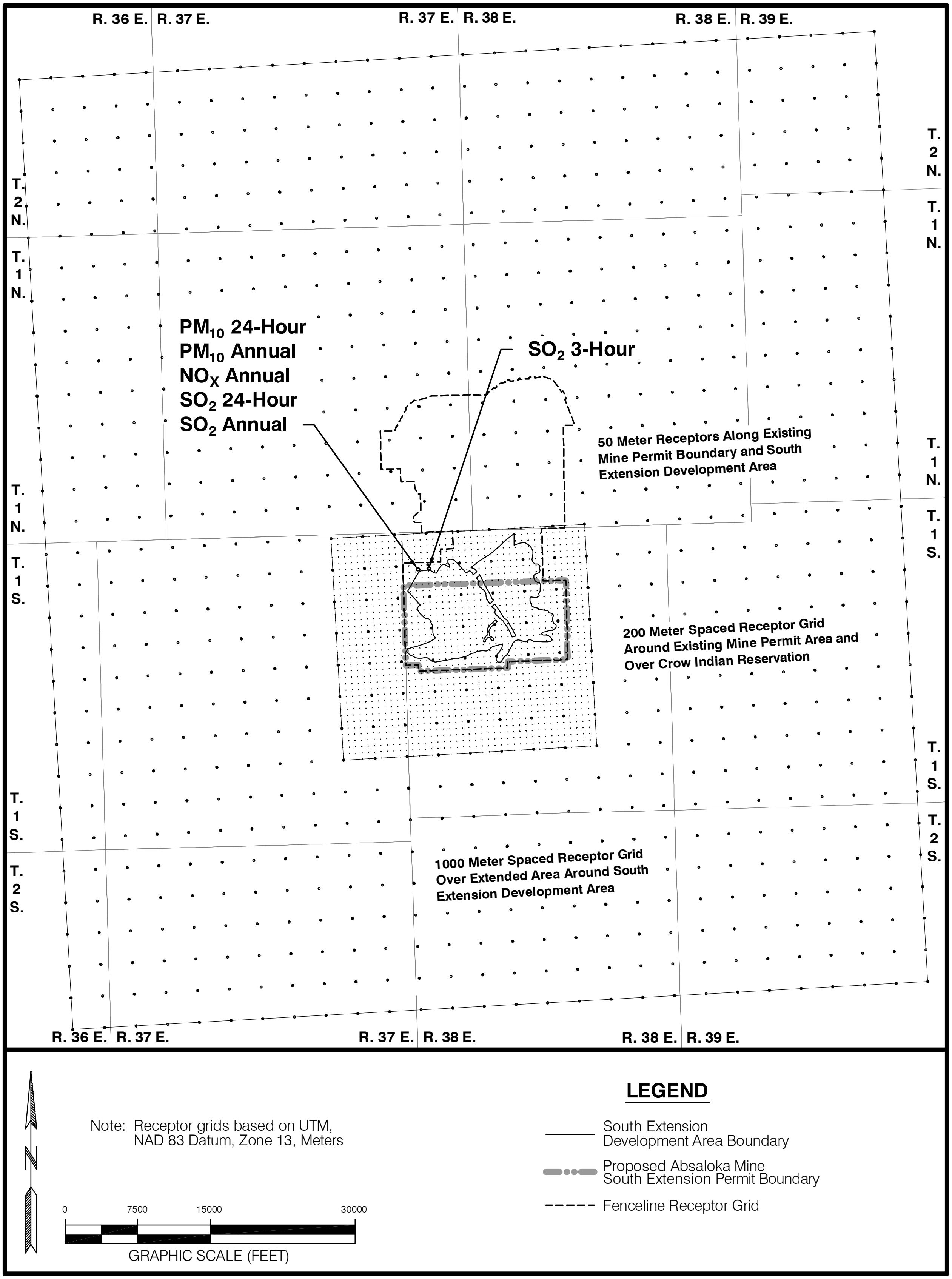


Figure 3-6. Maximum PM_{10}, NO_X, and SO_2 Class II Concentration Locations Within the South Extension Development Area Receptor Grids for the Year 2020.

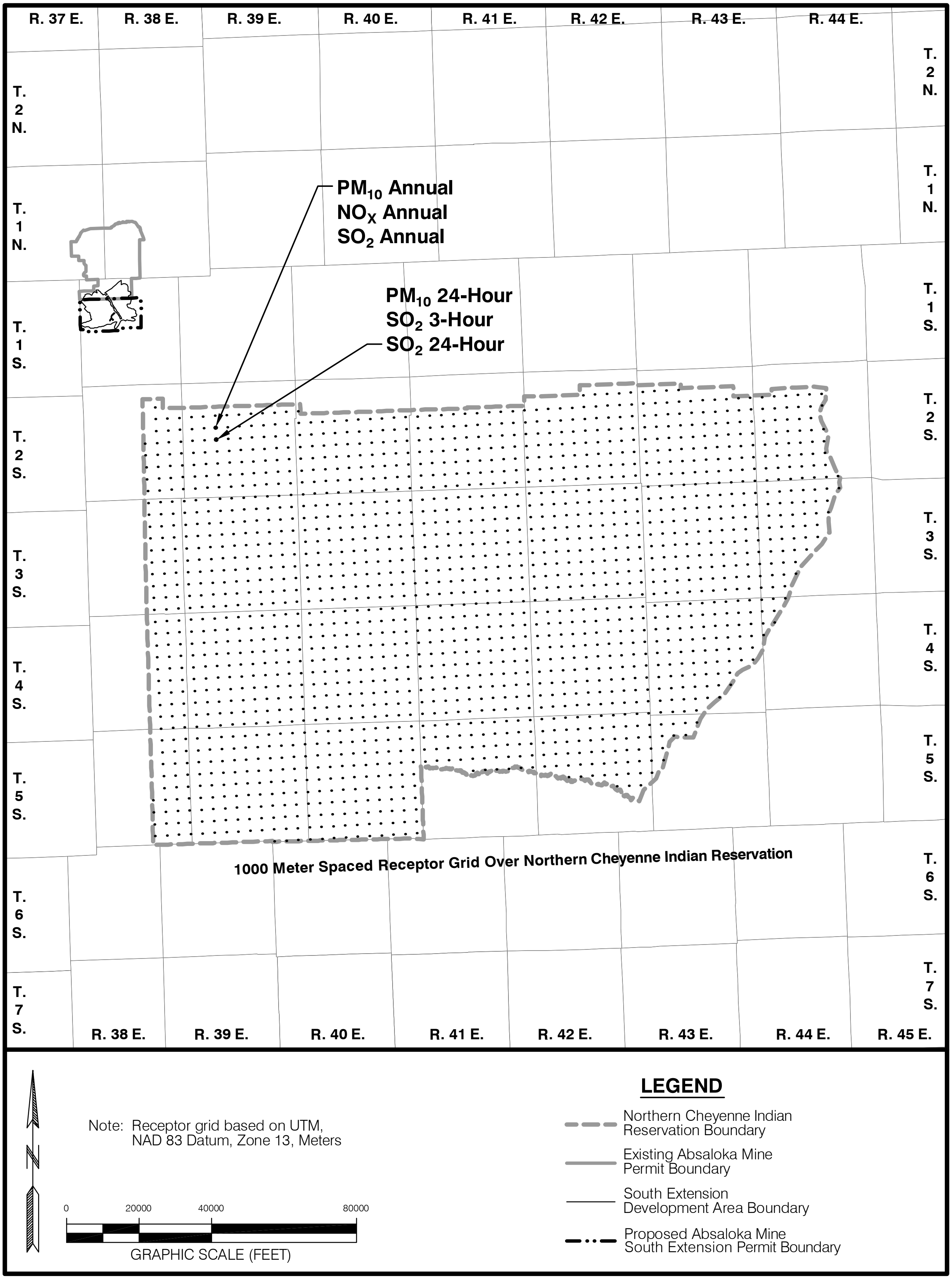


Figure 3-7. Maximum PM_{10}, NO_X, and SO_2 Class I Concentration Locations Within the Northern Cheyenne Indian Reservation Receptor Grid for the Year 2011.

Table 3-6. Ambient Standards Analysis On or Near the Crow Indian Reservation.

Pollutant	Averaging Period	Peak Modeled Concentration (Mining Year 2020) (µg/m³)	Background Concentration[1] (µg/m³)	Predicted Ambient Concentration (µg/m³)	NAAQS (µg/m³)	Percent of NAAQS	MAAQS (µg/m³)	Percent of MAAQS
PM_{10}	24-hr	34.7	41.0	75.7	150	50.5	150	50.5
	Annual	5.3	13.0	18.3	---	---	50	36.5
$PM_{2.5}$	24-hr	6.9	15.0	21.9	35	62.6	---	---
	Annual	1.0	10.0	11.0	15	73.3	---	---
SO_2	1-hr	13.0	35.0	48.0	---	---	1,300	3.7
	3-hr	7.7	26.0	33.7	---	---	---	---
	24-hr	2.5	11.0	13.5	365	3.7	262	5.2
	Annual	0.4	3.0	3.4	80	4.3	60	5.7
NO_X	1-hr	227.8	75.0	302.8	---	---	564	53.7
	Annual	5.8	6.0	11.8	100	11.8	94	12.6
CO	1-hr	50.2	1,725	1,775.2	40,000	4.4	26,450	6.7
	8-hr	15.7	1,150	1,165.7	10,000	11.7	10,000	11.7

[1] Background concentrations are estimated from one year of ambient PM_{10} monitoring data collected within the proposed development area. These data were adjusted for the impacts of the Sarpy Creek and Pine Ridge Fires, which affect the data for at least the second half of July 2006.

Source: Bison Engineering 2007

Table 3-7. Ambient Standards Analysis On the Northern Cheyenne Indian Reservation.

Pollutant	Averaging Period	Peak Modeled Concentration (Mining Year 2011) (µg/m³)	Background Concentration[1] (µg/m³)	Predicted Ambient Concentration (µg/m³)	NAAQS (µg/m³)	Percent of NAAQS	MAAQS (µg/m³)	Percent of MAAQS
PM_{10}	24-hr	1.26	41.0	42.3	150	28.2	150	28.2
	Annual	0.08	13.0	13.1	---	---	50	26.2
$PM_{2.5}$	24-hr	0.25	15.0	15.3	35	43.7	---	---
	Annual	0.02	10.0	10.0	15	66.7	---	---
SO_2	1-hr	1.28	35.0	36.3	---	---	1,300	2.8
	3-hr	0.71	26.0	26.7	---	---	---	---
	24-hr	0.094	11.0	11.1	365	3.0	262	4.2
	Annual	0.006	3.0	3.0	80	3.8	60	5.8
NO_X	1-hr	32.20	75.0	107.3	---	---	564	19.0
	Annual	0.092	6.0	6.1	100	6.1	94	6.5
CO	1-hr	7.15	1,725	1,732.1	40,000	4.3	26,450	6.5
	8-hr	0.91	1,150	1,150.9	10,000	11.5	10,000	11.5

[1] Background concentrations are estimated from one year of ambient PM_{10} monitoring data collected within the proposed development area. These data were adjusted for the impacts of the Sarpy Creek and Pine Ridge Fires, which affect the data for at least the second half of July 2006.

Source: Bison Engineering 2007

Table 3-8. Class II PSD Increment Modeling Results On or Near the Crow Indian Reservation.

Pollutant	Averaging Period	Modeled Concentration (Mining Year 2020) (µg/m³)	Class II Increment Standard	Percent Class II Increment Consumed
PM_{10}	24-hr	34.7	30	115.8
	Annual	5.3	17	30.9
SO_2	3-hr	7.7	512	1.5
	24-hr	2.5	91	2.8
	Annual	0.4	20	1.9
NO_X	Annual	5.8	25	23.4

Source: Bison Engineering 2007

Table 3-9. Class I PSD Increment Modeling Results On the Northern Cheyenne Indian Reservation.

Pollutant	Averaging Period	Modeled Concentration (Mining Year 2011) (µg/m³)	Class II Increment Standard	Percent Class II Increment Consumed
PM_{10}	24-hr	1.3	8	15.8
	Annual	0.08	4	2.0
SO_2	3-hr	0.71	25	2.9
	24-hr	0.094	5	1.9
	Annual	0.006	2	0.3
NO_X	Annual	0.092	2.5	3.7

Source: Bison Engineering 2007

Lame Deer, Montana is a non-attainment area for PM_{10}. Table 3-10 shows the comparison of the model-predicted PM_{10} concentrations at Lame Deer with the NAA Significant Impact Levels (SIL). The highest model-predicted concentrations occurred in mining year 2011 (Bison Engineering 2007). The impacts on the PM_{10} non-attainment area were shown to be insignificant, indicating that the proposed mining activities will not cause or contribute to a violation of the NAAQS at Lame Deer.

OSM (2007) stated in its Technical Adequacy Review Report of the air quality impact analysis that, "According to the results generated from the model, impacts to air quality from mining in the South Extension area will be consistent with historic monitoring results for the Absaloka Mine and will likely be negligible. OSM's review finds that the permit application contains information sufficient to be in accord with the requirements at 30 CFR 750.12(d)(2)(vi)."

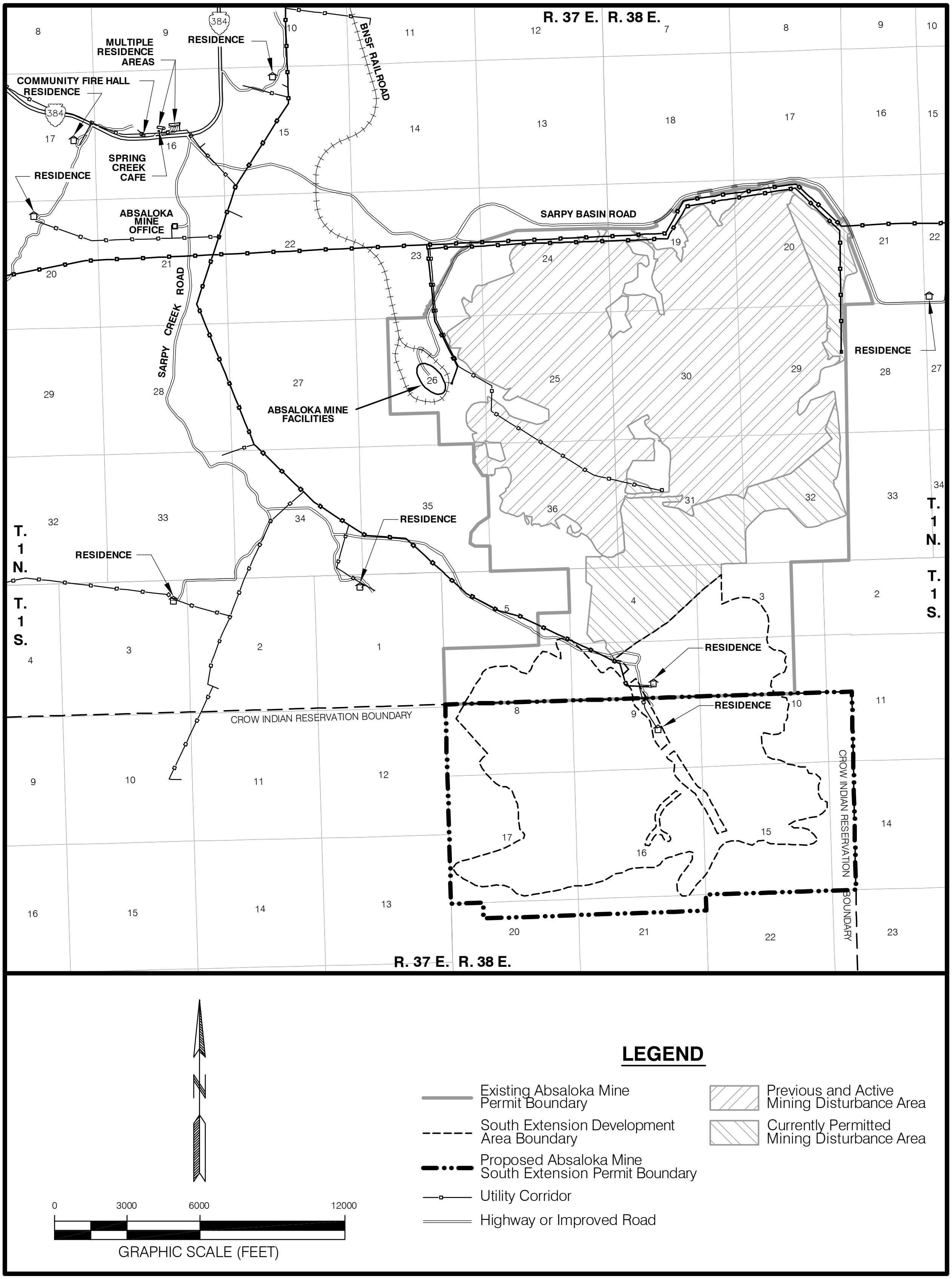


Figure 3-8. Transportation Facilities Within and Adjacent to the South Extension Development Area.

Table 3-10. Non-attainment Area Significant Impacts Level Analysis.

Pollutant	Averaging Period	Peak Modeled Concentration (µg/m³)	Non-attainment Area SIL (µg/m³)	>SIL? (Y/N)
PM_{10}	24-hr	0.13	5	N
	Annual	0.02	1	N

Source: Bison Engineering 2007

3.4.2.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted, and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to air quality resources described above would continue as permitted on the Absaloka Mine's permit area for about 3 years (post 2006), or until about 2009. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.4.2.3 Regulatory Compliance, Mitigation and Monitoring for Particulate Emissions

Control of particulate emissions at PRB coal mines is accomplished with a variety of measures. Point source particulate emissions (emissions from coal crushing, storage, and handling facilities) are controlled with dust collection systems, passive emission control systems (PECs), or water sprayers/atomizers/foggers. MDEQ establishes BACT measures on a case-by-case basis. BACT on emissions from the Absaloka Mine's point sources are PECs, included covered conveyors, telescoping loadout chutes, and an enclosed storage device (coal barn).

Fugitive particulate emissions (emissions that do not pass through a stack, chimney, vent, or other functionally equivalent opening) are controlled with a variety of measures that MDEQ considers BACT. Typically, water trucks are used to apply water and chemical dust suppressants on all haul roads used by trucks and/or scrapers. Material drop heights for shovels and draglines (bucket to truck bed or backfill) are limited to the minimum necessary to conduct the mining operations. Timely permanent and temporary revegetation of disturbed areas is utilized to minimize wind erosion. Fugitive emissions from the coal truck dumps are controlled using bottom dump coal haulers to minimize drop distances. All of these control measures are employed at the Absaloka Mine.

MDEQ requires the collection of information documenting the quality of the air resource at select Montana PRB surface coal mines. Each participating mine monitors air quality for a 24-hour period every six days at multiple monitoring sites. Monitoring is also conducted in the Northern Cheyenne Indian Reservation and at power plant locations near Colstrip and Hardin.

Westmoreland has demonstrated from earlier required monitoring and recent additional monitoring that monitored ambient air quality concentrations did not exceed the levels outlined in the initial air quality permits (WRI 2005, Bison Engineering 2006b). MDEQ amended Absaloka Mine's Air Quality Permit #1418-03 in 1998 to remove the ambient air quality monitoring requirements. The ambient air quality monitoring requirements can be reinstated in the future if the department determines that it is necessary. Air Quality Permit #1418-04 was amended in 2005 to reflect the addition of a covered conveyor for transporting coal from the existing train loading facility to a closed, elevated storage bin for truck loading and increased the number of vehicle miles traveled on the access roads. Absaloka Mine's current air quality permit includes a commitment to continue employment of BACT on mine-wide emissions and concludes that the NAAQS would be protected through the life of the mine. Absaloka Mine's Air Quality Permit #1418-04 is on file at the MDEQ offices in Helena and Billings, Montana and available for public review, or it can be accessed on the Internet at website http://www.deq.state.mt.us/AirQuality/ARM_Permits/1418-04.pdf.

The following list contains the required emission control technologies and techniques employed by the Absaloka Mine under its current MDEQ air quality permit:

- Coal conveyor belts – All conveyor belts shall be covered on three sides. Belt transfer points shall be hooded.

- Primary coal crusher, secondary crusher, and screen – Primary and secondary crushers shall be enclosed. Feed points to the crushers and secondary crushers screen shall be hooded.

- Coal storage – 50,000-ton coal storage pile enclosed in a storage barn.

- Open coal storage – Water or equivalent dust suppression on open coal storage as necessary.

- Train and truck loadout – Minimize the free fall distance by the use of a retractable loading chute.

- Overburden and interburden removal – Minimize the fall distance from the dragline bucket to the spoil pile.

- Coal removal – Minimize fall distance from the front-end loader or shovel to the haul trucks.

- Coal and overburden drilling – Use water injection on the drills.

- Coal and overburden blasting – Minimize overshooting and minimize the area to be blasted.
- Haul roads – Chemical dust suppressant or equivalent shall be used.
- Access road – Water or equivalent dust suppression to be employed on the access roads.
- Topsoil removal and exposed areas – Topsoil stripping to precede mining as closely as practicable. Reclaim overburden and interburden piles as closely behind the mining operation as possible.
- Truck dump – Bottom dump coal haulers to minimize drop distances.

Use of these control measures were assumed to be employed in the air quality dispersion model predicting the effects of the Absaloka Mine expansion onto the Crow Indian Reservation. WRI intends to continue implementing these operational measures to control particulate emissions if the proposed development area is mined.

3.4.3 Emissions of Nitrogen Oxides (NO_X)

3.4.3.1 Affected Environment for NO_X Emissions

Gases that contain nitrogen and oxygen in varying amounts are referred to as nitrogen oxides (NO_X). One type of NO_X is NO_2, a reddish brown gas that is heavier than air and has a pungent odor. Gaseous NO_2 is highly reactive and combines with water to form nitric acid and nitric oxide. According to the EPA (EPA 2007a):

- NO_X may cause significant toxicity because of its ability to form nitric acid with water in the eyes, lungs, mucous membranes, and skin.
- Acute exposure may cause death by damaging the pulmonary system.
- Chronic or repeated exposure to lower concentrations of NO_2 may exacerbate pre-existing respiratory conditions, or increase the incidence of respiratory infections.

The primary direct source of emissions of NO_X from coal mining operations is tailpipe emissions from large mining equipment, railroad locomotive emissions, and other vehicle traffic inside the mine permit area. Blasting that is done to remove the material overlying the coal (the overburden) can result in emissions of several products, including NO_2, as a result of the incomplete combustion of nitrogen-based explosives. When this occurs, gaseous, orange-colored clouds may be formed and they can drift or be blown off mine permit areas.

NO_2 is a product of incomplete combustion at sources such as gasoline- and diesel-burning engines or from mine blasting activities. Incomplete combustion during blasting may be caused by various physical conditions present in the overburden, such as the presence of groundwater. Generally, blasting-related NO_X emissions are more prevalent at operations that use the blasting technique referred to as cast blasting (Chancellor 2003). Cast blasting refers to a type of direct blasting in which the blast is designed to cast the overburden from on top of the coal into the previously mined area. The Absaloka Mine does not currently employ cast blasting, but it may be used in the future for specialized applications. Blasting is not a major source of NO_X emissions at the Absaloka Mine. To date, there have been no reported events of public exposure to NO_2 from blasting activities at the Absaloka Mine.

3.4.3.2 Environmental Consequences Related to NO_X Emissions

According to EPA, NO_X may cause a wide variety of health and environmental impacts because of various compounds and derivatives in the family of nitrogen oxides, including NO_2, nitric acid, nitrous oxide, nitrates, and nitric oxide. Potential health risks associated with short-term exposure to NO_2 include changes in airway responsiveness and lung function in individuals with pre-existing respiratory illnesses and increases in respiratory illnesses in children. Long-term exposure to NO_2 may lead to increased susceptibility to respiratory infection and may cause irreversible alterations in lung structure (EPA 2007a and 2007b).

There are no state or federal rules that require the public or employees to stay back a certain distance from mine blasting operations in order to limit their exposure to NO_2.

3.4.3.2.1 Proposed Action and Alternative 1

The same general procedures for estimating the PM_{10} emissions were used to estimate NO_X emissions. The maximum impacts from the NAAQS and MAAQS modeling analyses are shown in Tables 3-6 and 3-7 along with the national and Montana ambient standards. Long-term modeling indicated the proposed activities would be in compliance with the annual NO_X NAAQS and MAAQS for the proposed life of the Absaloka Mine. Short-term (1-hour) modeling indicated that the proposed activities would be in compliance with the 1-hour NO_X Montana ambient air standards for the life of the Absaloka Mine. There are no federal short-term NO_X standards currently in-place. The summary data for both Table 3-6 and 3-7 are the maximum for the mining period. The modeling analyses projected that the maximum impacts for the NAAQS and the MAAQS for the entire proposed mining period occurred during year 2020 in the area surrounding the South Extension development area (inside the existing Absaloka Mine permit boundary, about 200 meters north of the Crow Indian Reservation boundary), and that the maximum impacts for the NAAQS and MAAQS for the entire proposed mining period occurred during year 2011 on the Northern Cheyenne Indian Reservation.

Table 3-8 summarizes the highest modeled PM_{10}, NO_X, and SO_2 concentrations along with the Class II PSD increment standards for the receptors on and near the Crow Indian Reservation. The highest modeled concentrations occurred for mining year 2020 near the Crow Indian Reservation. The location of the maximum modeled Class II annual NO_X PSD increment concentration for year 2020 is shown on Figure 3-6. As depicted by Figure 3-6, the Class II PSD increment analysis predicted that the locations for all peak concentrations are inside the existing Absaloka Mine permit area.

Table 3-9 presents a comparison of the Class I PSD increment standards to the highest modeled PM_{10}, NO_X, and SO_2 concentrations along with the Class I PSD increment standards for the receptors on and near the Northern Cheyenne Indian Reservation. The highest modeled concentrations occurred for mining year 2011 on the Northern Cheyenne Indian Reservation. The location of the maximum modeled Class I annual NO_X PSD increment concentration on the Northern Cheyenne Indian Reservation for year 2011 is shown on Figure 3-7.

EPA recommends that NO_2 concentrations not exceed 0.5 parts per million (ppm) (or 940 $\mu g/m^3$) for a 10-minute exposure. Although appropriate models do not exist to accurately predict 10-minute NO_X impacts, the 1-hour modeling results indicate that the NO_X levels will be well below EPA recommended levels. Public exposure to emissions caused by surface mining operations is most likely to affect travelers on publicly accessible roads and highway that pass near the mine and occupants of dwellings near the area of mining operations. Figure 3-8 shows the locations of currently occupied residences, public roads and highway, and other publicly accessible facilities in the vicinity of the South Extension development area. There are just two occupied dwellings on or within one mile of the South Extension development area and one non-mine related business within 4.6 miles of the proposed development area. The two dwellings are located within the South Extension development area and the occupants of those dwellings would relocate prior mining. The density of public roads and accessible facilities is very low in the vicinity of the proposed development area.

Current air quality impacts are within MAAQS/NAAQS limits. If WRI's Tract III South permit revision and South Extension permit application packages (WRI 2006 and 2007a) are approved and Absaloka Mine expands into the South Extension, mining techniques (i.e., blasting, excavating, hauling, etc.) would be similar to those outlined in the currently approved air quality permit. Therefore, air quality impacts that result from mining the South Extension development area by Absaloka Mine at an estimated average annual coal production rate of 6.5 to 7.0 mmtpy should also be within MAAQS/NAAQS limits outside the mine's permit boundary.

3.4.3.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted, and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts from blasting emissions as described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.4.3.3 Regulatory Compliance, Mitigation and Monitoring for NO_X Emissions

The Absaloka Mine has not experienced NO_X problems related to vehicle emissions or blasting and does not currently have blasting restrictions in their mine permit to address NO_X.

3.4.4 Visibility

Visibility refers to the clarity with which scenic vistas and landscape features are perceived at great distances. Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. Fine particulate matter ($PM_{2.5}$) is the major cause of reduced visibility (haze). Regional haze degradation is caused by fine particles and gases scattering and absorbing light. Some haze-causing particles are directly emitted to the air. Others are formed when gases emitted to the air form particles as they are carried many miles from the source of the pollutants. Particle pollution is made up of a number of components, including acids, organic chemicals, metals, and dust particles. Fine particles, such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller (EPA 2007d).

In 1999, EPA announced a major effort to improve air quality in national parks and wilderness areas. Under the Regional Haze Rule (RHR), states must develop implementation plans, in coordination with the EPA, National Park Service, U.S. Fish and Wildlife Service, and other interested parties, that contain enforceable measures and strategies for reducing visibility-impairing pollution in 156 federally designated Class I areas across the United States. States are required to conduct certain analyses to ensure reaching natural visibility conditions in 60 years (from 2004 to 2064) in the designated Class I areas.

In 2005, the EPA published the final amendments to its 1999 rule providing the final guidance for Best Available Retrofit Technology (BART). The BART rule requires the installation of BART on industrial emission facilities built between 1962 and 1977 that have the potential to emit more than 250 tons per year of visibility-impairing pollution. MDEQ is responsible for the BART process in

Montana and it must identify those sources that meet the definition of BART-eligible sources, with assistance from the owner or operator of such source.

Montana's state plan for regional haze was due December 2007, but on June 19, 2006, MDEQ announced that it was withdrawing its efforts to adopt the provisions of the RHR as required under 40 CFR 51.308 (MDEQ 2006a). Due to MDEQ's announcement, EPA is moving forward with the technical and policy work needed to implement the RHR requirements as part of a Federal Implementation Plan (FIP). EPA is picking up the process where the state left off, however, MDEQ will complete the BART process.

Federal ambient air quality standards for $PM_{2.5}$ are shown in Table 3-4. The EPA promulgated the air quality standards for $PM_{2.5}$ on July 18, 1997 and issued official designations for the $PM_{2.5}$ standard on December 17, 2004. On October 17, 2006, EPA published final revisions to the NAAQS for particulate matter that took effect on December 18, 2006. The revision strengthens the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and revokes 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 $\mu g/m^3$. Montana has not yet adopted a $PM_{2.5}$ standard, and EPA has not yet adopted $PM_{2.5}$ PSD Class I or Class II Increment Standards for evaluating particulate emissions, nor has Montana adopted an ambient air quality standard for $PM_{2.5}$.

3.4.4.1 Affected Environment for Visibility

The potential air pollutant effects on visibility are applied to PSD Class I and Class II areas. Table 3-5 lists the 14 PSD Class I and II areas located nearest to the South Extension development area.

The Regional Haze Rule calls for improved visibility on the most-impaired days and no additional impairment on the least-impaired days. EPA participates in the IMPROVE visibility monitoring program as part of its visibility protection program. The IMPROVE monitoring sites were established to be representative of all PSD Class I areas.

Indian Tribes may assume authority under the CAA to be responsible for managing air quality on their reservations with program approval by EPA. The Northern Cheyenne Tribe designated their Reservation as a voluntary PSD Class I area under the PSD program in 1977, although the national visibility regulations do not apply in this area (BLM 2006a). Currently, the Northern Cheyenne Tribe does not have any EPA approved CAA programs for issuing permits, nor is there a Tribal Implementation Plan (air quality control plan) with general source or source specific requirements. The Northern Cheyenne Tribe implemented an air quality monitoring program in 1981 and delivers air quality data to the EPA's AIRS database. Ambient air monitoring can be used to augment and validate modeled results, and the Northern Cheyenne Tribe conducts $PM_{2.5}$ monitoring at Lame

Deer. The tribe also operates an IMPROVE sampler that supplements EPA's core IMPROVE monitoring network.

Currently, there are two $PM_{2.5}$ monitoring sites at Lame Deer. The 24-hour $PM_{2.5}$ standard is met by evaluating the 98th percentile of the highest concentrations for all the collected 24-hour samples. At Lame Deer Site #1, the 98th percentile values were 16 µg/m^3 in 2004 and 24 µg/m^3 in 2005, compared to the NAAQS of 35 µg/m^3. At Lame Deer Site #2, the 98th percentile values were 11 µg/m^3 in 2004 and 23 µg/m^3 in 2005. The annual average $PM_{2.5}$ levels at the two sites were 5.8 and 5.9 µg/m^3 in 2004 and 7.7 and 6.6 µg/m^3 in 2005, compared to the NAAQS of 15 µg/m^3 (EPA 2007).

The Crow Indian Reservation is a Class II airshed. Currently, the Crow Tribe does not have any EPA approved CAA programs for issuing permits, nor is there a Tribal Implementation Plan with general source or source specific requirements. The Crow Tribe is not currently implementing an air quality monitoring program, and has never had one that submitted data to EPA's AIRS database.

3.4.4.2 Environmental Consequences Related to Visibility

Discrete visible plumes are not likely to impact the distant sensitive areas, but the potential for cumulative visibility impacts (increased regional haze) is a concern. Visibility impairment is expressed in terms of deciview (dv). A change in visibility of 1.0 dv represents a "just noticeable change" by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment. The deciview index is a scale related to visual perception that has a value near zero for a pristine atmosphere. 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. The National Visibility Goal was established as part of the CAA in order to prevent any future, and remedy any existing, impairment of visibility in mandatory federal PSD Class I areas that result from manmade air pollution. A 1.0 dv change is considered potentially significant in mandatory PSD Class I areas.

3.4.4.2.1 Proposed Action and Alternative 1

The impacts to visibility from mining the South Extension development area have been inferred from the currently permitted impacts of mining at the Absaloka Mine. The South Extension development area would be mined as an integral part of the Absaloka Mine. The average annual coal production is anticipated to remain at the current rate of 6.5 to 7.0 million tons, with or without the South Extension development area. Therefore, impacts to visibility under the Proposed Action and Alternative 1 would be similar to the impacts under the No Action Alternative, but they would be expected to continue for up to 12 years longer than was considered in the currently approved air quality permit. Material (soil, overburden and coal) movement would continue to be accomplished in the same manner using the same equipment, mine facilities described in the air quality permit would not change, and there are no plans to revise blasting procedures or sizes associated with mining the South Extension development area.

MDEQ states that visibility requirements are only applicable to the owner or operator of a proposed major stationary source, as defined by ARM 17.8.801(22). The MDEQ has determined that the Absaloka Mine is a minor source of emission as defined under Title V (WRI 2005). Therefore, the State of Montana has not and would not require the Absaloka Mine to evaluate visibility impacts on Class I areas.

OSM stated in its Technical Adequacy Review Report that was prepared for the air quality impact analysis of mining the South Extension area that, "all emissions associated with mining the South Extension area are fugitive emissions which, under EPA regulations, do not constitute a major source requiring a permit and which are not applicable to PSD increments" and "according to the results generated from the model, impacts to air quality will be consistent with historic monitoring results for the Absaloka Mine and will likely be negligible" (OSM 2007).

The maximum impacts from the NAAQS modeling analyses are shown in Tables 3-6 and 3-7 along with the NAAQS. The NAAQS are applicable on the Crow and Northern Cheyenne Indian Reservations. Long-term and short-term modeling results indicate that the projected mining activities would be in compliance with the annual and short-term NAAQS for $PM_{2.5}$ for the life of the Absaloka Mine (Bison Engineering 2007). The summary data for both Table 3-6 and 3-7 are the maximum for the mining period, which occurred for mining year 2020 near the Crow Indian Reservation and year 2011 on the Northern Cheyenne Indian Reservation.

3.4.4.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted, and coal removal and associated impacts would not occur on the development area. Mining operations and the associated potential emission impacts described above would continue as permitted on the Absaloka Mine's existing permit area for approximately 3 more years (post-2006), or until 2009. Impacts to visibility related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.4.4.3 Regulatory Compliance, Mitigation and Monitoring for Visibility Impacts

As discussed above, $PM_{2.5}$ is the main cause of visibility impairment. Mitigation measures being used to limit emissions of particulate matter are discussed in Section 3.4.2.3. WRI intends to continue implementing these operational measures to control particulate emissions if the proposed development area is mined.

State agencies develop and maintain air pollution control plans referred to as State Implementation Plans (SIPs). These control plans explain how an agency will protect against air pollution under the CAA. For the purposes of addressing reasonably attributable visibility impairment, each SIP must include a long-term (10 to 15 years) strategy for making reasonable progress toward the national goal specified in §51.300(a). Since Montana never adopted long-term strategies, EPA incorporated a federal long-term strategy into the Montana SIP. According to EPA, the Montana SIP for Class I Visibility Protection long-term strategy would focus on "preventing any future, and remedying any existing, impairment of visibility in mandatory Class I federal areas, which impairment results from manmade air pollution; and to establish necessary additional procedures for new source permit applicants for states and federal land managers to use in conducting the visibility impact analysis required for new sources under §51.166" (U.S. CFR 2004). Administrators of the tribal (non-mandatory) Class I areas may request a visibility analysis for informational purposes, though the results would not be binding. In addition, MDEQ may request visual impact analysis for sensitive Class II areas if impacts are of particular public concern (MDEQ 2006b).

Visibility monitoring within the state of Montana consists of the IMPROVE program and $PM_{2.5}$ monitoring sites. These sites are being utilized to characterize the extent, frequency of occurrence, and magnitude of visual air quality.

3.4.5 Residual Impacts to Air Quality

No residual impacts to air quality would occur following mining and reclamation.

3.5 Water Resources

3.5.1 Groundwater

3.5.1.1 Affected Environment

The general analysis area overlies six geologic water-bearing strata that have been directly affected by existing mining activities at the Absaloka Mine and/or would be directly affected by mining the South Extension development area. In descending stratigraphic order, these units are the recent alluvium, the Rosebud-McKay overburden, the Rosebud-McKay coal seams, the interburden between the Rosebud-McKay and Robinson coal seams, and the Robinson coal seam. The Rosebud and McKay coals have been addressed as a single aquifer within the Absaloka Mine's currently approved mine permit and will continue to be considered as a single, separate aquifer within the South Extension development area. The sixth water-bearing stratum that has been and would continue to be affected is the Mississippian-age Madison Limestone, which is used for the mine's industrial water supply.

The Robinson seam was mined in the early years of the mine's operation, but is no longer being mined and would not be mined within the South Extension development area. Therefore, the Robinson seam and the interburden between the Rosebud-McKay and Robinson seams would not be physically disturbed by the proposed South Extension development plan.

Baseline investigations conducted by WRI in 1975 found that most of the domestic and stock wells in the general area of the Absaloka Mine are completed in the sub-Robinson unit, which is a stratigraphic sequence of interbedded shales, siltstones, and sandstones beneath the Robinson seam that is approximately 180 to 350 feet thick (WRI 1975). Only six of 156 private wells inventoried in the area in 1975 were completed below the sub-Robinson unit.

Deeper aquifers that do not crop out in the general analysis area are seldom used as a source of ground water within a radius of 50 miles of the area (WRI 1975). WRI drilled three test holes into the Tullock Member of the Fort Union Formation in an attempt to develop an adequate industrial water supply for the mining operation; however, an insufficient supply of water was obtained from this drilling effort (BIA 1974). The present source of industrial water supply for the Absaloka Mine is from a 7,977 foot-deep well completed in the Madison Limestone.

WRI established an extensive groundwater monitoring program, which is approved by MDEQ, to record mining effects on the area's groundwater resources, and the results of these monitoring activities are reported to MDEQ semi-annually. Absaloka Mine's historical groundwater monitoring network, and the extensive groundwater monitoring network established to describe the current hydrogeologic conditions within and around the South Extension development area is discussed in Section 3.5.1.3.

Both regional and site-specific baseline hydrogeologic environments within and around the Absaloka Mine are extensively characterized in the MDEQ Surface Mine Permit No. 85005 (OSM Surface Mine Permit MT-0007F) (WRI 2003). In addition, Hydrometrics, Inc. of Billings, Montana, prepared the *Tract III South Extension Baseline Water Resources Data Report* and the *Comprehensive Analysis of Probable Hydrologic Consequences for the Absaloka Mine* in September and November 2006, respectively (Hydrometrics 2006a, 2006b). These reports are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI 2007a). Baseline monitoring data were collected in accordance with ARM 17.24.304 (1)(f) and 30 CFR Sec. 780.21 (b) and (c) and are included in Hydrometrics reports, which are on file and available for public review at the respective surface mining regulatory agency's offices. These reports are referenced extensively within this EIS.

3.5.1.1.1 Recent Alluvium

Within the South Extension development area, alluvial (unconsolidated, stream laid) deposits occupy the Middle Fork Sarpy Creek valley bottom, and minor amounts of alluvial/colluvial deposits are present in some of the ephemeral tributary coulees. Shallow surficial colluvial (or near-source slope wash and cliff debris) deposits generally flank the alluvial deposits, exist on the side slopes of the bordering highlands, and may interbed with the alluvial deposits. The alluvial and colluvial deposits generally form a continuity of unconsolidated surficial deposits that extend from the bordering highland areas onto the valley floor. A thin layer of fine-grained sand and silt of eolian origin generally blankets the entire width of valley fill, including the colluvial deposits. Groundwater is present in the Middle Fork Sarpy Creek alluvium. Minor amounts of groundwater occur in the alluvial/colluvial deposits of some tributary drainages, particularly near their mouths. Groundwater does not typically occur in the thin surficial colluvial deposits.

Lithologies of these unconsolidated deposits reflect relatively near-source (limited weathering of rock fragments) and episodic deposition that resulted in layers of differing grain sizes (Hydrometrics 2006a). The Middle Fork Sarpy Creek alluvium consists predominately of a silt and clay matrix interbedded with occasional very thin sandy layers and sparse, thin lenses of angular to sub-angular clinker and bedrock fragments. These fine-grained alluvial materials in turn overlie coarser alluvial materials consisting of poorly sorted, fine- to coarse-grained sand with moderate to abundant coal fragments. The basal zone contains some thin, sandy gravel lenses containing abundant angular to subangular clinker, coal, and bedrock fragments of local origin. The thickness of alluvial deposits in the general analysis area varies from zero along the margins of the valley to approximately 40 feet, and is typically around 20 feet. The width of the Middle Fork valley occupied by unconsolidated stream laid deposits ranges from about 500 to 1,000 feet. The alluvial deposits in upper Sarpy Creek have very similar characteristics to those of Middle Fork Sarpy Creek. The alluvial and colluvial deposits associated with tributary draws and other minor surface drainages in the general analysis area are generally too thin and not laterally extensive enough to be saturated and are not considered to be aquifers.

Figure 3-9 depicts the locations of Absaloka Mine’s currently active groundwater monitoring wells within and adjacent to the South Extension development area. Aquifer testing of alluvial monitor wells indicates that the hydraulic conductivity of the alluvium within the general analysis area is variable, ranging from less than 0.5 feet per day (ft/day) at well A-46 to 39 ft/day at well A-40 (Figure 3-9). Hydraulic conductivities are lowest in wells completed in the alluvial/colluvial deposits present in minor tributary drainages (e.g., at well A-46), where the saturated thickness is minimal and the percentage of fine-grained alluvial materials is higher. Conversely, where the saturated thickness is greater and the

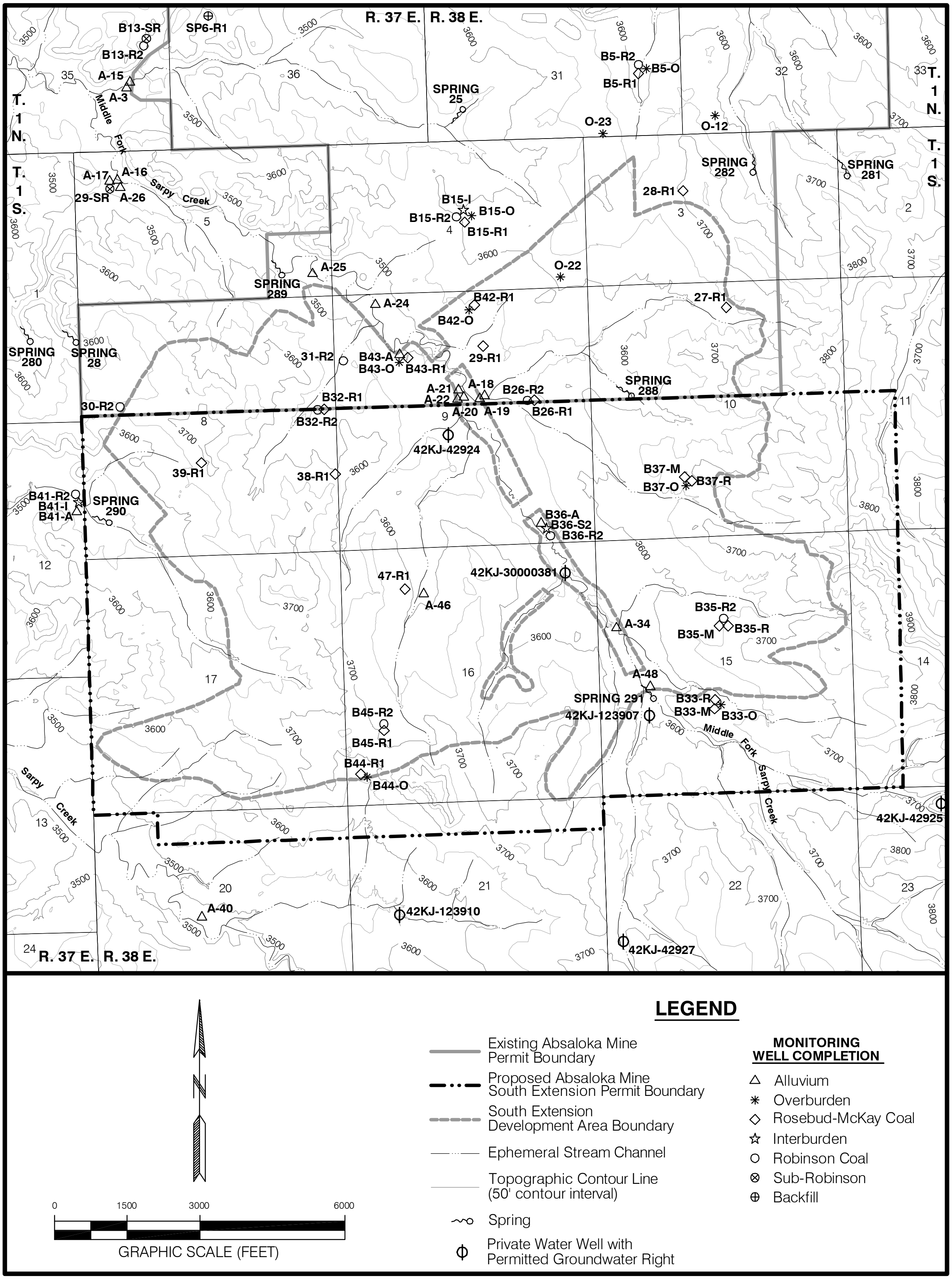


Figure 3-9. WRI's Groundwater Monitoring Network Within and Adjacent to the South Extension Development Area.

alluvial sediments have fewer fines (e.g., at well A-40 on Sarpy Creek), the hydraulic conductivities are highest (Hydrometrics 2006a).

Alluvial groundwater level data indicate that the flow direction is downstream, parallel to the valley's axis, under a hydraulic gradient of 0.005 to 0.014 ft/ft. Middle Fork's alluvial groundwater flow gradients are steeper upstream near the southern edge of the South Extension tract, then decrease downstream as the valley widens near the Crow Indian Reservation boundary (Hydrometrics 2006a), similar to the valley's profile. There have been no mining-related disturbances to the Middle Fork Sarpy Creek alluvial aquifer, and no impacts to the alluvial groundwater elevations and flow patterns within the general analysis area have occurred to date.

Water levels measured from the alluvial monitoring wells show slight seasonal fluctuations, typically less than two feet. Groundwater elevations increase in the spring in response to snowmelt and precipitation runoff, and then decrease throughout the remainder of the year (Hydrometrics 2006a and WWC 2004). A component of recharge to the alluvium is from streamflow infiltration; however, there is also a component of recharge to the alluvium from the subcropping Rosebud-McKay coal seams and overburden (Hydrometrics 2006a and WWC 2004).

Groundwater flow directions in the overburden and Rosebud-McKay coal seams within the general analysis area are toward the aquifers' subcrops beneath Middle Fork Sarpy Creek alluvial valley fill deposits. Overburden and Rosebud-McKay groundwater levels monitored in 2005 and 2006 in the general analysis area indicate that groundwater in these units is flowing toward the drainage bottom and discharging to the alluvium (Hydrometrics 2006a). The occurrence of groundwater, its flow directions, and estimates of the rate of flow in these water-bearing strata will be described in more detail below.

Limited recharge occurs to bedrock units that lie beneath the alluvium except where zones of higher permeability bedrock occur. For example, at roughly 5,000 feet downstream of the Crow Indian Reservation boundary, the alluvial groundwater flow gradients become much steeper as the water moves vertically downward to recharge the underlying, sandy sub-Robinson unit that subcrops beneath the valley fill materials, leaving the alluvium essentially dry downstream (WWC 2004).

In conclusion, Middle Fork Sarpy Creek alluvium upstream of the Crow Indian Reservation boundary receives recharge from streamflow and subcropping aquifers and stores and conveys groundwater downstream. The amount of groundwater flowing downstream through the alluvium of Middle Fork near the Reservation boundary was calculated to be 392 gallons per minute (gpm) in November 2003 (WWC 2004) and 123 gpm in October 2005 (Hydrometrics 2006a). The alluvial groundwater underflow then drains down into the permeable Fort

Union bedrock strata (the sub-Robinson units) that subcrop beneath the valley fill, which in effect leaves the alluvium essentially dry at, and downstream/downgradient of, an area that begins approximately 6,000 feet downstream of the Reservation boundary (WWC 2004).

Seasonal water quality samples were collected from alluvial monitoring wells within and adjacent to the South Extension development area in 2005 and 2006. In general, the quality of groundwater in the saturated Middle Fork Sarpy Creek alluvium was relatively consistent throughout the general analysis area and did not vary appreciably during the baseline monitoring period. With the exception of wells A-18 and A-24 (Figure 3-9), total dissolved solids (TDS) concentrations ranged from around 1,250 milligrams per liter (mg/L) to 1,800 mg/L. The average TDS concentrations at wells A-18 and A-24 were around 2,900 and 2,800 mg/L, respectively. These two wells are located in close proximity to the Rosebud-McKay coal's alluvial subcrop, which suggests that the groundwater discharged from the coal seam aquifer to the alluvium has an affect upon the alluvial groundwater quality. The Middle Fork Sarpy Creek alluvial groundwater is generally a magnesium-sulfate type; however, calcium and bicarbonate concentrations are also high relative to the other cations and anions. The quality of Sarpy Creek alluvial groundwater sampled at well A-40 (Figure 3-9) during the baseline monitoring period is comparable to that of the Middle Fork Sarpy Creek alluvial groundwater. The mean TDS concentration at well A-40 was 1,810 mg/L, and the water type is a magnesium sulfate. The alluvial groundwater quality characteristics are due partly to solute concentration by evapotranspiration, and partly to the relatively poor water quality that recharges the aquifer.

A classification of irrigation waters in arid and semiarid regions, developed by McKee and Wolf (1974), indicates TDS concentrations ranging from 30 mg/L to 2,100 mg/L have a medium to very high salinity hazard, and concentrations above 2,500 mg/L have a very high salinity hazard. The dissolved sulfate concentration is another water quality criterion used to classify the suitability of irrigation water. Dissolved sulfate concentrations greater than 576 mg/L to 1,485 mg/L are unsatisfactory for most plants except those that have a high tolerance to saline conditions (McKee and Wolf 1974). Mean dissolved sulfate concentrations of all samples collected during the baseline monitoring period ranged from 552 to 1,941 mg/L, which classifies Middle Fork's alluvial groundwater as a high salinity hazard for irrigation water. According to Montana's groundwater classification system, Middle Fork Sarpy Creek and Sarpy Creek alluvial groundwater is generally a Class II or Class III groundwater that is at least marginally suitable for domestic water supplies (with treatment), livestock and wildlife use, and most commercial and industrial purposes. It is also marginally suitable for some salt tolerant crops (MDEQ 2006c).

TDS and sulfate concentrations exceed the EPA's secondary maximum contaminant level (SMCL) at every Middle Fork Sarpy Creek and Sarpy Creek alluvial well location. Dissolved metals concentrations are typically low; however, dissolved iron and manganese concentrations are above the SMCL levels in nearly every sample collected. SMCLs are based on non-enforceable standards for public drinking water that are not considered to be a health risk, but cause adverse affects (i.e., odor and staining) (EPA 2006). EPA's National Primary Drinking Water Standard, or the Maximum Contaminant Levels (MCLs) are enforceable. The levels of potential contaminants such as nitrate, arsenic, selenium, barium, and trace metals (e.g., mercury, lead, chromium, copper, cadmium, zinc) are typically less than the analytical detection limits or are significantly below the MCLs in all water samples that were collected in 2005 and 2006 from alluvial monitoring wells located within and adjacent to the South Extension development area.

The highest levels of nitrate plus nitrite as nitrogen observed at all of WRI's groundwater monitoring wells, including those completed in the alluvial, overburden, Rosebud-McKay coal seam, interburden, Robinson coal seam, sub-Robinson unit, and backfilled spoils aquifers, occur in samples collected from alluvial wells A-16, A-18, and A-24 (Figure 3-9). The historical maximum concentrations of nitrogen at these three wells ranges from 1.87 to 4.17 mg/L and the historical mean concentrations range from 0.47 to 1.66 mg/L. These three alluvial wells are located in the Middle Fork Sarpy Creek valley, near where livestock are commonly concentrated during the winter seasons. High concentrations of nitrate in shallow groundwater are strongly associated with agricultural land use, particularly in areas with more intensive use of fertilizers and/or places where large numbers of livestock are found (USGS 1999a).

Seasonal water quality samples were also collected during the 2005-2006 baseline monitoring period from wells A-46 and B41-A, which are installed in the shallow alluvial/colluvial deposits of minor tributaries to Middle Fork Sarpy Creek and Sarpy Creek (Figure 3-9), and found to be of better quality than the alluvial groundwater in the valleys of Middle Fork and Sarpy Creek. The mean TDS concentration of four samples from well A-46 was 781 mg/L, the mean TDS concentration of five samples from well B41-A was 513 mg/L, and the water type of all samples from both wells was a calcium-bicarbonate.

The existing Absaloka mine permit and Hydrometrics' reports (2006a and 2006b), which are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI 2007a), contain extensive tabulated summaries of alluvial groundwater quality analyses of samples that have been collected within and near the mine's existing permit area and the South Extension development area to date. These documents are on file and available for public review at MDEQ's offices in Helena and Billings, Montana.

3.5.1.1.2 Overburden

Overburden (the strata lying above the mineable coal seams) in the general analysis area consists mainly of interbedded shales, siltstones, claystones and fine- to very fine-grained sandstones. Any of the deposits may be water bearing, although the siltstones and sandstones possess a greater potential for groundwater yield. These more permeable strata are generally discontinuous and separated laterally and vertically by the finer-grained deposits. The discontinuous nature of the deposits produces considerable variability and unpredictability in groundwater occurrence within the overburden, both laterally and vertically. The hydraulic connection between sandstone lenses is tenuous due to intervening shale aquitards; thus, groundwater movement through the overburden is limited. Because the water-bearing units are not continuous, the overburden is not considered to be a regional aquifer.

Drilling conducted by WRI within and around the South Extension development area in 2005 and 2006 identified areas where groundwater is present within the overburden. Groundwater monitoring wells were then installed at those locations where saturated overburden strata were encountered. Within the South Extension development area, the overburden is dry west of the Middle Fork Sarpy Creek valley, except along the northern margin near the Tract III revision fault, at well B43-O (Figure 3-9). Water is present in the overburden immediately south of the southern fault at wells B33-O and B44-O; however, the overburden is dry immediately north of the southern fault in the vicinity of wells B35-R, B35-R2, and B35-M. Groundwater flow does not appear to occur through the overburden across the southern fault (Hydrometrics 2006a). East of Middle Fork Sarpy Creek, groundwater was encountered, and monitoring wells were installed at all of the other overburden well locations shown on Figure 3-9 (B37-O, B42-O, O-22, B15-O, and O-23).

Prior to mining, if groundwater was present in the overburden in the Absaloka Mine area, its flow direction tended to reflect the topography, flowing downgradient towards the major stream valleys (Hydrometrics 2006b). In areas where water-bearing overburden strata intersected the ground surface or subcropped beneath unconsolidated deposits, springs potentially occurred. In the general analysis area, mining has not disturbed the overburden, and where groundwater does occur it follows the topography. During the spring of 2006, groundwater flow in the overburden east of Middle Fork Sarpy Creek was toward the west under a gradient of approximately 0.017, ultimately discharging into the Middle Fork Sarpy Creek alluvial aquifer (Hydrometrics 2006a).

Recharge to the overburden is from the infiltration of precipitation, and discharge from the overburden is by seepage into the alluvium along stream courses, seepage to springs, pumping wells, and drainage into Absaloka Mine's excavations. Groundwater levels in the overburden monitoring wells were relatively consistent throughout 2006 with less than one foot of fluctuation, with the exception of well B43-O. As stated previously, water levels in each of the aquifers in the vicinity of well B43-O show similar trends, which suggests hydraulic communication between the units (Hydrometrics 2006a).

Field aquifer testing conducted within and adjacent to the South Extension development area in 2005 indicates that the water-bearing overburden strata have a hydraulic conductivity that is similar to or slightly higher than the deeper coal aquifers (Hydrometrics 2006a), ranging from 0.2 to 1.5 ft/day.

According to the potentiometric surface map derived from the Fall 2005/Spring 2006 groundwater level data for the overburden, groundwater flow in the general analysis area is toward the Middle Fork Sarpy Creek drainage bottom where it discharges into the alluvial aquifer. Groundwater flow through the overburden within the South Extension development area was calculated to be approximately 25.5 gpm. The majority of this flow occurs within the Tract III Revision area north of the Crow Indian Reservation boundary, and it appears to all discharge into the Middle Fork Sarpy Creek alluvium (Hydrometrics 2006a).

Seasonal water quality samples were collected in 2005 and 2006 from overburden monitoring wells located within and adjacent to the South Extension development area. The concentrations of dissolved constituents were somewhat variable spatially. For example, the mean TDS concentrations ranged from a low of 794 mg/L at well B42-O to a high of 2,838 mg/L at well B37-O. The average TDS concentration of all overburden groundwater samples collected in the general analysis area at this time was 1,636 mg/L. However, the water quality at each well remained consistent throughout the 2005-2006 baseline monitoring period. The overburden groundwater type is characterized as a magnesium/calcium-sulfate. TDS, sulfate, iron, and manganese concentrations exceed the EPA's SMCL in every sample. The levels of potential contaminants such as nitrate, arsenic, selenium, barium, and trace metals (e.g., mercury, lead, chromium, copper, cadmium, zinc) are typically less than the analytical detection limits or are much below the MCLs in all water samples that were collected in 2005 and 2006 from overburden monitoring wells located within and adjacent to the South Extension development area. According to Montana's groundwater classification system, groundwater from the saturated overburden strata within the general analysis area is generally a Class II groundwater that is at least marginally suitable for domestic water supplies (with treatment), livestock and wildlife use, and most commercial and industrial purposes. It is also marginally suitable for irrigation of some agricultural crops (MDEQ 2006c).

The existing Absaloka mine permit and Hydrometrics' reports (2006a and 2006b), which are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI 2007a), contain extensive tabulated summaries of overburden groundwater quality analyses of samples that have been collected within and near the mine's existing permit area and the South Extension development area to date. These documents are on file and available for public review at MDEQ's offices in Helena and Billings, Montana.

3.5.1.1.3 Rosebud-McKay Coal

The lowermost coal seams of the Tongue River Member of the Fort Union Formation, the Rosebud, McKay, and Robinson, are preserved in the general analysis area. Two thin coal seams, the Stray 1 and Stray 2, also occur in the general analysis area and are each only a few feet thick. The Stray 1 coal occurs within the overburden unit and the Stray 2 coal occurs within the interburden unit. These two “rider” seams are not considered by WRI to be economical to mine and are not described as aquifers of local or regional importance. All younger, stratigraphically higher coal seams have been removed by erosion. In parts of the current Absaloka Mine area, the Rosebud and McKay seams are joined into a single seam referred to as the Rosebud-McKay, which averages 32 feet thick. In the South Extension development area, a claystone parting of variable thickness separates the Rosebud and McKay seams, ranging from less than one foot to over 40 feet, but averaging 11.7 feet.

All or parts of the Rosebud and McKay seams are absent in certain areas within the general analysis area, where either the Rosebud or both the Rosebud and McKay seams have been removed by erosion or are burned. In the southern portion of the proposed mine area, the coal has been partially or completely removed by erosion in the Middle Fork Sarpy Creek drainage bottom. In the western portion of the South Extension tract, both seams have been extensively burned and are eroded away within the Sarpy Creek drainage. Both seams therefore outcrop to the west and in the center of the South Extension development area, and the mineable coal reserves are delimited by the seams’ burn lines, which mark areas of weathering, oxidation, or erosion (Norwest 2006). In the northern portion of the proposed mine area, the overburden has been completely eroded away from the top of the coal by Middle Fork Sarpy Creek and the Rosebud-McKay seam is in direct contact with the stream’s alluvial deposits. Where not affected by erosion or oxidation, the Rosebud and McKay seams are relatively consistent in thickness throughout the general analysis area.

Localized folding and faulting mask the regional geologic structure of the northern Powder River Basin (PRB) of southern Montana. The geologic structure of the general analysis area exhibits gentle dips, typically less than three degrees, to the north with local northeast-trending folds forming shallow basins and domes (Norwest 2006). Four northeast-trending structural faults occur in the proposed development area; all four are high-angle, normal, and downthrown on the southern side. The South Extension development area is bound on the north and south sides by the two larger faults, the Tract III revision fault and the southern fault (Figure 3-3), both of which extend completely across the proposed development area. Stratigraphic displacements on the southern fault are greatest, ranging from 100 to 200 feet. The two smaller faults are on the west side of the South Extension tract and are of limited length (Norwest 2006).

In general, the Fort Union coal seams are considered regional aquifers because they are water bearing and laterally continuous throughout large areas. Hydraulic conductivity within the coal seams is highly variable and reflective of the amount of fracturing the coal has undergone, as unfractured coal is virtually impermeable (Van Voast and Hedges 1974).

West of Middle Fork Sarpy Creek, the claystone parting between the Rosebud and McKay seams is relatively thin, and in this area the coals contain little groundwater. The coals are essentially dry throughout all of Section 17, T.1S., R.38E., in an area around well 39-R1 north of the Tract III revision fault, and in a relatively large area between the Middle Fork and well 47-R1 (Figure 3-9). Hydraulic conductivity values for the coal seams determined by field aquifer tests in the area west of Middle Fork are very low, ranging from less than 0.01 ft/day at well B45-R1 to 0.2 ft/day at well B43-R1. Hydraulic conductivity values calculated for the coal seams in the area east of Middle Fork are also very low (less than 0.3 ft/day), with the exception of well B37-M (Figure 3-9), which was determined to be 2.7 ft/day (Hydrometrics 2006a).

Absaloka Mine has been mining the Rosebud-McKay coal seam north of the proposed South Extension development area since the mid-1970s. Mining has not disturbed the coal seams in the general analysis area, and the dewatering effects from the mining operation have not extended into the proposed development area. The Tract III revision fault breaks the coal seams' areal continuity and effectively prevents the mining-related water level drawdowns from propagating south across the fault plane into the proposed development area. Rosebud and McKay coal seam groundwater levels recorded in the general analysis area throughout 2005 and 2006 were relatively consistent, fluctuating less than one foot.

According to the Rosebud-McKay coal seam's potentiometric surface map derived from the Fall 2005/Spring 2006 groundwater level data (Hydrometrics 2006a), groundwater flow in the general analysis area is toward the Middle Fork Sarpy Creek drainage bottom where it discharges into the alluvial aquifer at the coal seams' alluvial subcrop areas. The movement of groundwater in the area west of Middle Fork Sarpy Creek is generally northward to slightly northeast under a gradient of 0.02 ft/ft. East of Middle Fork, the parting between the Rosebud and McKay seams thickens, and this separation results in differences in water levels between the two coal seams; however, groundwater flow in both seams in this area is toward the northwest under a gradient of 0.016 (McKay) to 0.02 (Rosebud). Groundwater flow through the two coal seams in 2006 within the South Extension development area was calculated to be approximately 11.0 gpm (Hydrometrics 2006a). The baseline (July 2005 through June 2006) water level monitoring data, groundwater level hydrographs, and potentiometric surface map for the Rosebud-McKay coal aquifer in the general analysis area are included in Hydrometrics' 2006 report (Hydrometrics 2006a). The alluvial valley floor assessment for Middle Fork Sarpy Creek, which was conducted in 2003, estimated the rate of recharge from the subcropping coal seams to the Middle Fork alluvial groundwater system to be 15 gpm (WWC 2004).

Recharge to the Rosebud and McKay coals in the general analysis area occurs principally from the east. Due to the stratigraphic displacement of over 100 feet by the southern fault (Figures 3-3 and 3-4), little, if any, recharge to the coal seams in the proposed development area occurs from the south. Groundwater flow from south to north across the fault plane does not occur in the coal seams, nor does it flow northward across the fault plane from the overburden to the coals (Hydrometrics 2006a).

Seasonal water quality samples were collected from all of the Rosebud and McKay coal monitoring wells within and adjacent to the South Extension development area in 2005 and 2006. The concentrations of dissolved constituents were variable spatially; however, the water quality at each well remained very consistent throughout the baseline monitoring period. For example, the mean TDS concentrations ranged from a low of 612 mg/L at well B45R1 to a high of 3,445 mg/L at well B37R (Figure 3-9). In general, TDS concentrations were lowest in samples collected from coal monitoring wells that are less than 100 feet deep. The average TDS concentration of all groundwater samples collected from the Rosebud and McKay coal wells was 1,606 mg/L. The composition of groundwater in the coal is also variable spatially. Sodium is generally the predominant cation; however, calcium or magnesium is the predominant cation at some locations. The predominant anion is typically sulfate, but bicarbonate is the predominant anion at some locations, particularly where the TDS concentrations are relatively low. TDS, sulfate, iron, and/or manganese concentrations exceed the EPA's SMCL in every sample. The levels of potential contaminants such as nitrate, arsenic, selenium, barium, and trace metals (e.g., mercury, lead, chromium, copper, cadmium, zinc) are typically less than the analytical detection limits or are much below the MCLs in all water samples that were collected in 2005 and 2006 from Rosebud and McKay coal monitoring wells located within and adjacent to the South Extension development area. According to Montana's groundwater classification system, groundwater from the Rosebud and McKay coal seams within the general analysis area is a Class II groundwater that is at least marginally suitable for domestic water supplies (with treatment), livestock and wildlife use, and most commercial and industrial purposes. It is also marginally suitable for irrigation of some agricultural crops (MDEQ 2006c).

The existing Absaloka mine permit and Hydrometrics' reports (2006a and 2006b), which are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI 2007a), contain extensive tabulated summaries of Rosebud and McKay coal groundwater quality analyses of samples that have been collected within and near the mine's existing permit area and the South Extension development area to date. These documents are on file and available for public review at MDEQ's offices in Helena and Billings, Montana.

3.5.1.1.4 McKay-Robinson Interburden

Within the general analysis area, the lithology of the McKay-Robinson interburden is similar to that of the overburden. The Stray 2 coal seam, which is only a few feet thick and anywhere from approximately 1 foot to 10 feet below the McKay seam, occurs within the interburden unit. Mining in the South Extension development area would not directly disturb any stratigraphic units below the McKay seam. Two wells (B41-I and B36-S2) were installed in the McKay-Robinson interburden within the general analysis area and were monitored for groundwater levels in 2005 and 2006.

Well B41-I was installed near the western edge of the South Extension tract (Figure 3-9). The Rosebud and McKay coals have been eroded away in this area, and the interburden, which is relatively sandy at this location, is in direct contact with the overlying alluvium of an unnamed tributary to Sarpy Creek. The alluvial deposits are saturated; therefore, groundwater can percolate downward to recharge the permeable interburden. Well B41-I is estimated to yield 10 gpm and the water levels were very stable throughout the monitoring period. The interburden's hydraulic conductivity was determined to be approximately 2.9 ft/day at this location (Hydrometrics 2006a).

Well B36-S2 was installed in the Stray 2 coal seam and is located in the Middle Fork Sarpy Creek valley bottom (Figure 3-9). Both the Rosebud and McKay coal seams have been eroded away in this area and the Stray 2 seam is in contact with the Middle Fork alluvium. Water levels at well B36-S2 were observed to fluctuate similar in trend and magnitude as the alluvial water table, indicative of hydraulic communication between the two units in this area. The Stray 2 coal's hydraulic conductivity was determined to be approximately 8.8 ft/day at this location (Hydrometrics 2006a).

3.5.1.1.5 Robinson Coal

The Robinson coal seam was mined along with the Rosebud-McKay coal at the Absaloka Mine; however, it is no longer being mined. Where it was mined, backfilled overburden has replaced the Robinson. The Robinson seam would not be mined within the South Extension development area. Potentiometric surface contours for the Robinson coal and associated backfill monitoring wells completed to the depth previously occupied by the Robinson coal indicate that groundwater is generally flowing northward toward the backfilled pit. Groundwater movement in the Robinson coal seam has changed little since 1982. The Robinson is therefore providing, and will continue to provide, lateral recharge to the existing backfill (Hydrometrics 2006b).

The Robinson coal is present beneath most of the South Extension development area, but is eroded away in the Middle Fork Sarpy Creek valley immediately downstream of the Crow Indian Reservation boundary. WRI installed several

Robinson coal monitoring wells in the general analysis area (Figure 3-9), and according to the Spring 2006 groundwater level data, the movement of groundwater is to the north-northwest under a gradient of 0.015 ft/ft. Groundwater levels in the Robinson coal were very consistent during the 2005-2006 baseline monitoring period. Hydraulic conductivity values for the Robinson coal, determined by field aquifer tests, were relatively low, ranging from nearly impermeable at well 30-R2 to about 0.9 ft/day at well B32-R2 (Figure 3-9). Groundwater flow through the Robinson Coal was estimated for the entire general analysis area to be 1.2 gpm (Hydrometrics 2006a).

Due to the stratigraphic displacement across the southern fault (Figures 3-3 and 3-4), saturated overburden strata south of the fault plane are in contact with the Robinson seam north of the fault plane. Recharge from the overburden south of the fault to the Robinson seam north of the fault may therefore occur in minor amounts (Hydrometrics 2006a).

Seasonal water quality samples were collected from all of the Robinson coal monitoring wells within and adjacent to the South Extension development area in 2005 and 2006. The quality of groundwater in the Robinson coal seam varies considerably, with average TDS concentrations ranging from 533 mg/L at well B41R2 to 3,487 mg/L at well 30R2. The average TDS concentration of all Robinson coal groundwater samples collected in this area was 1,793 mg/L (Hydrometrics 2006a). The water quality was consistent during the baseline monitoring period at each well, and the water type is a sodium sulfate at most locations. TDS, sulfate, iron, and/or manganese concentrations exceeded the EPA's SMCL in every sample. The levels of potential contaminants such as nitrate, arsenic, selenium, barium, and trace metals (e.g., mercury, lead, chromium, copper, cadmium, zinc) are typically less than the analytical detection limits or are much below the MCLs in all water samples that were collected in 2005 and 2006 from Robinson coal monitoring wells located within and adjacent to the South Extension development area. According to Montana's groundwater classification system, groundwater from the Robinson coal seam within the general analysis area is a Class II groundwater that is at least marginally suitable for domestic water supplies (with treatment), livestock and wildlife use, and most commercial and industrial purposes. It is also marginally suitable for irrigation of some agricultural crops (MDEQ 2006c).

The existing Absaloka mine permit and Hydrometrics' reports (2006a and 2006b), which are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI 2007a), contain extensive tabulated summaries of Robinson coal groundwater quality analyses of samples that have been collected within and near the mine's existing permit area and the South Extension development area to date. These documents are on file and available for public review at MDEQ's offices in Helena and Billings, Montana.

3.5.1.1.6 Sub-Robinson Unit

The sub-Robinson unit is currently being used for livestock water supply purposes and remains as a potential water supply replacement source in the general area of the Absaloka Mine. Most of the domestic and stock wells in the area are completed in the sub-Robinson unit (also referred to as the undifferentiated Fort Union aquifer), range 50 to 300 feet deep (WRI 1975), and generally yield less than 10 gpm (BIA 1974). WRI has completed three wells in the sub-Robinson unit to supply water for livestock grazing on reclaimed mine lands. The sub-Robinson unit is recharged vertically from overlying aquifers and discharge is to springs, where the unit crops out, to alluvial deposits, and to deeper aquifers (USGS 1977).

The Absaloka Mine has not directly disturbed the sub-Robinson unit or affected its water-bearing characteristics. Recent water level data from WRI monitoring wells show groundwater in the sub-Robinson unit flows northward under a gentle gradient of about 0.005 foot per foot over the Tract III Coal Lease area. Overall, flow directions in the mining area are similar to premining baseline conditions (Hydrometrics 2006b). WRI currently collects water quality samples from select sub-Robinson monitoring wells within Absaloka Mine's permit area, and the TDS concentrations range from around 1,800 mg/L to 2,360 mg/L. The water quality has remained consistent and impacts from mining have not occurred (Hydrometrics 2006b).

Hydrologic investigation of the sub-Robinson water-bearing strata was not conducted in the proposed South Extension development area because the Robinson coal is the first continuous water-bearing unit below the McKay seam.

3.5.1.1.7 Springs

Fifty-four springs or seeps have been identified within and near the Absaloka Mine permit area during and since the initial spring inventory efforts conducted by WRI in the late 1970s. It should be noted that the mine's initial spring inventory followed a period of above average precipitation, and many of the areas identified as springs at that time were merely wet seep areas that have since gone dry. It is a logical conclusion that recharge to those seep areas is of limited areal extent and relatively local. Should an extended period of above average precipitation occur again, it is likely that seeps would reappear at those locations. WRI has monitored the flow rates and water quality of most of these springs, at least intermittently, since 1980. To date, 17 springs have been mined through and 15 are currently in WRI's hydrologic monitoring network. In the spring and fall seasons, if a spring is flowing, the discharge rate is measured and a water quality sample is collected.

Absaloka Mine's permit document includes a detailed discussion of springs in Exhibit I-33 (Hydrometrics 1982). That evaluation concluded that most of the springs in and near the Tract III Coal Lease are formed in unconsolidated deposits within drainage bottoms, where the local alluvial water table intersects the ground surface. Many of these springs formed at a nick point in a drainage channel profile, and where relatively impermeable bedrock strata underlie the more permeable, unconsolidated valley fill deposits. Discharge from some of these springs has been enhanced by excavation for livestock use.

Nine of the 15 springs that are currently being monitored by WRI are depicted on Figure 3-9. One of the springs shown on Figure 3-9, Spring 25, will be removed by the currently approved mining operation. Spring 288, which is located within the South Extension development area, would be removed by the proposed mining operation. Springs 290 and 291 are located within the boundary of the South Extension tract, but are outside of the proposed disturbance area and would therefore not be physically disturbed. Spring 289 is located adjacent to the Middle Fork Sarpy Creek channel immediately downstream of the South Extension development area, and it too would not be disturbed by currently approved or proposed mining operations.

Spring 25, located in the channel bottom of a tributary of Middle Fork Sarpy Creek, has been dry since 2004. Water has been ponded, but no flow has occurred since 2002 at Spring 288, which is located in the bottom of another tributary of Middle Fork. Spring 290 is located in the valley bottom of a Sarpy Creek tributary. The area around Spring 290 was wet during the spring of 2005, but dry upon subsequent visits. A livestock well and tank are located adjacent to Spring 290, and it appears that the water present at this spring's location may in fact be the result of tank overflow. Spring 291, located in the Middle Fork Sarpy Creek stream channel, was dry during the 2005-2006 baseline monitoring period. Water was ponded, but no flow occurred at Spring 289 during 2004, although it discharged about 0.25 gpm during the spring of 2005.

Spring discharge information has been recorded by WRI from 1980 through 2006. Discharge rates have been highly variable throughout the period of record. At many springs, flows appear to have been highest during the early 1980s, followed by lower flows in the latter 1980s and early 1990s, followed by slightly higher flows in the mid-1990s, after which, lower flows have occurred. Precipitation, runoff events, evapotranspiration, and geological conditions combine to affect flows from springs. Effective infiltration to spring recharge areas must occur in order for springs to exhibit flow. The majority of surface runoff events in the area typically occur during late winter or early spring when the soils are still frozen or semi-frozen; therefore, effective infiltration to spring recharge areas (alluvial and colluvial deposits upstream/upgradient of a spring) is somewhat limited at that time and does not necessarily result in higher spring flow. Low rainfall, as well as warm and windy conditions, will reduce or limit infiltration, and the combination of factors makes it difficult to evaluate the exact reasons for changes in flow (Hydrometrics 2006b).

The quality of the water issuing from springs in the area is very comparable to that of the alluvial groundwater. Average TDS concentrations for water from all springs exceed 1,000 mg/L, and at some sites (e.g., Spring 288) it exceeds 3,000 mg/L. Dissolved solids concentrations have varied considerably in samples collected from all springs, which is probably due to the springs' flow rates and the time of year at which sampling occurred. Variations in TDS concentrations of 50 to 300 percent have been recorded at most springs. Spring water quality type, like alluvial groundwater in the area, is commonly a calcium/magnesium-sulfate. At times, there may be a predominance of bicarbonate rather than sulfate anions (Hydrometrics 2006b).

3.5.1.2 Environmental Consequences

3.5.1.2.1 Proposed Action and Alternative 1

Surface coal mining impacts the quantity of the groundwater resource in two ways: 1) the coal aquifer and any water-bearing overburden strata are removed during mining and replaced with unconsolidated backfill after the coal is removed, and 2) water levels in the coal and overburden aquifers adjacent to the mine pits are depressed as a result of seepage into and dewatering from the open excavations in the area of coal and overburden removal. Under the Proposed Action or Alternative 1, the area of coal removal and reclamation would increase at the Absaloka Mine, which would result in an increase in the area of mining-related impacts to groundwater quantity. While there would be variations in hydrologic properties, the time the pits are open, and the distance from mining and dewatering that has occurred as a result of previous mining, the area subject to lower water levels would be increased roughly in proportion to the increase in area affected by mining.

As mining expands, additional water-bearing bedrock strata would be exposed and groundwater would drain by gravity into the active pits. In mined areas, the layered stratigraphy and multiple potentiometric surfaces are replaced with a mixture of backfilled overburden and interburden materials and, thus, a single hydrostratigraphic unit. Currently approved mining will continue to remove the existing overburden, Rosebud and McKay coals, and interburden on the Tract III Coal Lease and replace these stratified units with backfill material composed of an unlayered mixture of the shale, siltstone, and sandstone that makes up the existing overburden and interburden (if present). These impacts would be extended onto an additional area of about 1,771 acres under the Proposed Action or about 268 acres under Alternative 1.

Under the Proposed Action and Alternative 1, the coal and overburden aquifers within the proposed disturbance areas would be completely dewatered and removed, and the area of drawdown caused by coal and overburden removal would be extended to the east and south of the active mine area. The extent that drawdowns would propagate away from the mine pits is a function of the water-bearing properties of the aquifer materials.

Due to the geologic makeup and tenuous hydraulic continuity of the water-bearing units within the Fort Union Formation overburden (Section 3.5.1.1.2), drawdowns in the overburden are variable and do not extend great distances from the active mine pits. Very low hydraulic conductivity values and a paucity of groundwater within the overburden strata also contribute to the variability of drawdown caused by the Absaloka Mine (McDannel 2007). Extensive water level monitoring has been conducted at the Absaloka Mine throughout mining. Historical water levels in monitoring wells can be examined to evaluate the actual effects of past mining on groundwater levels near the mine. Future mining would be expected to have similar effects to those observed in the past. Water level changes recorded in overburden monitoring wells resulting from mining have been variable, and in some cases, difficult to distinguish from normal water level fluctuations that would be expected in an unconfined system. Furthermore, there is no clear correlation between historical water level drawdowns in the overburden and distances from the open mine pit. The maximum drawdown observed is approximately 10 feet at a well (O-11) located about 3,800 feet from an open mine pit. Drawdown at all other currently monitored overburden wells has been less than five feet (Hydrometrics 2006b).

Due to the low to very low transmissivity of the Rosebud-McKay coal, the radius of influence from the active Absaloka Mine is small (Hydrometrics 2006b). It can be concluded from examination of historical, mining-induced water level changes recorded in Rosebud-McKay coal monitoring wells that there is no clear correlation between decreases in water levels and the distances from the mine pit. As discussed in Section 3.5.1.1.3, the Rosebud-McKay coal seams have been mined north of the proposed South Extension development area since the mid-1970s, and the dewatering effects from the mining operation have not extended into the proposed development area. Rosebud-McKay coal seam groundwater levels recorded in the general analysis area throughout 2006 and 2007 fluctuated less than one foot (Hydrometrics 2006a). Groundwater level monitoring data are included in the annual progress reports that Absaloka Mine submits to MDEQ and OSM.

In 2004, WRI used the numerical groundwater flow model MODFLOW (McDonald and Harbaugh 1988) to simulate potential impacts to the groundwater system related to the current Absaloka Mine operation (Nicklin 2004). Overall, groundwater level monitoring data have approximated the modeled impacts relatively well with respect to the radius of influence, or extent of drawdown in the overburden and coal seams. However, the model predicted water level drawdowns to increase with decreasing distances from the mine pit, although as stated above, monitoring data does not verify that correlation. The general structure of the 2004 groundwater model was adapted for the South Extension development area with appropriate changes in the model parameters required to represent the unique hydrogeologic conditions within the general analysis area, including the major geologic faults that bound the South Extension development area and the large areas where the overburden and coal are unsaturated. Nicklin (2006) used MODFLOW to project the groundwater level drawdowns in the overburden and Rosebud-McKay coal seams and to predict the rate of groundwater extractions from those aquifers over the life of the Absaloka Mine, if the South Extension development area is mined.

Under the Proposed Action and Alternative 1, the extent of coal-mining related drawdown (which is equivalent to the predicted five-foot drawdown contour line) in the overburden and coal seam aquifers projected through the end of mining (assumed to be year 2021) is shown on Figures 3-10 and 3-11, respectively. These figures show that drawdowns related to mine pit dewatering would not extend beyond the boundary faults or into those areas where the aquifers are not saturated. Groundwater level drawdowns will occur in the immediate vicinity of the mine pits and are not projected to extend much beyond the boundary of the proposed mine development area (Nicklin 2006).

Figure 3-10 illustrates that the overburden between the two major boundary faults is presently dry over the majority of the area west of Middle Fork Sarpy Creek, and that the life of mine drawdown is projected to be no more than five feet at a distance of about 1,200 feet east of the South Extension boundary. Maximum drawdown in the overburden is projected to be about 40 feet in the area immediately east of the easternmost pit, and the maximum drawdown directly south of the South Extension development area is about 10 to 20 feet (Nicklin 2006).

Figure 3-11 shows where the Rosebud-McKay coal seams are presently unsaturated, and that drawdown at the end of mine life is projected to be very similar to that of the overburden. No more than five feet of drawdown is anticipated at a distance of about 1,200 feet east of the South Extension tract boundary, and a maximum of about 40 feet of drawdown is projected at the eastern edge of the easternmost pit. No drawdown in the coal seams is expected on the south side of the southern fault (Nicklin 2006).

Nicklin used MODFLOW in 2004 to predict the rate of groundwater extractions from the affected aquifers over the life of the Absaloka Mine. Observations by Absaloka Mine staff indicate that pit inflows have been lower than was estimated. Groundwater discharges into the open pits have been observed to be very low, on the order of only a few gallons per minute. It is anticipated that groundwater inflow to the pits in the South Extension development area may be higher than historical observations due to the proximity of Middle Fork Sarpy Creek. Nicklin (2006) used the MODFLOW model to project the rate of groundwater extractions from the affected aquifers over the life of the Absaloka Mine, if the South Extension development area is mined under the Proposed Action and Alternative 1. The groundwater model perimeter was assumed to be the entire area within the

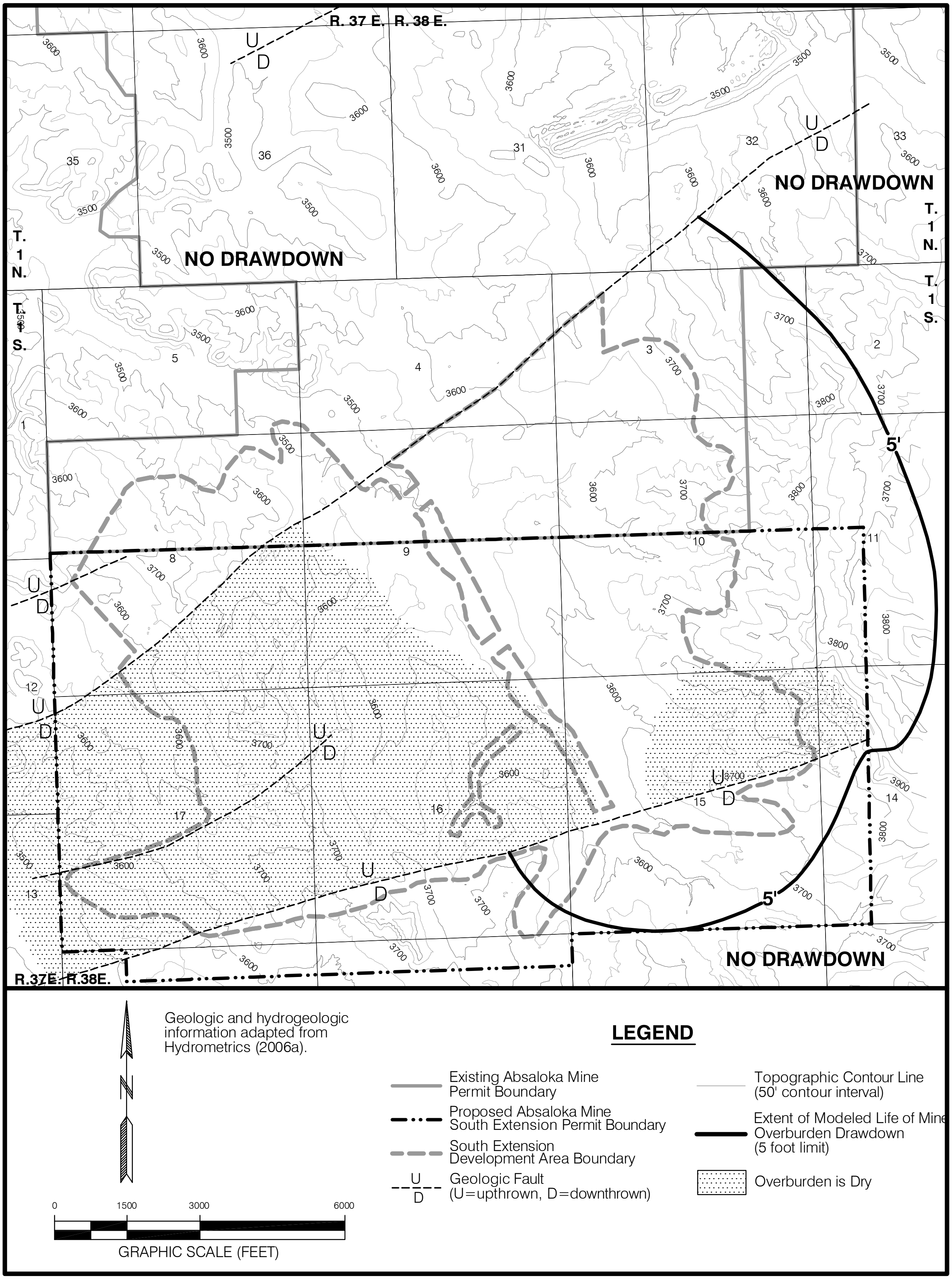


Figure 3-10. Life of Mine Drawdown Map - Overburden, Resulting from Mining the South Extension Development Area.

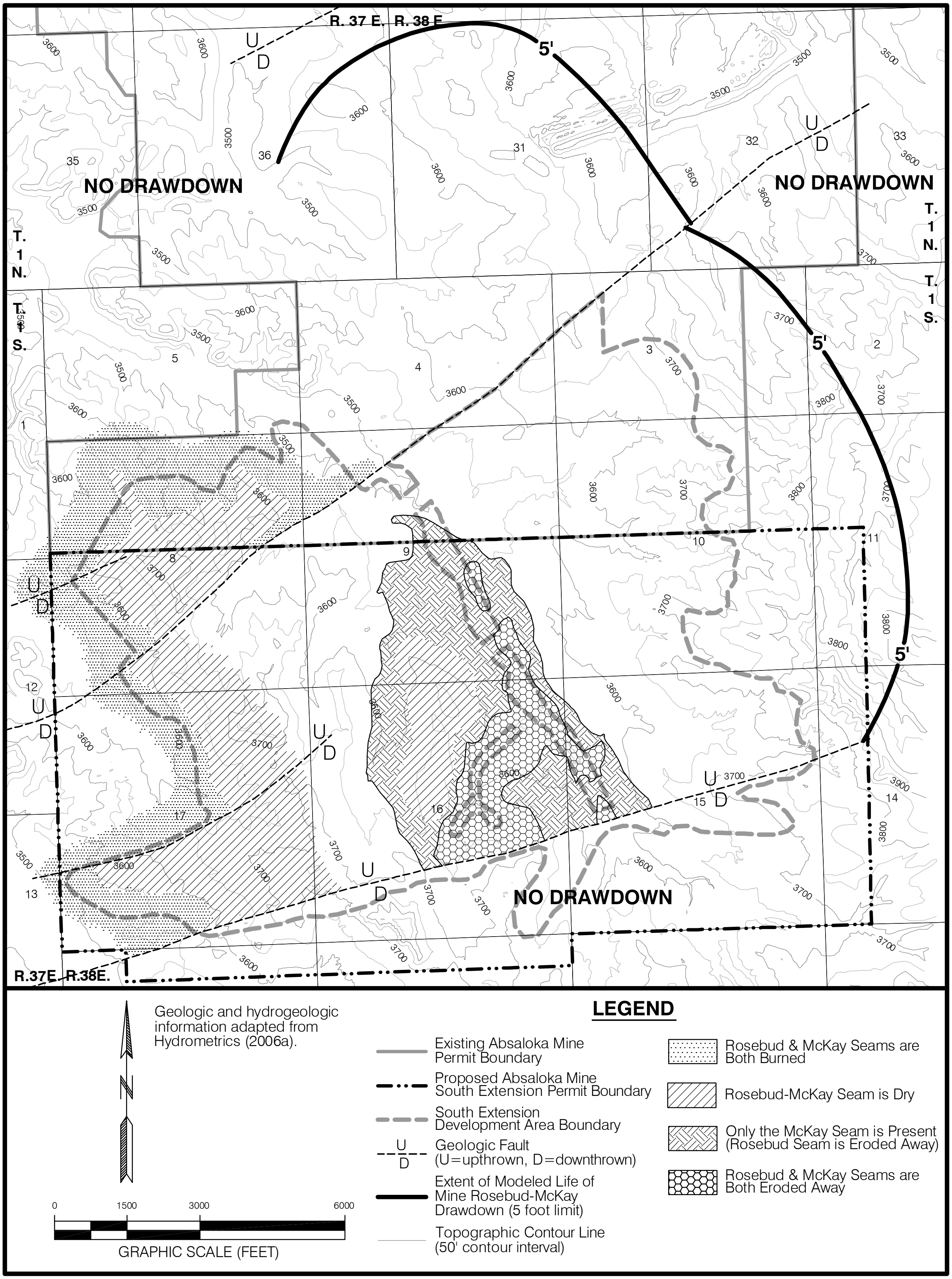


Figure 3-11. Life of Mine Drawdown Map - Rosebud-McKay Coal, Resulting from Mining the South Extension Development Area.

confines of the upper Sarpy Creek watershed down to the East Fork confluence. The groundwater discharge through that entire basin area was calculated to be approximately 1.73 cubic feet per second (cfs). Model predictions of groundwater losses from the hydrologic system due to mining the South Extension development area ranged from about 22 to 94 gpm, which represents about 3 to 12 percent of the estimated basin discharge (Nicklin 2006).

Additional groundwater inflow could occur in areas where mining is conducted adjacent to saturated alluvial sediments with water levels above the base of the McKay coal seam. To reduce the potential for dewatering saturated alluvial deposits and increasing pit inflows, WRI plans to employ best management practices (BMPs), such as leaving competent coal between the alluvial deposits and the pits. Localized, short-term dewatering of the alluvium may occur if an excavation unintentionally intersected the edge of saturated alluvial deposits, but WRI would alter mining in that area as necessary to avoid excessive, long-term alluvial dewatering.

All or parts of the Rosebud-McKay coal have been removed by erosion beneath the Middle Fork Sarpy Creek. It would therefore be uneconomical for WRI to mine that area, so an undisturbed corridor would remain in place along the drainage bottom of Middle Fork Sarpy Creek (refer to Section 3.5.2.2.1). This would limit impacts to the alluvium in the drainage and allow surface water in the main channel to flow through this area during mining; therefore, recharge patterns to the alluvium from runoff events are not expected to change (Hydrometrics 2006b). The alluvial aquifer is recharged primarily from upstream runoff sources, of which only a small portion would be interrupted and captured during mining by the mine's drainage control measures.

Some interruption of lateral recharge to the alluvium may occur due to the interception of groundwater in the bedrock aquifers by the pits on either side of the Middle Fork Sarpy Creek drainage bottom. Groundwater flow through the alluvium directly north of the reservation boundary has been estimated to be 123 gpm to 392 gpm (Hydrometrics 2006a and WWC 2004). Groundwater flow calculated for the overburden and Rosebud-McKay coal units within the South Extension development area are 11 gpm and 25.5 gpm, respectively (Hydrometrics 2006a). Mining would interrupt recharge from these units to the alluvium; therefore, assuming all flow is abruptly cut off, a maximum reduction in groundwater flow through the Middle Fork alluvial aquifer system of up to 30 percent could occur.

Groundwater flowing through the Middle Fork alluvium provides recharge to the sub-Robinson units immediately downstream of the South Extension development area (Section 3.5.1.1.1). As a result, the alluvium is dry or nearly dry in the lower portion of the Middle Fork Sarpy Creek drainage basin. Therefore, no discernable impacts to the overall Sarpy Creek hydrologic system due to the loss of alluvial groundwater flow during mining are expected.

Once mining is completed, water levels would be reestablished in the adjacent backfill, and lateral recharge to the alluvium would resume. Furthermore, all surface runoff from the reclaimed lands would be reestablished, thus reestablishing that component of recharge to the alluvial aquifer. The result of these measures would help reduce impacts to the hydrologic system and aid in reestablishment of the alluvial groundwater system (Hydrometrics 2006b).

No water-bearing strata beneath the Rosebud-McKay coal are removed or disturbed by mining, so they are not directly impacted by coal mining activity. Absaloka Mine's current water supply well is completed in the Madison Formation, which is considerably below the mined coal seams. If mining occurs within the South Extension development area, water would be produced from this industrial well for a longer period of time. WRI would not require additional sub-coal wells for industrial water supply to continue mining and reclaiming the entire Absaloka Mine, including the South Extension development area, which is expected to be complete by approximately 2023.

As noted above, the existing layers of sediment and rock in the area of coal removal would be replaced by generally homogeneous, unconsolidated backfill material, which would recover as a single hydrostratigraphic unit. The backfill unit created in the South Extension development area would be in hydraulic communication with the contiguous undisturbed coal and overburden, and recharge would therefore begin as soon as the pits are backfilled. Surface infiltration recharge rates for the unconsolidated backfill materials should be equivalent to or somewhat greater than infiltration recharge through undisturbed overburden. Water levels in the affected aquifers would remain depressed below premining levels for a long period of time, since groundwater discharge rates from the affected aquifers into the proposed mine pits are expected to be small. Groundwater models (Nicklin 2004 and 2006) project that drawdown effects would be very localized and limited to areas near the pits. Groundwater would accumulate in the backfill and eventually discharge to hydrostratigraphic units bordering the spoil, at which time, groundwater levels and flow patterns are expected to be similar to premining condition. Groundwater flow through the backfill and undisturbed bedrock near the pits would be interrupted until saturation levels in the backfilled pits have risen, and the rates of recharge to and discharge from the backfill equilibrate. Post-mining water levels in the backfill will likely be lower than were the premining, steady-state levels in the undisturbed aquifers for a long time after mining, and could even be a permanent affect (Hydrometrics 2006b).

Nicklin (2006) predicted that there would be no drawdown in the Rosebud-McKay coal aquifer outside of the backfilled pits, north of the Tract III revision fault, 50 years after mining ends. Furthermore, saturation levels in the backfilled pits north of the Tract III revision fault would still be 5 to 30 feet lower than the premining (steady-state) potentiometric heads in the Rosebud-McKay aquifer 50 years after mining ends. In the South Extension development area, groundwater levels in the backfill were predicted to be up to 40 to 50 feet lower than steady-state potentiometric heads, and there would still be 5 feet or more drawdown within approximately 1 mile of the backfilled pits, 50 years after mining ends. Fifty years after backfilling is completed, the saturation level in the South Extension development area would still be 20 to 30 feet lower than steady-state potentiometric levels were in the overburden. No water level predictions were modeled beyond 50 years after mining the South Extension development area is complete; however, water levels were predicted to still be rising within the backfill (Nicklin 2006).

The hydraulic properties of the backfill aquifer based on the results of aquifer testing at surface coal mines in the PRB are quite variable, although generally equal to or greater than the undisturbed overburden and coal aquifers (Van Voast et al. 1978 and Rahn 1976). It is early in the process of full reclamation and to date, the backfilled materials have not reached a saturated thickness to be adequately aquifer tested at the Absaloka Mine. Therefore, no site-specific data are available for the hydraulic properties of the mine's backfill. Water levels measured in existing backfill monitoring wells are rising at variable rates, which indicate that recharge, albeit at different rates due to various factors related to the mining operation, is occurring. Overburden spoils have been, and will continue to be, placed with a dragline. Due to that method of material placement, the permeability of the backfill would likely be variable and at least the same or greater than the premining stratified sediments, particularly the vertical permeability.

These data therefore provide an indication that the Absaloka Mine backfill would resaturate as potentiometric elevations recover in the surrounding undisturbed aquifers, and that wells completed in the backfill (including in the South Extension development area) would be capable of yields sufficient for livestock watering uses.

Mining and reclamation also impact groundwater quality; the TDS concentration in the water resaturating the backfill is generally higher than the TDS concentration in groundwater from the overburden and coal seam aquifers prior to mining. This is due to the increased porosity and surface area of backfilled overburden sediments, causing exposure of fresh mineral surfaces to groundwater that moves through the backfill and increased oxidation that occurs from exposure of sediments during mining. Scientific tests in the laboratory and in the field show the predominant cause for high dissolved-solids contents in mine backfill is the availability of highly soluble salts in the overburden sediments. The soluble salts that are exposed to groundwater are readily mobilized; therefore, groundwater quality in recently backfilled mine pits is highly diverse due to the variable distribution of soluble salts and the variable permeability of the backfill.

Research conducted by the Montana Bureau of Mines and Geology in the northern PRB (Van Voast and Reiten 1988) indicates that upon initial saturation, mine backfill is generally high in TDS concentration and contains soluble salts of calcium, magnesium and sodium sulfates. Van Voast's and Reiten's 1988 research indicated that the average TDS concentrations in mine backfill are 50 to 200 percent higher than average concentrations in undisturbed aquifers.

As the backfill is resaturated and groundwater flow patterns are reestablished, the soluble salts are leached by groundwater inflow. Groundwater quality in the backfill then depends on a balance between the introduction of new salts by groundwater that recharges the backfill and the flushing of the newly exposed soluble salts by groundwater flow. Using data compiled from 10 surface coal mines in the eastern PRB, Martin et al. (1988) concluded that backfill groundwater quality improves markedly after the backfill is leached with one pore volume of water. Van Voast and Reiten (1988) reached the same conclusions after analyzing data from the Decker and Colstrip mines located in southeastern Montana. TDS concentrations tend to decrease with time, indicating that the long-term groundwater quality in mined and adjacent lands would not be compromised. Clark (1995) conducted a study to determine if the decreases predicted by laboratory studies actually occur onsite. In the area of the West Decker Mine near Decker, Montana, Clark's study found that dissolved solids concentrations increased when water from an upgradient coal aquifer flowed into a backfill aquifer, and apparently decreased along an inferred path from a backfill aquifer to a downgradient coal aquifer.

Studies of backfill groundwater quality are not yet conclusive due to a relatively short period of monitoring available in the PRB. A general observation is that the content of TDS, calcium, magnesium, and sodium sulfates, when compared to the undisturbed aquifers, is roughly two to three times as high at present. However, these elevated levels should decline as flushing and leaching of soluble salts reaches equilibrium. Even at a two to three fold increase in TDS concentration, the water in the backfill will, in most cases, be suitable for its predominant premining use, stock watering (Straskraba 1986).

Potential post-mining groundwater quality at the Absaloka Mine has been predicted through modeling and by evaluating actual backfill water quality. Analytical methods predicted a TDS concentration of 2,600 to 2,900 mg/L, and subsequent predictions of water quality were based on the water quality analyses of samples collected from the mine's existing backfill monitoring wells. Groundwater quality samples are currently being collected annually at nine backfill monitoring wells at the Absaloka Mine. The average TDS concentration of all samples collected to date from these wells is 2,464 mg/L, with an overall range in TDS of 730 to 4,840 mg/L. The predictions of post-mining TDS concentrations are therefore accurate, although the observed ranges of TDS concentrations have been substantial and wider than were originally predicted (Hydrometrics 2006b). Groundwater quality within the backfill aquifer in the South Extension development area would be expected to be similar to groundwater quality measured in existing wells completed in the backfill at the Absaloka Mine, and would therefore meet Montana's Class III standard for livestock and wildlife use.

Probable hydrologic consequence (PHC) analyses conducted for previous amendments to Absaloka Mine's mine permit predicted impacts to certain springs in the area due to mining, such as a reduction in flow rate or physical removal. As of 2007, most of the springs that were predicted for removal have been mined through. As discussed in Section 3.5.1.1.7, WRI has monitored the flow rates and water quality of nearly 50 springs within and near the Absaloka Mine since 1980, and to date, 17 springs have been removed and 15 are in WRI's current hydrologic monitoring network. Based on these historical data, no definitive impacts to the flow rate at any of the monitored springs can be directly attributable to mining (Hydrometrics 2006b).

Historical monitoring information from springs located in areas that are hydraulically isolated from the mine (i.e., updip / upgradient of the mine) provides a good indication of the natural responses of spring flows to variations in recharge from precipitation infiltration and runoff. The highly variable nature of the historical discharge rates from most of the monitored springs is related to annual precipitation and long-term precipitation trends rather than the dewatering of the overburden and coal seam aquifers by the mine.

Future approved mining will remove one additional spring, Spring 25. Proposed mining in the South Extension development area would remove one spring, Spring 288 (Figure 3-9). Mining within the South Extension development area would physically disturb none of the other springs that WRI currently monitors. No impacts to any of the other springs are expected for the following reasons: their distance from proposed mining is too great; the source of water is alluvial material that receives recharge upgradient of the mine area, and the alluvium would not be disturbed; and the springs are hydraulically isolated from the mine area by geologic structural faults.

3.5.1.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Impacts to groundwater resources related to existing approved mining would continue to occur. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan. No portion of any aquifer in the South Extension development area would be disturbed to recover the coal in the existing approved mine and reclamation plan.

3.5.1.3 Regulatory Compliance, Mitigation and Monitoring

WRI evaluated regional and site-specific baseline hydrogeologic environments within and around the mine and used MODFLOW (McDonald and Harbaugh 1988), a groundwater flow model, to predict the extent of water level drawdown in the affected aquifers (overburden and coal seams) that would occur as a result of mining. Results of these studies are included in the approved mine permit (WRI 2003). Studies to describe the regional and site-specific baseline hydrogeologic environments within and around the South Extension development area and the probable hydrologic consequences of mining the South Extension development area, including a groundwater flow model, were conducted by WRI in 2006 (Hydrometrics 2006a, Hydrometrics 2006b, and Nicklin 2006). If the South Extension development plan is accepted, Absaloka Mine's existing mine permit would be revised to authorize mining the Tract III Revision area, and a new federal mine permit would have to be approved to authorize mining the South Extension, and these studies would be included accordingly. The mining and reclamation plan for the South Extension development area would minimize disturbances to the hydrologic balance and would employ groundwater protection measures within the permit areas and adjacent areas, and prevent material damage outside the permit areas.

As discussed in Section 3.5.3, the federal law and Montana regulations require mine operators to provide the owner of a water right whose water source is interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality.

Surface coal mines are also required to monitor water levels and water quality in the overburden, coal seams, interburden, underburden, and backfill. Groundwater monitoring wells installed by WRI within and around the current permit area have been used to evaluate groundwater conditions since 1972. Most monitoring wells were installed between 1972 and 1977, and have since been used for long-term monitoring purposes until removed by mining operations or discontinued. Wells for which monitoring has been discontinued are still in place and may be reincorporated into the monitoring network in the future. Additional wells have been installed as mining has progressed, more than 40 of which were installed in 2005 to obtain groundwater baseline information within and adjacent to the South Extension development area. A total of 226 monitoring wells have historically been installed and used by WRI in the Absaloka Mine area. Currently, 118 wells in and surrounding the mine permit area, including the proposed South Extension development area, are monitored by WRI: 46 in the alluvium, 11 in the overburden, one in the clinker, 15 in the Rosebud-McKay coal seam, three in the Rosebud seam, five in the McKay seam, one in the Stray 2 seam, two in the McKay-Robinson interburden, 16 in the Robinson coal seam, eight in the sub-Robinson unit, and 10 in the backfill. There are also 15 springs in and surrounding the current mine permit area and the proposed South Extension development area that are included in the groundwater monitoring program. The locations of the wells and springs currently monitored within and adjacent to the South Extension development area are shown on Figure 3-9.

Groundwater levels are monitored on a quarterly frequency, as determined by the MDEQ. Groundwater samples are collected annually from select wells, as determined by the MDEQ. All groundwater samples are analyzed for the following constituents:

Specific conductivity	Bicarbonate
pH	Carbonate
Temperature	Sulfate
Acidity (if pH<6.0)	Chloride
Total Dissolved Solids	Boron
Calcium	Fluoride
Magnesium	Zinc
Sodium	Iron
Potassium	Manganese
Nitrate+Nitrite as N	

Select groundwater samples will be analyzed for the following constituents in consultation with MDEQ:

Aluminum	Lead
Arsenic	Mercury
Barium	Molybdenum
Cadmium	Nickel
Chromium	Selenium
Copper	Vanadium

Groundwater monitoring would continue according to the mine's approved Water Resources Monitoring Plan, which is included as Exhibit B-35 in MDEQ Surface Mine Permit No. 85005 and OSM Permit MT-0007F (WRI 2003).

3.5.2 Surface Water

3.5.2.1 Affected Environment

Both regional and site-specific baseline surface water drainage systems and environments within and around the Absaloka Mine are extensively characterized in the MDEQ Surface Mine Permit No. 85005 (OSM Surface Mine Permit MT-0007F) (WRI 2003). In addition, Hydrometrics, Inc. of Billings, Montana, prepared the *Tract III South Extension Baseline Water Resources Data Report* and the *Comprehensive Analysis of Probable Hydrologic Consequences for the Absaloka Mine* in September and November 2006, respectively (Hydrometrics 2006a, 2006b). These reports are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI

2007a). Baseline monitoring data were collected in accordance with ARM 17.24.304(1)(f) and 30 CFR Sec. 780.21(b)&(c) and are included in Hydrometrics reports, which are on file and available for public review at the respective surface mining regulatory agency's offices. These reports are referenced extensively within this EIS.

The existing Absaloka Mine permit area and the adjacent South Extension are located entirely within the Sarpy Creek drainage basin. Middle Fork Sarpy Creek, a tributary of Sarpy Creek, drains the majority of the South Extension development area. The extreme western portion of the South Extension development area drains directly to Sarpy Creek. Middle Fork Sarpy Creek flows north-northwest, roughly through the central portion of the general analysis area, to its confluence with Sarpy Creek, approximately three miles to the northwest and downstream of the proposed development area. Sarpy Creek flows from south to north and empties into the Yellowstone River about 36 miles north of the Absaloka Mine. On a large scale, the drainage patterns are dendritic. The Sarpy Creek watershed (Hydrologic Unit Code 10100001, Montana waterbody number MT42K002_090) covers approximately 453 square miles. Absaloka Mine development currently exists within the watersheds of Sarpy Creek and two of its largest tributaries, Middle Fork Sarpy Creek, and East Fork Sarpy Creek (MT42K0020_100). The entire Sarpy Creek drainage basin, prior to all mining disturbances, is displayed in Figure 3-12.

The general analysis area consists predominantly of gently rolling hills, dissected plains and ridges of moderate to low relief. Sarpy Creek and its tributaries have their headwaters in the Little Wolf and Sarpy Mountains to the north, east, and south of the Absaloka Mine area (Figure 3-12). Elevations in these moderately rugged and dissected upland areas are in excess of 4,500 feet above mean sea level. Stream channels in these headwater areas are more like steep-sided gulches and are relatively straight where slopes are steeper. After the creeks leave the steeply sloping and rugged terrain at their headwaters, channel gradients become more gentle and uniform toward their mouths where the channels typically meander through wider valleys.

Surface elevations range from approximately 3,200 to 3,800 feet within the current Absaloka Mine permit area, and from approximately 3,500 to 3,790 feet within the South Extension development area. The Middle Fork Sarpy Creek channel elevation ranges from approximately 3,750 to 3,500 feet within the South Extension development area, and is at approximately 3,300 feet at the creek's confluence with Sarpy Creek. The channel slope, or gradient, of Middle Fork, from where it enters the South Extension development area to where it exits the proposed development area is approximately 39.3 feet per mile (or 0.0074 foot per foot). Middle Fork Sarpy Creek has a total drainage area of approximately 12.6 square miles, of which about three square miles (approximately 1,900 acres) of the watershed lie upstream of the South Extension development area. No natural

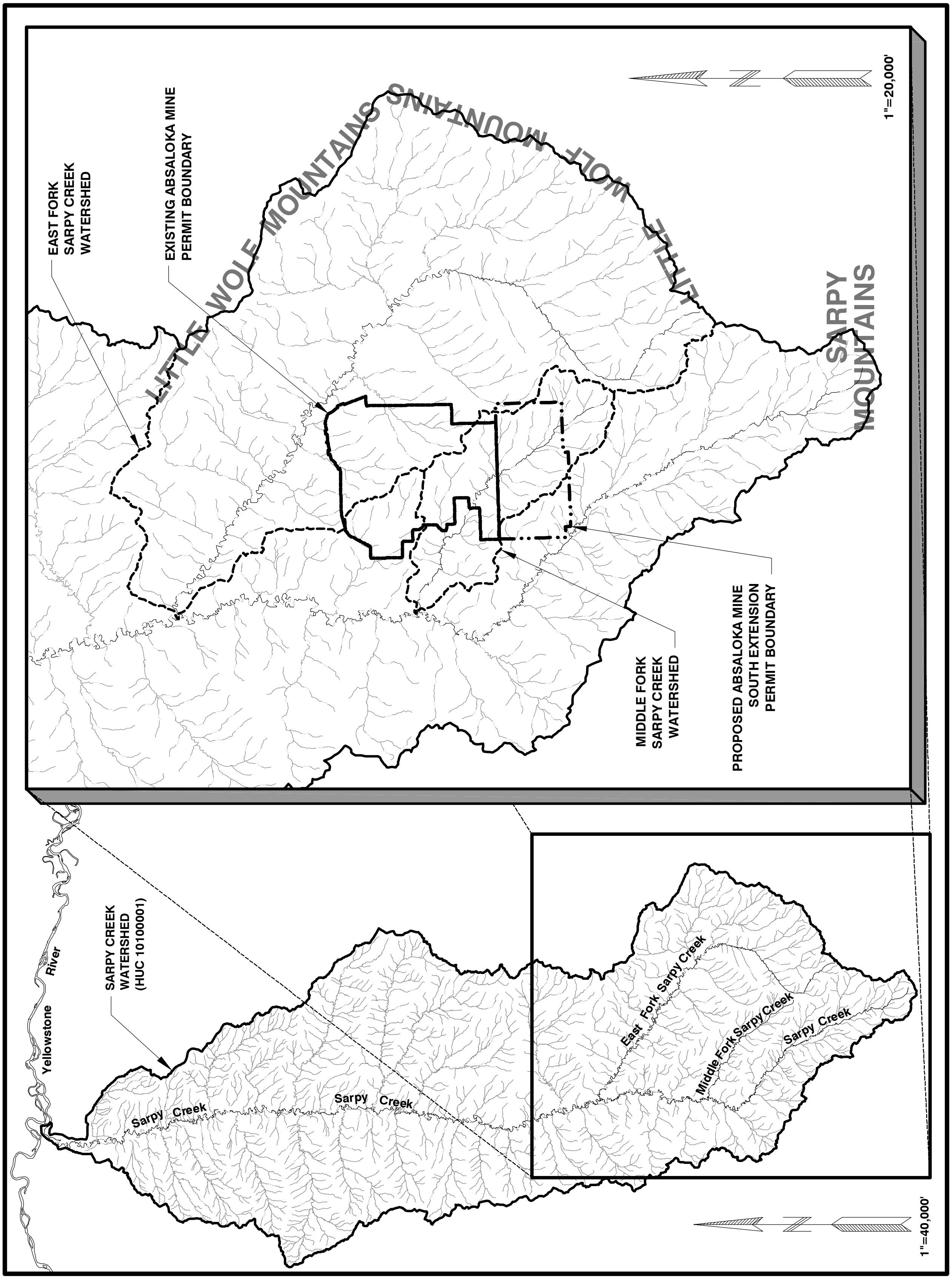


Figure 3-12. Sarpy Creek Drainage Basin and Absaloka Mine Location.

topographic depressions or internally drained areas occur within the general analysis area.

All streams within the general analysis area are ephemeral and flow only in response to snowmelt or rainfall events, which is typical for this region of the PRB. Snowmelt runoff generally occurs in March; however, warm Chinook wind conditions in January or February can quickly melt the snow pack. During such events, large volumes of water may rapidly run off over the frozen soils, resulting in little infiltration and lower recharge to unconsolidated valley fill deposits present in the drainage bottoms. Such occurrences may produce the peak runoff event for the year. The area's streams commonly contain little or no flow throughout the remainder of the year. Runoff may also occur in response to intense rainfall events, but such events are rare. The major portion of precipitation for this area occurs during May and June, while December through February are the driest months (Hydrometrics 2006a).

Springs and seeps are present in some of the tributary drainages in the general analysis area (Section 3.5.1.1.7), most of which flow only in response to sustained recharge. Springs most commonly occur in drainage bottoms and issue from the unconsolidated valley fill deposits. Whenever springs do flow, discharge rates are typically quite low (less than one gpm), contributing little or nothing to the overall stream flow. Water from springs normally flows for only a short distance before being lost to evapotranspiration or infiltration back into the streambed.

The locations of Absaloka Mine's current surface monitoring sites and the surface water features prior to all mining disturbances in the general analysis area are shown on Figure 3-13. WRI began monitoring surface flow of Sarpy Creek, East Fork Sarpy Creek, Middle Fork Sarpy Creek, and some unnamed tributaries of those streams within and around the Absaloka Mine in 1975. Seven continuous flow monitoring stations were established in 1980, four of which have been discontinued. WRI established two additional continuous stream flow measurement sites, G-10 and G-11, on Middle Fork Sarpy Creek in 2002 and 2003, respectively. Another continuously recording stream flow site, G-12, was established on Sarpy Creek upstream of the proposed South Extension development area in 2005. Sites G-11a, G-14, and G-15 were all established in 2005 also, but record only peak discharges.

Surface water flows in the channels vary considerably and are dependent on precipitation patterns, the intensity and duration of rainfall and snowmelt events, antecedent soil conditions (i.e., moisture content, frozen or not, etc.), vegetation cover, and other factors (i.e., gradient, impoundment storage, etc.), which affect runoff to channels. Annual flows measured at those sites having long-term records have varied by several orders of magnitude from year to year. For example, the historical annual flow volumes recorded at a gaging station on Sarpy Creek, located at the Sarpy Basin Road crossing (Figure 1-1), range from approximately 7 acre-feet to about 1,329 acre-feet. Therefore, it can be concluded

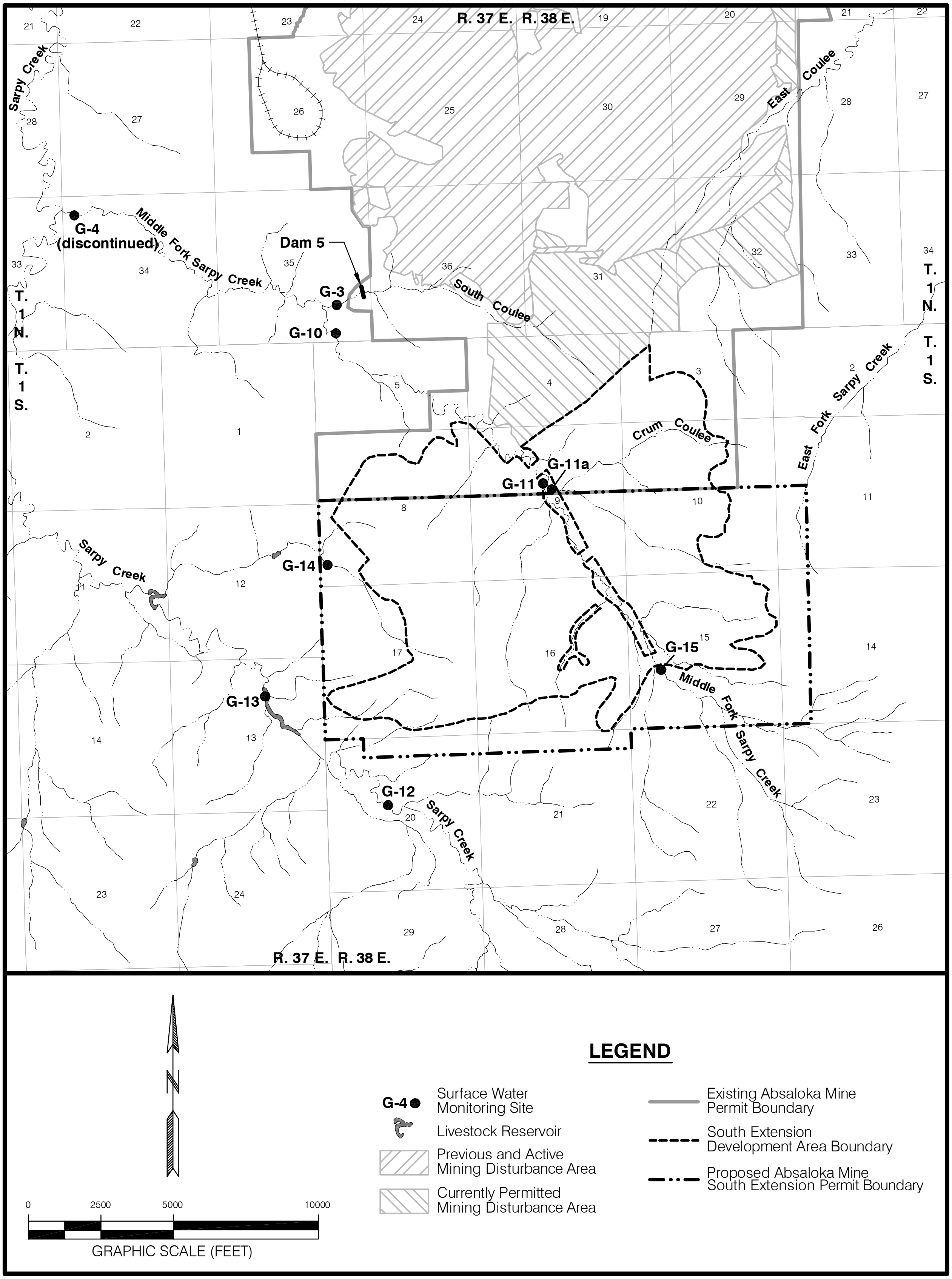


Figure 3-13. WRI's Surface Water Monitoring Network Within and Adjacent to the South Extension Development Area.

that these broad flow ranges can be expected for all drainages in the area (Hydrometrics 2006b).

Annual stream flow volumes of Middle Fork Sarpy Creek measured at station G-10 (Figure 3-13) were 67.4 acre-feet, 3.5 acre-feet, and 13.1 acre-feet in 2003, 2004, and 2005, respectively. Annual stream flow volumes measured at station G-11 were 4.7 acre-feet and 3.9 acre-feet in 2004 and 2005, respectively. Runoff calculations performed using the SEDCAD watershed model (Warner, et al. 1998) indicate that the 2-year, 24-hour flood for Middle Fork at station G-10 peaks at 33.06 cubic feet per second (cfs), and the total runoff volume is 34.49 acre-feet.

No flow was observed on Sarpy Creek at station G-12 in 2005 or from March through October of 2006. Flow patterns at station G-12 are likely to be comparable to those of other drainages in the area that have long-term flow records, in that the majority of flow occurs during late winter months when the ground is still frozen and rapid snowmelt occurs.

The ephemeral/intermittent nature of streamflow affects water quality. Surface water quality in this area typically varies with flow and/or season. In general, as streamflow increases, TDS concentration decreases, while the total suspended solids (TSS) concentration increases. Conversely, as streamflow decreases, the TDS concentration increases, while the TSS concentration decreases. Therefore, the concentration of chemical constituents in a stream generally tends to be inversely related to stream flow, with the following exceptions. In late winter and early spring, snowmelt runoff is relatively low in both dissolved and suspended solids due to frozen soil conditions, regardless of streamflow rate. At the beginning of a rainfall runoff event and shortly thereafter, the initial runoff moving into a stream carries relatively high dissolved and suspended solids concentrations. That is, the sudden flows tend to flush an area of readily dissolved materials and initially increase both the TDS and TSS content of the runoff. Streamflow may continue to increase, but by then the effect of dilute water flowing over previously flushed surfaces is greater than the effect of water flowing over newly contacted surfaces, and the TDS concentration decreases. The effects of land use and water use by man are superimposed on the natural chemical composition of a stream and may modify the general observations described above. Sarpy Creek basin has been used for many generations for grazing and cropland, which affect surface water quality to an un-quantified degree (USGS 1977).

Montana waterbodies (including rivers, streams, lakes, and wetlands) are classified according to the present and future beneficial uses that they should be capable of supporting (75-5-301, MCA). The State Water-Use Classification System (ARM 17.30.604-629) identifies the beneficial uses and employs categories that are based on water temperature, type of fishery, and associated aquatic life. Sarpy Creek and its tributaries are listed in the Montana Surface Water Quality Standards and Classifications (ARM Title 17, Chapter 30, Subchapter 6) as Class

C-3 streams, which are to be maintained suitable for bathing, swimming, and recreation; growth and propagation of warm water (non-salmonid) fisheries and associated aquatic life; waterfowl; and furbearers. Because C-3 streams often contain naturally high TDS concentrations, their quality is marginal for drinking water, culinary, food processing, agricultural and industrial water supply. Degradation that would impact existing or established uses, regardless of the classification, is not allowed (MDEQ 2006c).

Under Section 303(d) of the Clean Water Act (CWA), states have been required to submit their lists of impaired or threatened waters (termed "303(d) Lists") to the EPA every two years. When water quality monitoring data reveal changes to the natural conditions that exceed those allowed by the state standards, the water is determined to be impaired (does not fully meet standards) or threatened (is likely to violate standards in the near future). Under requirements of the CWA, any water found to have one or more impaired or threatened uses must be placed on a list of water for which a "water quality management plan" must be developed to correct the causes of the impairment. In those cases where the impairment involves the need to reduce the amount or concentration of specific pollutants, the water quality management planning process must identify the total maximum daily load (TMDL) of each pollutant causing the exceedance(s). A schedule for the development of water quality management plans (including a schedule for developing TMDLs where necessary) is a required element of these 303(d) Lists. A category of 1 through 5 is assigned to each stream segment to indicate the assessment status and TMDL development needs for the stream segment. Those categories are as follows:

- <u>Category 1</u>: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.
- <u>Category 2</u>: Waters for which those beneficial uses that have been assessed are fully supported, but some applicable uses have not been assessed.
- <u>Category 3</u>: Waters for which there are insufficient data to assess the use support of any applicable beneficial use, so no use determinations have been made.
- <u>Category 4</u>: Waters where one or more beneficial uses have been assessed as being impaired, fully supporting but threatened, all TMDLs are completed but impaired beneficial uses have not yet achieved fully supporting status, or impaired and TMDLs are not required.
- <u>Category 5</u>: Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is

required to address the factors causing the impairment or threat.

The State of Montana listed Sarpy Creek in its 2006 Integrated 303(d) List and 305(b) Water Quality Report to the EPA as a Category 5 stream. Sarpy Creek, from the Crow Indian Reservation boundary to its mouth, is listed as “partially supporting” aquatic life and a warm water fishery. The probable cause of impairment is high nutrient measurements (i.e., nitrate + nitrite as nitrogen, total nitrogen, total phosphorus, and total Kjehldahl nitrogen), and according to the MDEQ (2006c) the probable source of impairment is agricultural and grazing practices. The stream’s impairment does not represent a risk to recreational uses and human health. Development of TMDLs has not yet started for the lower Yellowstone watershed, including Sarpy Creek. East Fork Sarpy Creek was also evaluated for EPA’s 303(d) list in 2006 and found to not be impaired and fully supports its beneficial uses as a Class C-3 stream (MDEQ 2006c).

WRI began monitoring the surface water quality of Sarpy Creek, East Fork Sarpy Creek, Middle Fork Sarpy Creek, and some unnamed tributaries of those streams within and around the Absaloka Mine in 1975. Monitoring is ongoing in order to record and evaluate the variation in water quality as it relates to seasonal surface water flow conditions and the mining operation. Based on these historical water quality analyses, surface waters in the Absaloka Mine area have shown a wide variability in quality, apparently due to natural variations in flow volumes, precipitation intensity and duration, and conditions that preceded or accompanied the sampling event. For example, samples collected during and following high flow periods resulting from significant precipitation events or snow melt events tend to have lower concentrations of dissolved solids than samples that were collected during low flow periods when water is being released from bank storage or when the evaporation rate is high. Calcium/magnesium-sulfate is the predominant water type, with TDS concentrations ranging from around 500 mg/L to 4,500 mg/L, but most commonly around 2,000 to 3,000 mg/L. TSS concentrations are relatively low, averaging less than 100 mg/L. Total iron and manganese concentrations are significantly high in relation to domestic water use (Hydrometrics 2006b).

Three surface water quality monitoring stations (G-10, G-11, and G-11a) were established by WRI in the general analysis area in 2002 and 2003, and four additional surface water quality monitoring stations (G-12, G-13, G-14, and G-15) were established in 2005 and 2006. Stations G-10, G-11, and G-15 are located on Middle Fork Sarpy Creek, Station G-11a is located on Crum Coulee (a tributary of Middle Fork), Stations G-12 and G-13 are located on Sarpy Creek, and Station G-14 is located on an unnamed tributary of Sarpy Creek (Figure 3-13). No water quality samples were collected from June 2005 through May 2006 from any of these monitoring sites during a streamflow event. Samples that were collected during that period were from water that was pooled or ponded in the stream channel at the respective site location (Hydrometrics 2006a).

Two samples have been collected from Middle Fork at site G-10, one in March 2003 and one in January 2005. The TDS concentrations were 183 and 135 mg/L, respectively, and the predominant ions in both samples were calcium and bicarbonate. Only one sample has been collected from Middle Fork at site G-11. It was collected in January 2005, and the water quality was very similar to that of the sample collected at G-10 at that time. Two samples have been collected from Middle Fork at site G-15, one in March 2006 and one in May 2006. The TDS concentrations were 332 and 1,470 mg/L, respectively, and the water type was calcium/magnesium-sulfate.

Only one sample has been collected from Sarpy Creek at site G-12, and it was collected in March 2006. The TDS concentration was 2,240 mg/L and the water type was magnesium/calcium-sulfate.

Four samples were collected in 2005 and 2006 from the reservoir on Sarpy Creek at site G-13. Grab samples were collected from the edge of the pond or through the ice. The TDS concentration was relatively constant at around 1,600 mg/L, and the water type was either sodium-bicarbonate or magnesium-sulfate. The total iron concentration was very high (26.5 mg/L) in a sample collected in September 2005.

No samples have been collected from site G-14 as it was dry when visited in 2005 and 2006.

Surface water in the vicinity of the Absaloka Mine is used primarily for agricultural purposes (livestock watering), industrial uses (primarily haul road watering), and wildlife. No public or domestic water supplies are known to exist that rely on surface water from the Sarpy Creek drainage.

The existing Absaloka mine permit and Hydrometrics' reports (2006a and 2006b), which are included in WRI's Tract III South permit revision package (WRI 2006) and South Extension permit application package (WRI 2007a), contain extensive tabulated summaries of surface water quality analyses of samples that have been collected within and near the mine's existing permit area and the South Extension development area to date. These documents are on file and available for public review at MDEQ's offices in Helena and Billings, Montana.

3.5.2.2 Environmental Consequences

3.5.2.2.1 Proposed Action and Alternative 1

Mining operations in the South Extension development area are proposed to begin in 2008 and continue through 2021. Reclamation would be ongoing and concurrent with mining. WRI expects all disturbed areas to be fully reclaimed by 2025. Currently permitted and proposed future mining operations would affect a total of about 3,382 acres, or 41.4 percent, of the 8,160-acre Middle Fork Sarpy

Creek watershed, and less than 100 acres of the upper Sarpy Creek watershed would be disturbed by the proposed South Extension development plan (Figure 3-12).

Changes in surface runoff characteristics and sediment discharges would occur during mining of the South Extension development area as a result of the removal and reconstruction of drainage channels as mining progresses and the use of runoff and sediment control structures to manage discharges of surface water from the mine permit area. Erosion rates could be high on the disturbed areas due to lack of vegetation. However, both state and federal regulations require treatment of surface runoff from mined lands to meet effluent standards. Generally, the surface runoff sediment is deposited in ponds or other sediment control structures inside the permit area before the surface runoff water is allowed to leave the permit area. While mining is in progress, surface water quality would continue to be protected by directing surface runoff from affected areas to sediment ponds, traps, ditches, sumps, and/or mine pits. Surface runoff water from the mine permit area would be detained until testing has shown that effluent limitations would be met for water to be discharged. Discharge limitations are contained in MDEQ's Montana Pollutant Discharge Elimination System (MPDES) permit (MPDES Permit No. MT-0021129). Effluent limitations have not been exceeded in the past at the Absaloka Mine except during upset conditions caused by precipitation or snowmelt runoff events in excess of the 10-year, 24-hour storm event. Under normal conditions, exceedances of effluent limitations are not expected in the future as mining extends into new drainages and additional sediment control facilities are added (Hydrometrics 2006b).

Since the South Extension development area would be mined as an extension of the existing mine, there would not be a large increase in the size of the area that is disturbed and not reclaimed at any given time as a result of the Proposed Action or Alternative 1. The presence of disturbed areas creates a potential that sediment produced by large storms (i.e., greater than the 10-year, 24-hour storm) could potentially adversely impact areas downstream of the mining operation. This potential for adverse downstream impacts would be extended if the South Extension development area were mined.

Mining has affected surface water within the Absaloka Mine area by reducing runoff during storm and snowmelt runoff events. During these events, water and sediment are routed to and contained within ponds or impoundments constructed along the perimeter of the mine. Under normal operating conditions, water is detained and released slowly after sediment has settled. Runoff from minor storms or snowmelt events, especially those smaller than 10-year, 24-hour events, may not be released downstream due to mine-related uses, infiltration, and infrequency of runoff events. The net result has been a reduction (although not measurable) in surface water runoff from the mine area, and sediment loads have likely been reduced compared to premining conditions (Hydrometrics 2006b).

Immediately following reclamation, the loss of soil structure would act to increase runoff rates on the South Extension development area. However, the general decrease in average slope in reclaimed areas, as discussed in Section 3.2.2, and drainage densities common in reclamation would tend to outweigh the potential for an increase in runoff due to a loss of soil structure. Soil structure would gradually recover over time, and vegetation (after successful reclamation) would provide erosion protection from raindrop impact, retard surface flows, and control runoff at approximately premining levels. All surface drainage from reclaimed areas would be controlled using BMPs (including contour furrows, small depressions for sediment traps, and vegetation buffers) until the area is sufficiently stable that drainage control is no longer required. Sedimentation rates are expected to be similar to premining conditions.

The mining and reclamation plan for the South Extension development area is designed to avoid disturbance to Middle Fork Sarpy Creek and its alluvial deposits by not disturbing a corridor 500 to 600 feet wide that includes the stream channel. No mining disturbance would take place within this corridor except for three road and dragline crossings designed to pass runoff from a 10-year, 24-hour storm, consistent with federal and state regulations. The outer edges of the 500 to 600 feet-wide corridor that straddles Middle Fork Sarpy Creek would be no closer than 100 feet from the stream channel; therefore, all surface disturbances would be at least 100 feet away from the channel except at the three crossings. The majority of the mining-related impacts to Middle Fork Sarpy Creek and Sarpy Creek would be the result of disturbances to some of the two streams' unnamed ephemeral tributaries. Flow from upstream areas will pass through the mine, unaltered, and into the lower portion of Middle Fork Sarpy Creek drainage basin. Changes in water quality from these undisturbed areas are therefore not expected.

In addition to employing various runoff and sediment control facilities (e.g., small sediment ponds and sumps, excavated sediment traps and ditches, or small channel diversions), hydrologic control during mining would consist of allowing runoff to accrue to the mine pits where it would either be used for dust suppression or treated and discharged outside the mine's permit area if the water meets effluent limitations. Large flood control reservoirs are not anticipated for the South Extension development area.

During mining, the mine pits would intercept the majority of runoff within the South Extension development area. A slight reduction in downstream flow rates during mining would therefore be expected. Similarly, no negative impacts to surface water quality would occur while the pits are being used for runoff and sediment containment. Changes to the overall flow and water quality of Middle Fork Sarpy Creek and Sarpy Creek during mining are therefore expected to be negligible and undetectable.

As discussed in Section 3.5.2.1, wide variations in surface water quality have been observed in historical water quality samples collected in the general analysis area.

Most variations can be attributable to the natural seasonal streamflow conditions at the time the samples were collected. These variations in surface water quality following periods of high and low flow conditions make identification of potential impacts from mining more difficult. Surface water monitoring has and would continue to be conducted to evaluate and identify anomalous variations in surface water quality. To date, affects to surface water quality from mining are considered imperceptible and affects from future mining activities are expected to be similar (Hydrometrics 2006b).

Once mining is completed the pits would be backfilled and drainage would be reestablished. Reclaimed ephemeral drainageways would be constructed to approximate the premine condition and blend with the existing drainage system above and below the area disturbed by the mining operation. The proposed mine plan for the South Extension development area avoids disturbance of the Middle Fork Sarpy Creek stream channel; therefore, restoration of surface drainage flow patterns as part of the reclamation plan would be expedited. Reclamation at the Absaloka Mine has been successful at reestablishing drainage flow patterns and is an on-going process (Hydrometrics 2006b).

The impacts described above would be similar for both the Proposed Action and Alternative 1, and they are similar to the expected impacts for the currently permitted mining operation.

3.5.2.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. Coal removal and the associated disturbance to tributaries of Middle Fork Sarpy Creek and Sarpy Creek would not occur within either the Tract III Revision area or the South Extension. The impacts to surface water resources related to existing approved mining would continue to occur as permitted. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.5.2.3 Regulatory Compliance, Mitigation and Monitoring

Absaloka Mine's current mining and reclamation plan is designed to minimize disturbances to the hydrologic balance within the permit area and adjacent areas and prevent material damage outside the permit area. Control of surface drainage utilizes best technology currently available (BTCA) to prevent, to the extent possible, additional contributions of suspended solids to streamflow or runoff outside the permit area [82-4-231(k)(ii)(A), MCA]. Surface water flow from the mine is currently controlled using impoundments, located to capture and detain runoff water for sediment control. Sediment control structures are constructed in tributary drainages to Sarpy Creek, East Fork Sarpy Creek, and Middle Fork Sarpy Creek. Detailed descriptions of surface water runoff management and sedimentation control measures are included in WRI's Tract III South permit revision package (WRI 2006) which is on file and available for public review at MDEQ's offices in Helena and Billings, Montana. The majority of impoundments will be removed following mining; however, some will remain as permanent structures (Hydrometrics 2006b).

Control of surface water runoff and associated sedimentation would be accomplished during mining of the South Extension development area without the use of sediment pond dams outside the primary area of mine disturbance, consistent with the EPA's Final Effluent Limitations Guidelines and Standards for the Western Alkaline Coal Mining Subcategory (40 CFR Part 434) and alternate sediment control regulations. Surface drainage would be controlled and sediment contained within disturbance areas using a combination of BMPs and capturing drainage from active mining areas in the mine pits to the extent possible.

Mining operations would be conducted to disturb the smallest practicable area at any one time. Soil salvage would closely precede the active pit, with backfill regrading, soil redistribution, and revegetation following closely behind. The implementation of BMPs under the Western Alkaline Coal Mining Subcategory would serve to control and minimize sediment transport to sediment control facilities and undisturbed areas and prevent, to the extent possible, additional contributions of suspended solids to streamflow or runoff outside the permit area. Additional sediment control measures or appropriate means would be used when necessary to minimize erosion and sediment transport. Sediment control measures would be inspected regularly and sediment removal completed as required to maintain efficient function. Except for small depressions that may be left as post-mine features, sediment control measures would be removed during reclamation operations to provide a smooth topographic transition from reclaimed to undisturbed lands. BMPs would be used during reclamation to ensure that sediment transport from reclaimed lands does not exceed baseline conditions (WRI 2006 and 2007a).

The mining and reclamation plan for the South Extension development area is designed to avoid disturbance to Middle Fork Sarpy Creek by not disturbing a corridor 500 to 600 feet wide that includes the stream channel. No mining disturbance would take place within this corridor except for three road and dragline crossings over the channel designed to pass runoff from a 10-year, 24-hour storm, consistent with federal and state regulations. The outer edges of the 500 to 600 feet-wide corridor that straddles Middle Fork Sarpy Creek would be no closer than 100 feet from the stream channel; therefore, a no-disturbance buffer zone of a minimum distance of 100 feet from the stream channel would be maintained. By minimally disturbing the main drainage channel of Middle Fork to allow runoff from undisturbed, upstream portions of the basin to bypass the mine area, by controlling drainage and containing sediment within disturbance areas with sediment control structures and BMPs, and by retaining runoff water in mine pits, impacts to the Middle Fork Sarpy Creek and Sarpy Creek drainages would be minimized during mining. In the reclamation phase, as each sub-basin is reclaimed drainage would be reestablished, and sediment would be controlled using temporary BMPs to control sediment transport at or below baseline levels until vegetation is reestablished.

In accordance with the Surface Mining Control and Reclamation Act of 1977 (SMCRA) and Montana laws and rules (Title 82, Chapter 4, MCA, and ARM Title 17, Chapter 24), reclamation would restore the surface water drainage after surface mining operations are completed on the South Extension development area. Surface water flow, quality, and sediment discharge would approximate premining conditions. The drainages that intersect the disturbance area would be reclaimed to exhibit channel geometry characteristics similar to the premining characteristics. Tributary drainages of Middle Fork Sarpy Creek and Sarpy Creek would be restored in approximately the same location as the natural channels, and hydrologic functions, including the alluvial groundwater-surface water interaction, would be restored. (See additional discussion in Section 3.5.1.3.)

Monitoring requirements for the existing Absaloka Mine include a monitoring program to assure that all sediment ponds would always have adequate volume reserved to contain runoff from the 10-year, 24-hour storm and for sediment accumulation, collection of streamflow and water quality data from Middle Fork Sarpy Creek and Sarpy Creek at sites shown on Figure 3-13, and compliance with MPDES Permit No. MT-0021129 to meet effluent limits after treatment. The main function of the surface water monitoring program is to ensure protection of the hydrologic balance in the affected portions of watersheds. These requirements would be extended to include the South Extension development area if the MDEQ approves WRI's application to revise the Absaloka Mine Permit to include the Tract III Revision area (WRI 2006) and OSM approves WRI's Absaloka Mine - South Extension Permit Application (WRI 2007a).

The internal drainage control system in the South Extension mining area would route all runoff and water accumulating in mine pits to two primary surface water discharge points north of the reservation boundary, which would be regulated by MDEQ under MPDES Permit No. MT-0021129. Other outfall points would control stormwater only. North of the reservation boundary, these stormwater discharge points would also be regulated under MPDES Permit No. MT-0021129, while those stormwater outfalls on the Crow Indian Reservation would be regulated by EPA. WRI has applied to EPA for a National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit to cover these outfalls.

WRI would be required by MDEQ and OSM to post a reclamation bond to assure success of reclamation. This bond must remain in place for a minimum of 10 years after vegetation seeding. The 10-year minimum bonding period assures vegetation establishment and surface water flow, quality, and sediment discharge would approximate premining conditions. The MPDES and NPDES permits would require maintenance of sediment control structures until final landscape stabilization is achieved across each sub-watershed contributing runoff to the dedicated control structure.

3.5.2.3.1 Stormwater Discharges from Mining Operations

WRI has applied to EPA and MDEQ for permits for stormwater discharges associated with the proposed expansion of the Absaloka Mine. Any applicable stormwater discharge permits for mine activities on non-Indian country lands would be issued by the State of Montana. EPA Region 8 would issue any applicable NPDES permits for stormwater discharges from the proposed expansion of the Absaloka Mine onto Indian country lands, including lands within the boundaries of the Crow Indian Reservation. WRI has applied to EPA for an NPDES stormwater permit to discharge stormwater runoff from reclamation areas, brushing and grubbing areas, topsoil and stockpiling areas, and regraded areas associated with the proposed mine expansion onto the Reservation.

3.5.2.3.1.1 New Source Determination

Based on WRI's NPDES stormwater discharge permit application, EPA has determined that the proposed expansion of the Absaloka Mine onto the Crow Indian Reservation is a "major alteration", which constitutes a "new source" and is subject to new source performance standards in its NPDES permit [40 C.F.R. § 434.11(j)]. Pursuant to EPA regulations, EPA has evaluated whether one or more of the following events resulting in a new, altered or increased discharge of pollutants would occur in connection with the expansion of the mine onto the Reservation:

1. Extraction of a coal seam not previously extracted by the mine.
2. Discharge into a drainage area not previously affected by wastewater discharge from the mine.
3. Extensive new surface disruption at the mining operation.
4. Construction of a new shaft, slope or drift.
5. Such other factors as the Regional Administrator of EPA deems relevant.

EPA has determined that the proposed mine expansion, at a minimum, meets criteria 2 and 3. The proposed discharge drains into a new area not previously affected, based on the 12-digit Hydrologic Unit Code (HUC) delineation as defined by the U.S. Geological Survey (USGS), and the proposed expansion disturbs 2,637 acres, which constitutes extensive new surface disruption at the mining operation. Therefore, the proposed expansion project would be a "new source" for NPDES permitting purposes.

EPA public noticed this new source determination through the EPA Region 8 NPDES web site (www.epa.gov/region8/npdes), and through several newspapers including the Billings Gazette, the Sheridan Press, the Big Horn County News, and the Apsaalooke Nation.

3.5.2.3.1.2 EPA's NEPA Compliance

Because the proposed mine expansion onto the Crow Indian Reservation would be a "new source coal mine" as defined at 40 C.F.R. § 434.11(j)(1) and subject to New Source Performance Standards, EPA's issuance of an NPDES stormwater permit to this "new source" requires compliance with the National Environmental Policy Act (NEPA) and implementing regulations, and EPA's NEPA regulations at 40 CFR Part 6 (40 C.F.R. § 122.29). The BIA and MDEQ serve as joint lead agencies for preparation of this EIS under their respective authorities of NEPA and the Montana Environmental Policy Act (MEPA). EPA is a cooperating agency. EPA intends to make a decision, based on the analysis presented in this EIS, to issue or deny an NPDES permit for the discharges of stormwater associated with the proposed mine expansion onto the Crow Indian Reservation. This section of the EIS describes the Proposed Action for stormwater management, reasonable alternatives to the Proposed Action, the No Action Alternative, and their associated environmental impacts.

3.5.2.3.1.3 Stormwater Management Proposed Action and Alternatives

The Proposed Action is for EPA to issue an NPDES stormwater permit for the use of 24 sediment traps to contain the 2-year, 24-hour runoff event during the operational phase, which could be reduced in size to small depressions as a best management practice (BMP) during the reclamation phase. Sediment traps would be installed with additional freeboard to allow for three times the average annual sediment volume to allow for proper function until vegetated cover is maintained. Sediment traps would also need to be inspected for standing water (i.e., standing water would be pumped after inspection for clarity to allow for maximum replication of pre-development hydrology) and sediment would need to be excavated to ensure that the design capacity is not exceeded by greater than 25 percent. The permit would regulate discharges of stormwater from reclamation areas, brushing and grubbing areas, topsoil and stockpiling areas, and regraded areas associated with the proposed mine expansion onto the Crow Indian Reservation. Stormwater discharges from the proposed mine would be subject to EPA's effluent guidelines for Western Alkaline Coal Mining. These effluent guidelines are federal regulations that specify that a sediment control plan be submitted to EPA, approved by EPA, and be incorporated into the NPDES permit as an effluent limitation. The sediment control plan must be designed to prevent an increase in the average annual sediment yield from the premined, undisturbed conditions.

Based on the preliminary sediment modeling report submitted to EPA by WRI and through input to EPA from the Office of Surface Mining, Reclamation and Enforcement (OSM), two reasonable action alternatives to the Proposed Action are examined in this EIS specific to the discharge of stormwater runoff from the proposed mine expansion area. The Proposed Action and the two action alternatives analyzed all would require the issuance of an NPDES stormwater discharge permit. The alternatives are summarized as follows:

- Proposed Stormwater Management Alternative #1 (Proposed Action): Use of 24 sediment traps in each subwatershed to contain the 2-year, 24-hour runoff event plus sediment storage during the operational phase of the mine and managed to ensure pre-development hydrology, which could be reduced in size to small depressions as a BMP during the reclamation phase for all discharges to Sarpy Creek and Middle Fork Sarpy Creek. Includes the use of stormwater management practices to reduce erosion and sediment transport.

- Proposed Stormwater Management Alternative #2: Use of conventional sediment ponds to detain the 10-year, 24-hour runoff event plus sediment storage, with pond size reduced to detain the 2-year, 24-hour runoff event plus sediment storage during the reclamation phase for all discharges to Sarpy Creek and Middle Fork Sarpy Creek. This would require the consolidation of subwatershed drainages to facilitate the use of seven or more dams, each exceeding 20 acre-feet in size.

- Proposed Stormwater Management Alternative #3: Use of a single large dam on the mainstem of Middle Fork Sarpy Creek downstream of mine operations. This includes construction of a 200 acre-foot dam for discharges from Middle Fork Sarpy Creek. Discharges directly to Sarpy Creek would be treated through the use of sediment ponds designed to detain the 2-year, 24-hour event plus sediment storage during the reclamation phase.

- Proposed Stormwater Management Alternative #4 (No Action): The No Action Alternative for the EPA stormwater discharge permit action corresponds with BIA's alternative that does not involve expansion of the mine onto the Reservation or the South Extension Tract. If there is no expansion of the mine onto the Crow Indian Reservation, then EPA would not issue an NPDES stormwater discharge permit.

3.5.2.3.1.3.1 Environmental Consequences for the Stormwater Management Proposed Action and Alternatives

Proposed Stormwater Management Alternative #1 (Proposed Action)

This proposed alternative would include the use of 24 sediment traps in each subwatershed to contain the 2-year, 24-hour runoff event plus sediment storage during the operational phase of the mine, which could be reduced in size to small depressions as a BMP during the reclamation phase. In addition, this alternative includes the use of stormwater management practices to reduce erosion and settlement transport.

In developing the Western Alkaline Coal Mining effluent guidelines, EPA placed specific emphasis on the control of sediment. These effluent guidelines do not contain numeric limits for pH or metals because they are applicable only where the runoff from reclamation areas, brushing and grubbing areas, topsoil stockpiling areas, and regraded areas where the discharge, before any treatment, meets all of the following requirements:

1. pH is equal to or greater than 6.0.
2. Dissolved iron concentration is less than 10 mg/L.
3. Net alkalinity is greater than zero.

Sediment ponds often serve as a BMP for the purpose of controlling sediment at coal mining sites. Therefore, all three action alternatives proposed for the NPDES permitted discharges include some form of ponding used for the purpose of settling sediment to protect water quality from deleterious discharges of sediment and associated pollutants. In determining the size and location of ponds and/or other similar BMPs for settling sediment, it is important to recognize both the treatment capabilities for a given BMP or configuration of BMPs for a wide range of storm events and the impacts of BMPs on the hydrological balance, for the watershed as a whole.

For the purposes of settling sediment only, larger ponds are more effective. Generally speaking, a large pond or a series of large sediment ponds will treat sediment-laden runoff for more frequent, intense, and longer-lasting precipitation events than will smaller ponds. However, there is an environmental cost associated with detaining large amounts of water. While large sediment ponds may be very effective in reducing downstream loading of sediment, the net effect of significant detention of water resources can represent a disruption of the hydrologic balance, which may exceed the impact of the mining operation. Sediment ponds in arid and semi-arid western regions can:

- require significant additional surface disruption;
- result in environmental harm through the disruption of hydrologic balance;
- adversely affect valuable riparian or aquatic communities; and
- create contention during the administration of basin water rights.

There are several impacts that may harm the environment when sediment ponds are used to meet discharge requirements from mining in the arid and semi-arid west. Sedimentation ponds are designed to capture and store water from a precipitation event and then slowly release water in a continuous, low-velocity discharge. The negative effects of this include disruption of the natural and hydrologic and sediment balance, stream channel instability, and water loss due to evaporation. For the majority of storm events, downstream channel flow is either eliminated or significantly attenuated. Loss of runoff through evaporation, evapotranspiration, and localized infiltration can alter the hydrologic balance, downstream resources, ground water hydrology, and the spatial pattern of alluvial recharge. Discharge of sediment-free water from a sediment pond may also accelerate channel erosion because the sediment-free water will accumulate sediment from the channel immediately below the pond. Later, when the sedimentation pond is removed, drainage from the reclaimed area will flow uninterrupted. Channel reconfiguration may then occur, making the area more susceptible to erosion and instability than premining undisturbed conditions.

The aforementioned discussion of the effects of sediment ponds on hydrology is provided herein to note that the proposed alternative cannot solely address reductions in sediment yield since detaining and/or retaining water to meet the Western Alkaline Coal Mining effluent limitations can affect watershed hydrology, downstream water availability, aquatic life, wetland habitat, and riparian communities. Therefore, in addition to constructing smaller ponds, the proposed alternative for stormwater discharges must:

- prevent an increase in the average annual sediment yield from the premined, undisturbed conditions consistent with the Western Alkaline Coal Mining effluent limitations;
- minimize reductions in downstream runoff;
- reduce unnecessary additional disturbance of surface acreage; and
- restore or improve riparian and natural vegetative species.

WRI proposes to utilize small depressions for sediment control during the reclamation phase, to enhance infiltration, vegetative diversity and wildlife habitat. Also, reclamation operations including spoil scarification, soil preparation, and seeding would be conducted on the contour. Revegetation should compare favorably with premining vegetative cover within 3 years from seeding.

Operators of mines may supplement detention/retention facilities or replace such facilities where feasible with managerial and structural erosion and sediment control practices. Table 3-11 lists examples of managerial sediment and erosion control practices and the respective techniques for implementation. These may vary over the life of the disturbance and reclamation period, depending on changing site conditions. For the purposes of meeting sediment discharge limits while providing a natural post-mining hydrology, preventing erosion is environmentally preferable to treating for sediment downstream.

WRI has proposed in its NPDES stormwater discharge permit application, the use of several of these management practices in the development of coal resources in the proposed Absaloka Coal Mine expansion. Upon review by EPA and evaluation of the management practices with specific consideration to the preferred discharge alternative, if EPA's decision is to issue an NPDES stormwater permit for the proposed mine expansion onto the Crow Indian Reservation, EPA would include these management practices as enforceable permit conditions:

Table 3-11. Examples of Managerial Sediment and Erosion Control Practices.

Managerial Sediment	**Implementation Technique**
Minimizing the Area of Disturbance	Surface disturbances are minimized to that specific area necessary to conduct the mining and reclamation.
Appropriate Application	BMPs are judiciously used based on erosion and sedimentation control capabilities, site-specific environmental conditions, and sedimentation predictions.
Timely Placement	Structures are placed at the most appropriate time to function properly and effectively during their anticipated use period.
Control of Sediment at Source	BMPs are implemented at the source of the sediment. Terraces, check dams, straw bales, riprap, mulch, silt fences, etc., are implemented to control overland flow, trap sediment in runoff or protect the disturbed land surface from erosion.
Contemporaneous Reclamation	After mineral extraction is complete, disturbed areas are reclaimed as rapidly as is practicable and rehabilitated for the designated post-mining land use.
Periodic Inspection, Maintenance and Replacement	BMPs are periodically inspected during construction and use. Based on these inspections, maintenance is scheduled and adequately performed. When structures are no longer needed, they are removed, if necessary, and the disturbed area reclaimed. Most BMPs are installed as integral components of the surface drainage system and their removal is not needed.

1. Contemporaneous Reclamation. As the dragline pit advances, soil would be salvaged ahead of the pit prior to initiating drilling and blasting of overburden for the next mine cut. The pit advance allows regrading of the dragline spoils behind the active pit. Regrading typically follows pit advancement by four spoil ridges so that regrading can be accomplished in blocks. Once regraded areas are available, soil salvaged ahead of the pit can be hauled directly to regraded areas behind the pit and redistributed.

2. Control of Sediment at Source. Sediment control at the source includes erosion control measures to prevent sedimentation, structural BMPs for the purposes of filtering or settling sediment, and land contouring to allow for natural infiltration and deposition. Spoil scarification, soil placement, soil preparation, and sediment would need to be done on the contour as well unless siting of necessary equipment presents a significant operational hazard.

3. Periodic inspection and maintenance. Some BMPs may not need to be removed and may serve as a benefit during and post-construction such as the use of localized depressions for the purposes of settling sediment and infiltration of water. The majority of BMPs would need to be removed as part of the mine reclamation, and inspection and maintenance of structural BMPs would be critical to preventing non-natural localized sediment transport.

4. Erosion control. Several erosion control BMPs are included in the proposed mine plan. These may be written as enforceable conditions of the NPDES discharge permit and include:

   - scarifying regarded spoil, following contours where equipment can operate safely, to increase infiltration and minimize soil slippage potential;
   - minimizing compaction, to the extent possible, during final grading and redistribution of soil or other growth media;
   - use of seedbed preparation techniques that create a roughened surface to retard surface runoff and increase infiltration with the degree of roughness consistent with approved reclamation and postmine land uses;
   - use of commercial erosion control products, mulch, or cover crops where they will not adversely affect vegetation establishment and diversity;
   - establishment of permanent vegetative cover, as appropriate for the site, by the end of the third growing season following initial seeding;
   - reduction of slope length by reconstructing slope topography; and
   - use of coarse-textured substrates on sites with increased erosion potential and where establishment of woody species is desired.

<u>Proposed Stormwater Management Alternative #2</u>

Alternative #2 would include the use of conventional sediment ponds in each subwatershed to detain the 10-year, 24-hour runoff event plus sediment storage, with pond sizes reduced to detain the 2-year, 24-hour runoff event plus sediment storage during the reclamation phase.

In Middle Fork Sarpy Creek, one approach would be to consider conventional sediment pond dams to detain the 10-year, 24-hour runoff event plus sediment storage. This would require at least seven dams, most or all of which would exceed 20 acre-feet in size, triggering Mine Safety and Health Administration (MSHA) design and approval requirements under 30 CFR 77.216. With the exception of subwatershed A, all of the discharge points would be on the Reservation. Also, multiple dams would be required in subwatershed A and possibly subwatersheds B and C due to substantial drainage area above the mining disturbance area and a need to minimize impoundment size. In addition, because the coal seam extends to the margins of the flood plain, dams would need to be constructed over mineable coal, adversely affecting recoverability of the reserve base.

WRI's initial submittals to OSM and MDEQ (and to EPA) proposed excavated ponds or traps with 10-year, 24-hour runoff capacity during the operational phase, which would then be reduced in size to 2-year, 24-hour capacity in the reclamation phase. In their technical reviews, both agencies noted that ponds of this size are not necessary given the short duration of active mining operations in these small drainages. WRI reexamined the matter and realized that in these small drainages, as in the larger Middle Fork Sarpy Creek tributaries, most runoff would be directed to the pit during active mining. Additional modeling was completed, and WRI revised its proposal to utilize 2-year, 24-hour traps during the operational phase, which would be reduced in size to small depressions as a BMP during the reclamation phase.

The environmental impacts associated with sizing ponds to detain the 10-year, 24-hour event would likely be significant. These effects are largely based on the disruption of natural hydrology as defined by the premining condition. Retaining normal premining discharges from significant annual storm events would reduce the downstream availability of water for wetland, aquatic life, and riparian communities to reestablish post-mining. This would be exacerbated by the need to reroute the runoff from the 24 sub-watersheds in the project expansion area to allow for the construction of seven significant structures that can retain water from the more significant 10-year, 24-hour event.

For the NPDES discharge alternatives, any alternative that would likely include a physical structure into the project during and/or post-reclamation would reduce the rate at which wetland communities are reestablished, and/or alter the ability for wetland communities to become reestablished. Alternatives #2 and #3 both include the use of significant sediment ponds to detain water during and post-reclamation. This would effect the natural reestablishment of vegetation and wetlands. Also, the removal of any structures would be necessary in the long-term to ensure that premining hydrology is attained. This could cause downstream blowouts of vegetated areas where the vegetation has been reestablished based on a lesser flow regime.

<u>Proposed Stormwater Management Alternative #3</u>

Alternative #3 would include the use of a single large dam on the mainstem of Middle Fork Sarpy Creek downstream of mine operations. Discharges directly to Sarpy Creek would be treated through the use of sediment ponds designed to detain the 2-year, 24-hour event plus sediment storage during the reclamation phase. Preliminary design work indicates that such a dam would have a capacity of about 200-acre feet; it would be 23 feet high, and 1,000 feet long with a base width of up to 100 feet. At full pool, the dam and spillway would cover approximately 34 acres. An estimated 2,000 feet of drainage bottom would be affected by the dam and pool area. Both MDEQ and OSM have rejected this option as too disruptive hydrologically.

The hydrologic effects from creating a single sediment pond (Alternative #3) are similar to those for Alternative #2 with the exception that the use of a single sediment pond more significantly reduces the availability of downstream water. The use of a single sediment pond involves the instream placement of a significant dam that would alter the availability of water both during reclamation and post-reclamation. Though the dam would eventually be removed, the footprint of the physical structure would cause a significant delay in the reestablishment of wetland communities. This alternative would also require WRI to develop internal drainage controls that would likely not simulate pre-development hydrologic patterns as proposed in EPA's Effluent Guidelines for Western Alkaline Coal Mining.

Generally, the use of single large structures is not a method recommended by EPA for controlling sediment-laden discharges. This is because control of erosion and the use of management practices is considered to represent a more natural hydrologic condition and because the use of small and separated BMPs in combination with source controls is generally more effective in reducing site-specific sediment loading.

<u>Proposed Stormwater Management Alternative #4 (No Action)</u>

The No Action Alternative for the EPA stormwater discharge permit action corresponds with BIA's alternative that does not involve expansion of the mine onto the Reservation or the South Extension Tract. If there is no expansion of the mine onto the Crow Indian Reservation, then EPA would not issue an NPDES stormwater permit.

The impacts from the No Action Alternative are described in Section 3.5.2.2.2.

<u>3.5.2.3.1.3.2 Alternatives Considered but Eliminated from Detailed Analysis</u>

<u>Use of shallow injection wells to inject mine runoff to aquifers</u>

For the purposes of EPA's permitting action, shallow injection of runoff could be used to treat sediment-laden waters, but the reallocation of water from surface to groundwater resources would be in direct conflict with the goals of the Western Alkaline Coal Mining effluent guidelines. As part of the development of the effluent guideline, EPA placed particular emphasis on the need to maintain the existing hydrologic balance and the need to retain existing aquatic and riparian communities.

Avoid discharges of sediment by retaining all runoff during the mining phase

While this alternative could be cost prohibitive, the primary reason for not considering full retention of stormwater runoff is that it would impact the hydrologic balance and long-term sediment loading of receiving streams. Full retention of stormwater runoff would require that all stormwater be evaporated and be made unavailable for downstream water users and downstream aquatic life, and would limit water availability causing a disruption in aquatic and riparian communities. Full retention of stormwater runoff is similar to the Alternative #3 for Middle Fork Sarpy Creek, but extends the use of large dams to the smaller drainages that discharge directly to Sarpy Creek. Constructing a large dam in Sarpy Creek would require significant alteration of the subwatershed drainages and would create a lack of water availability resulting in a significantly altered post-mining hydrology.

3.5.2.3.1.3.3 EPA's Preferred Alternative

Considering the proposed stormwater management alternatives and the potential environmental impacts described herein, EPA's preferred alternative is the Proposed Stormwater Management Alternative #1. Appendix B presents a summary of the environmental impacts of the stormwater management alternatives.

3.5.2.3.1.4 Coordination with OSM

It is expected that, in general, the sediment control plan submitted to EPA will consist largely of materials generated as part of WRI's application to OSM for a surface mining permit (MT-0021-A). The Surface Mining Control and Reclamation Act (SMCRA) requires a coal mining operator to submit a reclamation plan, documentation, and analysis to OSM for approval. The plan submitted to OSM must address adverse impacts to the hydrologic balance, whether acid-forming or toxic-forming materials are present that could be mobilized, whether the operation could result in contamination, diminution, or interruption of underground or surface waters, impacts the proposed alteration will have on sediment yield, acidity, total dissolved and suspended solids, potential flooding or streamflow alterations, groundwater and surface water availability, and other site-specific characteristics as defined by OSM.

Prior to developing this EIS, EPA coordinated with OSM on review of the potential alternatives as proposed in the sediment modeling report submitted to EPA and OSM as part of the NPDES permit application process. EPA will continue to work with OSM to evaluate the alternatives for NPDES discharge as it relates to the goals defined in this EIS and to ensure consistency between the SMCRA and EPA permitting processes.

3.5.2.3.1.5 Discussion of Water Quality Standards

As previously noted in Section 3.5.2, the State of Montana listed Sarpy Creek in its 2006 Integrated 303(d) List and 305(b) Water Quality Report to the EPA as a Category 5 stream. Category 5 means one or more uses is impaired and a TMDL is needed. Sarpy Creek, from the Crow Indian Reservation boundary to its mouth, is listed as "partially supporting" aquatic life and a warm water fishery. The probable cause of impairment is high nutrient measurements (i.e., nitrate + nitrite as nitrogen, total nitrogen, total phosphorus, and total Kjehldahl nitrogen), and according to the MDEQ (2006c) the probable source of impairment is agricultural and grazing practices. The stream's impairment does not represent a risk to recreational uses and human health. Development of TMDLs has not yet started for the lower Yellowstone watershed, including Sarpy Creek. East Fork Sarpy Creek was also evaluated for EPA's 303(d) list in 2006 and found to not be impaired and fully supports its beneficial uses as a Class C-3 stream (MDEQ 2006c).

Surface water in the vicinity of the Absaloka Mine is used primarily for agricultural purposes (livestock watering), industrial uses (primarily haul road watering), and wildlife. No public or domestic water supplies are known to exist that rely on surface water from the Sarpy Creek drainage.

Because surface runoff from rainfall and snow melt is the only source of effluent, nutrient loading is not a concern. Any impairment of Sarpy Creek is a function of agricultural land uses in the drainage and highly mineralized ground water in the alluvium and base flow. It is anticipated that all of the discharge alternatives will not cause or contribute to an impairment of the water quality standards in Sarpy Creek once reclamation is complete with the exception of the No Action Alternative, which allows for continued nutrient loading from agricultural lands unless otherwise mitigated.

3.5.2.3.1.6 Availability of NPDES Permit

The draft NPDES permit for the stormwater discharges from reclamation areas, brushing and grubbing areas, topsoil and stockpiling areas, and regraded areas associated with the proposed mine expansion is available on EPA's Region 8 NPDES web site at: http://www.epa.gov/region8/water/wastewater/download.

3.5.3 Water Rights

3.5.3.1 Affected Environment

The Montana Department of Natural Resources and Conservation (DNRC) administers water rights in Montana. Water rights are granted for both groundwater and surface water appropriations. Records of the Montana DNRC were searched in February 2007 for groundwater and surface water rights in the general analysis area, the results of which are provided below.

The groundwater rights search area was:

<u>T.1S., R.37E.</u>
Sections 1 through 3 and 10 through 13;

<u>T.1S., R.38E.</u>
Sections 1 through 5, 8 through 17, and 20 through 24.

A detailed listing of the groundwater rights inventory is provided in Table 3-12. As of February 2007, there were 21 permitted groundwater rights within the search area, 19 of which are water wells and two are developed springs. One of the developed springs is owned by WRI. Of the 21 groundwater rights, 20 are designated for livestock use, and one is designated for wildlife use. Eighteen of these groundwater rights are owned by local land owners, two are owned by the U.S. Bureau of Land Management, and one (a developed spring) is owned by WRI. Montana DNRC does not require a water right for scientific monitoring wells, as there is no beneficial use; therefore, all groundwater monitoring wells owned by WRI in the Absaloka Mine area are not included in DNRC's water right database.

The surface water rights search area was:

<u>T.1S., R.37E.</u>
Sections 1 through 3 and 10 through 13;

<u>T.1S., R.38E.</u>
Sections 2 through 5, 8 through 11, 14 through 17, and 20 through 23;

<u>T.1N., R37E.</u>
Sections 34 and 35.

A detailed listing of the surface water rights inventory is provided in Table 3-13. As of February 2007, within the search area there were 18 surface water rights, eight of which are owned by WRI and designated for livestock use. Local land owners own the other 10 surface water rights, eight of which are designated for livestock use and two are for irrigation use. DNRC has also issued 4 provisional permits to WRI in the search area for industrial, sediment control, mining pollution abatement, livestock, wildlife, and waterfowl uses.

Table 3-12. Groundwater Rights Inventory.

Water Right No.	Priority Date	T	R	S	QQQ	Owner	Water Right Type	Description/Source	Use	Flow Rate (gpm)	Use Volume (ac-ft/yr)
42KJ-24785	6/28/1973	1S	37E	1	SWNWNW	WRI	Statement of Claim	Developed Spring/Unnamed Tributary of Middle Fork Sarpy Creek	Stock	2.0	0.61
42KJ-70793	1/18/1989	1S	37E	10	SENE	Private	Groundwater Certificate	Well/Groundwater	Stock	7.0	3.40
42KJ-111686	5/7/1868	1S	37E	15	SWSESW	Private	Reserved Claim	Developed Spring/Unnamed Tributary of Sarpy Creek	Stock	8.0	12.97
42KJ-54100	11/14/1983	1S	38E	2	NESW	Private	Groundwater Certificate	Well/Groundwater	Stock	5.0	1.95
42KJ-185756	12/31/1916	1S	38E	2	NENWSE	Private	Statement of Claim	Well/Groundwater	Stock	4.0	1.00
42KJ-185756	12/31/1916	1S	38E	2	NENWSE	Private	Statement of Claim	Well/Groundwater	Stock	4.0	1.00
42KJ-185756	12/31/1916	1S	38E	2	NENWSE	Private	Statement of Claim	Well/Groundwater	Stock	4.0	1.00
42KJ-185756	12/31/1916	1S	38E	2	NENWSE	Private	Statement of Claim	Well/Groundwater	Stock	4.0	1.00
42KJ-185756	12/31/1916	1S	38E	2	NENWSE	Private	Statement of Claim	Well/Groundwater	Stock	4.0	1.00
42KJ-42924	3/12/1982	1S	38E	9	NENESW	Private	Groundwater Certificate	Well/Groundwater	Stock	10.0	4.73
42KJ-42926	3/12/1982	1S	38E	11	SENWNE	Private	Groundwater Certificate	Well/Groundwater	Stock	6.0	4.73
42KJ-80261	12/31/1961	1S	38E	12	SENWNW	BLM	Statement of Claim	Well/Groundwater	Wildlife	5.0	7.38
42KJ-80262	12/31/1961	1S	38E	12	SENWNW	BLM	Statement of Claim	Well/Groundwater	Stock	5.0	0.69
42KJ-123901	12/31/1961	1S	38E	12	NWSESE	Private	Groundwater Certificate	Well/Groundwater	Stock	4.0	
42KJ-20348	9/20/1978	1S	38E	13	NENWSW	Private	Groundwater Certificate	Well/Groundwater	Stock	10.0	3.00
42KJ-123907	23/31/1949	1S	38E	15	SENWSW	Private	Statement of Claim	Well/Groundwater	Stock	10.0	5.04
42KJ-30000381	12/05/1901	1S	38E	16	NENE	Private	Groundwater Certificate	Well/Groundwater	Stock	12.0	5.10
42KJ-123910	12/31/1950	1S	38E	21	SESWNW	Private	Statement of Claim	Well/Groundwater	Stock	5.0	5.04
42KJ-42927	3/12/1982	1S	38E	22	NENESW	Private	Groundwater Certificate	Well/Groundwater	Stock	5.0	4.73
42KJ-42925	3/12/1982	1S	38E	23	NWNENW	Private	Groundwater Certificate	Well/Groundwater	Stock	4.0	4.73
42KJ-123902	12/31/1961	1S	38E	23	NWSESW	Private	Statement of Claim	Well/Groundwater	Stock	6.0	
42KJ-19861	12/31/1963	1S	38E	24	NENENW	Private	Statement of Claim	Well/Groundwater	Stock	6.0	
42KJ-35866	9/14/1981	1S	38E	24	NESWSE	Private	Groundwater Certificate	Well/Groundwater	Stock	8.0	1.13
42KJ-37874	11/12/1981	1S	38E	24	NESWSE	Private	Groundwater Certificate	Well/Groundwater	Stock	8.0	1.13
42KJ-91757	10/26/1994	1S	38E	24	NENWNW	Private	Groundwater Certificate	Well/Groundwater	Stock	5.0	2.26

Table 3-13. Surface Water Rights Inventory.

Water Right No.	Priority Date	T	R	S	QQQ	Owner	Water Right Type	Description/Source	Use	Flow Rate (cfs)	Use Volume (ac-ft/yr)
42KJ-24784	6/28/1973	1S	37E	1	SWNESE	WRI	Statement of Claim	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Stock		0.61
42KJ-7552	2/23/1976	1S	37E	1		WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-24790	12/31/1972	1S	37E	2	NENENE	WRI	Statement of Claim	Stream/Unnamed Tributary of Sarpy Creek	Stock		0.31
42KJ-189114	10/3/1967	1S	37E	3	NESWSW	Private	Statement of Claim	Stream/Unnamed Tributary of Sarpy Creek	Irrigation		180.00
42KJ-189114	10/3/1967	1S	37E	3	NESWSW	Private	Statement of Claim	Stream/Unnamed Tributary of Sarpy Creek	Irrigation		180.00
42KJ-189115	6/2/1969	1S	37E	11	NWNESE	Private	Statement of Claim	Stream/Sarpy Creek	Irrigation		234.00
42KJ-189115	6/2/1969	1S	37E	11	NWNESE	Private	Statement of Claim	Stream/Sarpy Creek	Irrigation		234.00
42KJ-7552	2/23/1976	1S	37E	12		WRI	Provisional Permit	Stream/Sarpy Creek	Industrial	1.11	
42KJ-6894	10/19/1951	1S	37E	13	SWNWNE	Private	Statement of Claim	Stream/Sarpy Creek	Stock		12.00
42KJ-7552	2/23/1976	1S	37E	13		WRI	Provisional Permit	Stream/Sarpy Creek	Industrial	1.11	
42KJ-24791	12/31/1972	1S	38E	2	SWNWSW	WRI	Statement of Claim	Stream/Unnamed Tributary of East Fork Sarpy Creek	Stock		0.31
42KJ-7552	2/23/1976	1S	38E	2		WRI	Provisional Permit	Stream/Unnamed Tributary of East Fork Sarpy Creek	Industrial	1.11	
42KJ-24788	6/28/1973	1S	38E	3	SENWSE	WRI	Statement of Claim	Stream/Unnamed Tributary of East Fork Sarpy Creek	Stock		0.31
42KJ-24789	6/28/1973	1S	38E	3	SENWSE	WRI	Statement of Claim	Stream/Unnamed Tributary of East Fork Sarpy Creek	Stock		0.31
42KJ-7552	2/23/1976	1S	38E	3		WRI	Provisional Permit	Stream/Unnamed Tributary of East Fork Sarpy Creek	Industrial	1.11	
42KJ-26748	12/31/1972	1S	38E	4	SWSWSW	WRI	Statement of Claim	Stream/Middle Fork Sarpy Creek	Stock		0.61
42KJ-7552	2/23/1976	1S	38E	4		WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-7552	2/23/1976	1S	38E	5		WRI	Provisional Permit	Stream/Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-7552	2/23/1976	1S	38E	8		WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-123905	12/31/1920	1S	38E	9	NESWSE	Private	Statement of Claim	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Stock		5.29
42KJ-123909	12/31/1951	1S	38E	9	SWSESW	Private	Statement of Claim	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Stock		5.04

Table 3-13. Surface Water Rights Inventory (Continued).

Water Right No.	Priority Date	T	R	S	QQQ	Owner	Water Right Type	Description/Source	Use	Flow Rate (cfs)	Use Volume (ac-ft/yr)
42KJ-7552	2/23/1976	1S	38E	9		WRI	Provisional Permit	Stream/Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-26749	12/31/1972	1S	38E	10	SESWNW	WRI	Statement of Claim	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Stock		0.31
42KJ-7552	2/23/1976	1S	38E	10		WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-123904	12/31/1950	1S	38E	11	NWNENW	Private	Statement of Claim	Stream/Unnamed Tributary of East Fork Sarpy Creek	Stock		
42KJ-7552	2/23/1976	1S	38E	11		WRI	Provisional Permit	Stream/East Fork Sarpy Creek	Industrial	1.11	
42KJ-7552	2/23/1976	1S	38E	14		WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-7552	2/23/1976	1S	38E	15		WRI	Provisional Permit	Stream/Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-123908	12/31/1920	1S	38E	16	SESWNE	Private	Statement of Claim	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Stock		5.04
42KJ-7552	2/23/1976	1S	38E	16		WRI	Provisional Permit	Stream/ Middle Fork Sarpy Creek	Industrial	1.11	
42KJ-7552	2/23/1976	1S	38E	17		WRI	Provisional Permit	Stream/Unnamed Tributary of Sarpy Creek	Industrial	1.11	
42KJ-189241	5/7/1868	1S	38E	20	SESENW	Private	Reserved Claim	Stream/Unnamed Tributary of Sarpy Creek	Stock		5.88
42KJ-189241	5/7/1868	1S	38E	20	SESENW	Crow Tribe, Allotment	Reserved Claim	Stream/Unnamed Tributary of Sarpy Creek	Stock		5.88
42KJ-123903	12/31/1920	1S	38E	21	SESWNW	Private	Statement of Claim	Stream/Unnamed Tributary of Sarpy Creek	Stock		5.04
42KJ-123906	12/31/1950	1S	38E	21	SWSWNW	Private	Statement of Claim	Stream/Unnamed Tributary of Sarpy Creek	Stock		1.93
42KJ-17809	3/1/1978	1N	37E	35	SENESE	WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Sediment Control		66.00
42KJ-24499	9/21/1979	1N	37E	35	SENESE	WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Mining/ Pollution abatement		84.00
42KJ-24786	6/28/1973	1N	37E	35	SWSWNE	WRI	Statement of Claim	Stream/Unnamed Tributary of East Fork Sarpy Creek	Stock		4.83
42KJ-101355	4/2/1997	1N	37E	35	SENESE	WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Stock		3.40
42KJ-101355	4/2/1997	1N	37E	35	SENESE	WRI	Provisional Permit	Stream/Unnamed Tributary of Middle Fork Sarpy Creek	Wildlife/ Waterfowl		126.60

3.5.3.2 Environmental Consequences

3.5.3.2.1 Proposed Action and Alternative 1

Two of the private water wells listed in Table 3-12 would be impacted under the Proposed Action and Alternative 1. Both wells (DNRC water rights 42KJ-42924 and 42KJ-30000381), which are used for livestock watering and are owned by the Marie L. Crum Trust, would be directly removed by the proposed mining operation. One private water well, DNRC water right 42KJ-123907, is located within an area where water-bearing overburden strata are predicted to experience some dewatering and drawdown associated with mining the South Extension development area, and it may therefore be affected. None of the other groundwater rights listed in Table 3-12 would be physically disturbed, nor are any other wells located within the five-foot drawdown contours (Figures 3-10 and 3-11) associated with mining the South Extension development area and, therefore, would not be affected by mining-related groundwater dewatering and drawdown.

Only a slight reduction in streamflow downstream of the South Extension development area during mining is expected due to the containment of runoff from the disturbed areas by the mine pits and other runoff control structures. Downstream surface water rights would be protected by minimizing detention of surface runoff for sediment control, maintaining unrestricted flow in Middle Fork Sarpy Creek through the mine area, and minimizing disturbance to the Middle Fork alluvial aquifer system. Changes to the overall flow and water quality of Middle Fork Sarpy Creek and Sarpy Creek during mining are expected to be negligible. None of the private surface water rights listed in Table 3-13 that are located outside of the South Extension development area would be impacted under the Proposed Action and Alternative 1. However, three of the private surface water rights listed in Table 3-13 are located within the proposed mining disturbance areas (DNRC water rights 42KJ-123905, 42KJ-123909, and 42KJ-123908) on unnamed tributaries of Middle Fork Sarpy Creek and would therefore be interrupted until the disturbance area is reclaimed.

Mining-related effects to any water rights held by WRI were not considered in this analysis.

3.5.3.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. Coal removal and associated disturbance would not occur within either the Tract III Revision area or the South Extension. The impacts to water rights associated with existing approved mining would continue to occur.

3.5.3.3 Regulatory Compliance, Mitigation and Monitoring

SMCRA and Montana regulations require surface coal mine operators to provide the owner of a water right whose water source is interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality. This required mitigation is considered to be part of the Proposed Action and Alternative 1. The most probable source of replacement water would be one of the aquifers underlying the Rosebud-McKay coal. The primary alternative groundwater sources are the Robinson coal, which is no longer being mined, and the sub-Robinson unit. Other deeper sources, including the Fox Hills sandstone, are also available.

3.5.4 Residual Impacts

The area of coal and overburden removal and replacement of overburden and associated groundwater drawdowns would be increased under the Proposed Action and Alternative 1 compared with that of the existing Absaloka Mine. The post-mining backfill may take in excess of 50 years to fully resaturate and reach equilibrium water levels and water quality. Less time would be required near the mining boundaries. Monitoring data from wells completed in existing backfilled areas in the PRB of Montana suggest that there would be an adequate quantity of water in the backfill to replace current use, which is for livestock. Water quality in the backfill would generally be expected to meet the Montana Class III standards for livestock and wildlife use. The hydraulic properties and water quality characteristics of the backfill may be somewhat different than that of the undisturbed overburden and Rosebud-McKay coal, although groundwater at comparable depth, yield, and quality would be available for the same premining uses within the South Extension development area.

By leaving an undisturbed corridor in place along the drainage bottom of Middle Fork Sarpy Creek, the time required to restore the essential hydrologic functions of Middle Fork Sarpy Creek and its alluvial aquifer system would be greatly reduced. No residual impacts to the overall Sarpy Creek hydrologic system are expected.

No water-bearing strata beneath the Rosebud-McKay coal would be disturbed by mining, so there would be no residual impacts to any of the deeper aquifers.

3.6 Alluvial Valley Floors

3.6.1 Affected Environment

Prior to mining, alluvial valley floors (AVFs) must be identified because, under SMCRA, mining on AVFs is prohibited unless the affected AVF is undeveloped rangeland that is not significant to farming, or if the affected AVF is of such small acreage that it would have a negligible impact on a farm's agricultural production.

These restrictions also apply to AVFs that are downstream of the area of disturbance but might be affected by disruptions in streamflow. AVFs that are determined not to be significant to agriculture can be disturbed during mining but must be restored as part of the reclamation process.

The Montana Strip and Underground Mine Reclamation Act [82-4-203(2), MCA] defines an AVF as "unconsolidated stream laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities but does not include upland areas which are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slope wash, together with talus, other mass movement accumulation and windblown deposits." ARM 17.24.301 defines "unconsolidated stream laid deposits holding streams," with respect to AVFs, as "all flood plains and terraces located in the lower portion of valleys which contain perennial or other streams with channels."

Guidelines established by OSM and MDEQ for the identification of AVFs require detailed studies of geomorphology, soils, hydrology, vegetation, and land use. These studies are used to identify 1) the presence of unconsolidated stream laid deposits, 2) the possibility for artificial flood irrigation, 3) past and/or present flood irrigation, and 4) apparent subirrigated areas and the possibility for natural flood irrigation. Areas that are identified as AVFs following these studies are evaluated for their significance to farming by MDEQ and OSM.

The reach of Middle Fork Sarpy Creek within and adjacent to the Absaloka Mine permit area, from the Crow Indian Reservation boundary downstream to surface water monitoring site G-10 (Figure 3-13), was investigated for the presence of an AVF in 2004 (WWC 2004). This AVF assessment was conducted in association with permitting the Absaloka Mine Tract III South Amendment Area (MDEQ Application #00170). The study was conducted directly north of the South Extension boundary, although the evaluation gave consideration to the entire upper Middle Fork Sarpy Creek drainage basin. As a result of the study, it was concluded that Middle Fork Sarpy Creek in this area does not meet the regulatory definition of an AVF. MDEQ and OSM subsequently evaluated the study presented in the permit amendment application, visited the study area, and determined that the Middle Fork does not meet AVF criteria (Hydrometrics 2006a).

The 2004 AVF assessment concluded that the unconsolidated stream laid deposits of Middle Fork Sarpy Creek do not provide enough subirrigation to benefit or enhance agricultural activities. Furthermore, the agricultural cropland that does exist does not benefit from natural or artificial flood irrigation. There is essentially no underflow of alluvial groundwater in the unconsolidated stream laid deposits downstream of the 2004 AVF study area. Groundwater that exists within the valley fill deposits in the AVF study area moves laterally downvalley until contacting the permeable sub-Robinson unit subcropping beneath the valley fill. At that point, the alluvial groundwater moves vertically downward to recharge the sub-Robinson unit, which in effect drains the valley fill and leaves it essentially dry downstream (refer to Section 3.5.1.1.1). Therefore, no essential hydrologic functions, with respect to making the natural flow of groundwater usefully available for agricultural activities, are performed by Middle Fork Sarpy Creek (WWC 2004, Hydrometrics 2006a).

Middle Fork Sarpy Creek within the South Extension tract has not been formally evaluated for the presence of an AVF. The area south of the Crow Indian Reservation boundary is similar to the area north of the Reservation boundary in that alluvial groundwater is restricted to the valley bottom; however, the alluvial deposits are not as areally extensive, narrowing in an upstream direction, and are generally restricted to the current stream channel. In addition, the shoulders of the channel and the valley floor, which are covered with colluvial and/or eolian deposits, are generally separated more from the alluvial water table than the soil surface is within the 2004 AVF study area, thus making subirrigation even less likely (Hydrometrics 2006a). In terms of the potential for flood irrigation in the South Extension, the 2004 AVF assessment concluded the following:

- There is no potential for natural flood irrigation to occur at a sufficient frequency to facilitate growth of vegetation other than very close to the stream channel.
- No specific agricultural activities occur as a result of natural flood irrigation along Middle Fork in the study area.
- No current or historical irrigation structures are present along Middle Fork.
- Property owners report that flood irrigation would not be feasible, either economically or physically.
- Most runoff occurs as a result of snowmelt prior to the growing season.

It can be reasonably concluded that unconsolidated stream laid deposits exist within the Middle Fork Sarpy Creek valley, but there is no potential for natural or artificial flood irrigation or subirrigation to support agricultural activities within the stream's valley. Therefore, the general absence of flood irrigation (natural or artificial) and subirrigation in the South Extension development area indicates that mining activity would not be precluded by the presence of an AVF significant to agriculture.

3.6.2 Environmental Consequences

3.6.2.1 Proposed Action and Alternative 1

As indicated above, it is unlikely the MDEQ and OSM would declare that an AVF significant to agriculture exists within the South Extension development area. The mining and reclamation plan for the South Extension development area is designed to avoid disturbance to Middle Fork Sarpy Creek by not disturbing a corridor 500 to 600 feet wide that includes the stream channel. No mining disturbance would take place within this corridor except for three road and dragline crossings over the channel. The outer edges of the 500 to 600 feet-wide corridor that straddles Middle Fork Sarpy Creek would be no closer than 100 feet from the stream channel. Therefore, a buffer zone of a minimum distance of 100 feet from the channel would be maintained during mining, which would limit impacts to the alluvial aquifer and allow surface water in the main channel to flow through this area during mining. No direct or indirect impacts to AVFs by surface coal mining operations within or adjacent to the South Extension development area are anticipated.

Streamflow in tributary drainages of Middle Fork Sarpy Creek and Sarpy Creek within the South Extension development area would be diverted around the active mining areas in temporary diversion ditches, captured in various runoff control structures above the pit, or allowed to accrue to the mine pits. During mining, sumps within the mine pits would intercept the majority of runoff within the South Extension development area. Therefore, during normal runoff events, a slight reduction in downstream flow rates would be expected. Following major runoff events, it would be necessary to evacuate the pit sumps and flood control devices to provide storage volume for the next runoff event. Runoff waters would then be discharged outside the mine permit area after sufficient time for settling of suspended sediment has passed. Consequently, disruptions to the overall streamflow of Middle Fork Sarpy Creek and Sarpy Creek that might supply downstream AVFs during mining are expected to be negligible. No direct or indirect impacts are anticipated to off-site AVFs through mining of the South Extension development area.

3.6.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted, and coal removal and associated impacts would not occur. Impacts associated with the existing Absaloka Mine to the non-significant AVF identified in the East Fork Sarpy Creek drainage would continue to occur as approved under the current mining and reclamation permit.

3.6.3 Regulatory Compliance, Mitigation and Monitoring

As discussed above, AVFs must be identified because SMCRA restricts mining activities that would affect AVFs that are determined to be significant to agriculture. Impacts are generally not permitted to AVFs that are determined to be significant to agriculture. AVFs that are determined not to be significant to agriculture or that were permitted to be disturbed prior to the effective date of SMCRA can be disturbed during mining but must be restored as part of the reclamation process. The determination of significance to agriculture is made by MDEQ and OSM, and it is based on specific calculations related to the production of crops or forage on the AVF and the size of the existing agricultural operations on the land of which the AVF is a part. For any designated AVF, regardless of its significance to agriculture, it must be demonstrated that the essential hydrologic functions of the valley will be protected. Downstream AVFs must also be protected during mining.

3.6.4 Residual Impacts

No residual impacts to AVFs would occur following mining.

3.7 Wetlands

3.7.1 Affected Environment

Wetlands are aquatic features defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3(a)(7)(b)). The prolonged presence of water creates conditions that favor the growth of specially adapted plants and promote the development of characteristic wetland (hydric) soils (EPA 2007e). Vegetation in wetland environments is highly productive and diverse and provides habitat for many wildlife species. These systems as a whole play important roles in controlling floodwaters, recharging groundwater, and filtering pollutants (Niering 1985).

A preliminary wetlands inventory of the lands within and adjacent to the South Extension development area was based on U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping. NWI mapping was prepared in 1998 primarily by interpretation of infrared aerial photographs that were taken of this area in July 1980, and based on visible vegetation and hydrology at that particular time and season without on-the-ground verification (USFWS 1998). NWI maps were consulted prior to the initiation of the soils and vegetation field surveys (refer to Sections 3.8 and 3.9); however, delineation of the potential wetland area boundaries required field examination of soils, vegetation, and hydrology. Due to the seasonal nature of Middle Fork Sarpy Creek streamflow events, the wetland boundaries and extent of the wetland areas reflects conditions during the specific year and season when they were determined and may vary depending on the recent climatic conditions. Figure 3-14 depicts potential wetlands identified by the USFWS using the 1980 color infrared aerial photographs of the Middle Fork Sarpy Creek drainage.

The wetland areas depicted on Figure 3-14 are described by USFWS as palustrine (marshy) emergent herbaceous vegetation that is supported by temporarily or seasonally flooded soils. These areas were mapped by USFWS as potential wetlands along the streambeds of Middle Fork Sarpy Creek and the lower portion of some unnamed tributaries. Three diked or impounded areas (one each on Middle Fork and two of its unnamed tributaries) were also mapped by USFWS as the same wetland type.

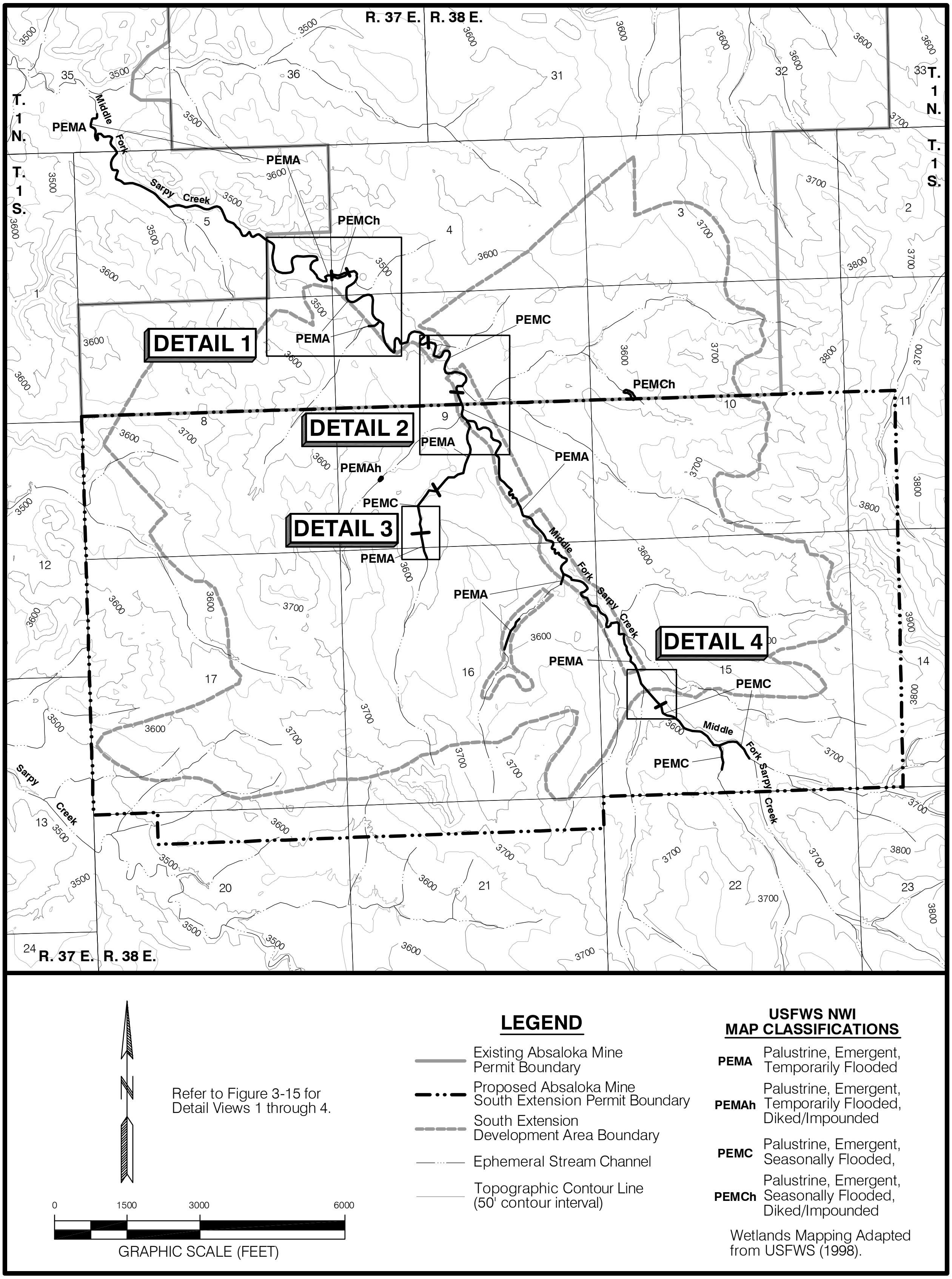


Figure 3-14. Wetlands Within and Adjacent to the South Extension Development Area Based on NWI Mapping.

Baseline field mapping of soils and vegetation provides a basis for the identification of potential wetland areas in the Middle Fork Sarpy Creek drainage. Small areas of hydric soils and/or inclusions of hydric soils (Aquolls and Aquents) were identified in the channel bottom of Middle Fork Sarpy Creek and one of its unnamed tributaries within the South Extension development area during the 2005 baseline soils survey. These areas' hydric soils are depicted on Figure 3-15 for comparison with the NWI mapping. Figure 3-16 shows all areas of hydric soils (mapping unit 100) within the proposed development area. During wet periods, the soils in these ephemeral stream channels may stay sufficiently saturated to support emergent herbaceous vegetation. However, following extended dry periods, such as the severe drought cycle that has persisted in this area since 2000, the obvious wetland vegetation may be lacking.

Herbaceous drainage bottom vegetation was identified during the 2005 vegetation inventory of the South Extension development area (refer to Section 3.9). The drainage bottom vegetation community, depicted as physiognomic type number 4 on Figures 3-17a through 3-17d, is comprised of herbaceous and deciduous physiognomic types. Approximately 5 percent of the South Extension development area is comprised of the drainage bottom vegetation community (WESTECH 2006b); however, the herbaceous vegetation type comprises just 14.0 acres, or 0.4 percent, of the South Extension development area, with the majority occurring along the Middle Fork Sarpy Creek channel within the Tract III Revision area. Of this total, only 0.9 acre is within the South Extension area. Areas of herbaceous drainage bottom vegetation are also shown on Figure 3-15 for comparison with the potential wetland areas mapped by NWI and the occurrence of hydric soils.

Although the 1980 NWI mapping identified potential wetlands occurring continuously along the length of Middle Fork Sarpy Creek within the South Extension development area, recent field surveys of soils and vegetation demonstrate that areas having characteristics of a wetland do occur along the Middle Fork's drainage channel, but are discontinuous and quite limited in extent. The 1980 NWI survey was completed after a series of wet years, and at that time the extent of lush drainage bottom vegetation visible on infrared aerial photographs may have been greater than demonstrated by the 2005 field mapping. This region has experienced a moderate to severe drought cycle that has persisted since 2000 (refer to Section 3.1.1).

3.7.2 Environmental Consequences

3.7.2.1 Proposed Action and Alternative 1

The mining and reclamation plan for the South Extension development area is designed to avoid disturbance to Middle Fork Sarpy Creek by not disturbing a corridor 500 to 600 feet wide that includes the stream channel. No mining disturbance would take place within this corridor except for three road and

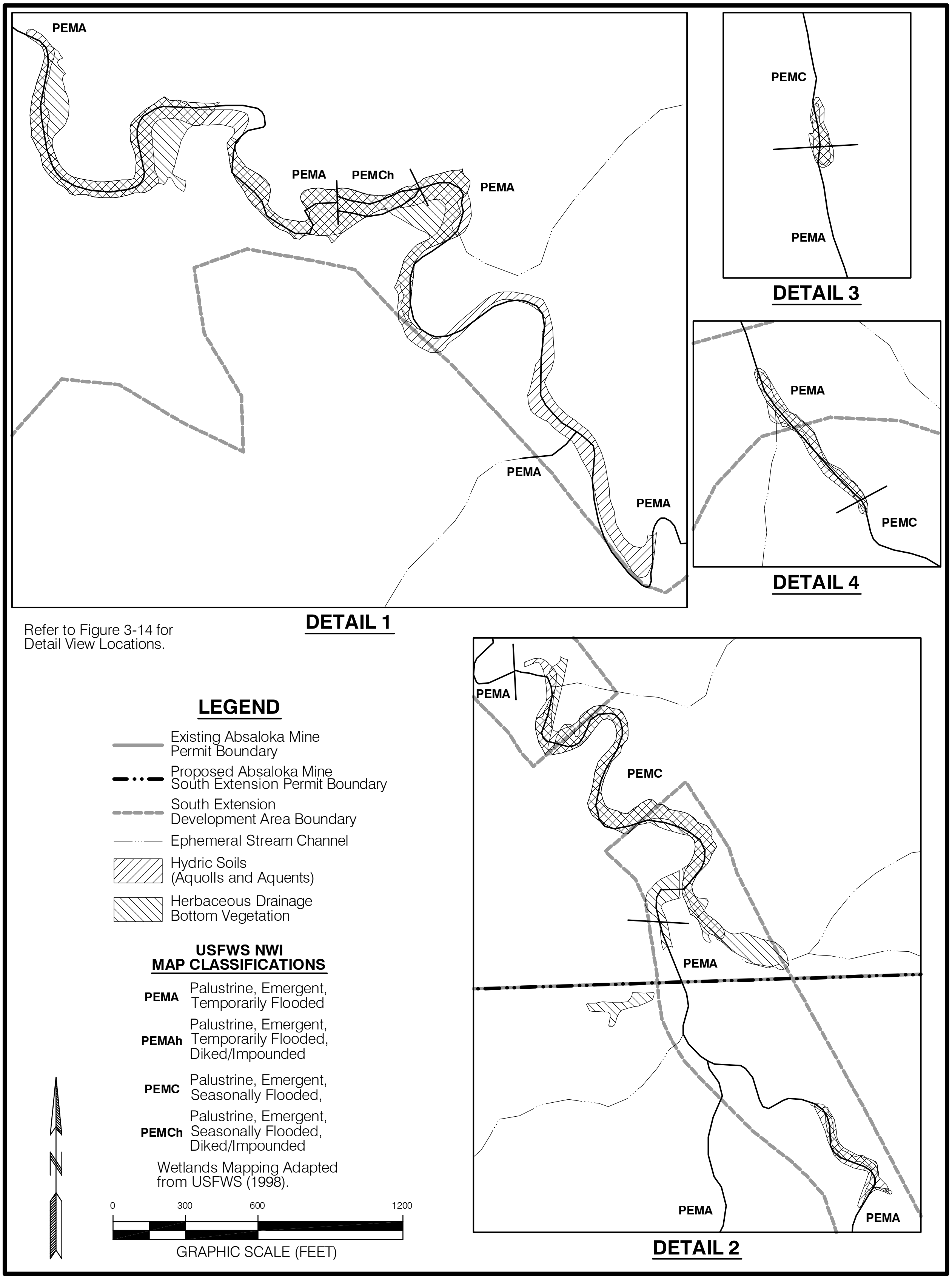


Figure 3-15. Detailed Views of 1980 NWI Wetland Mapping and Presently Existing Areas of Hydric Soils and Herbaceous Drainage Bottom Vegetation.

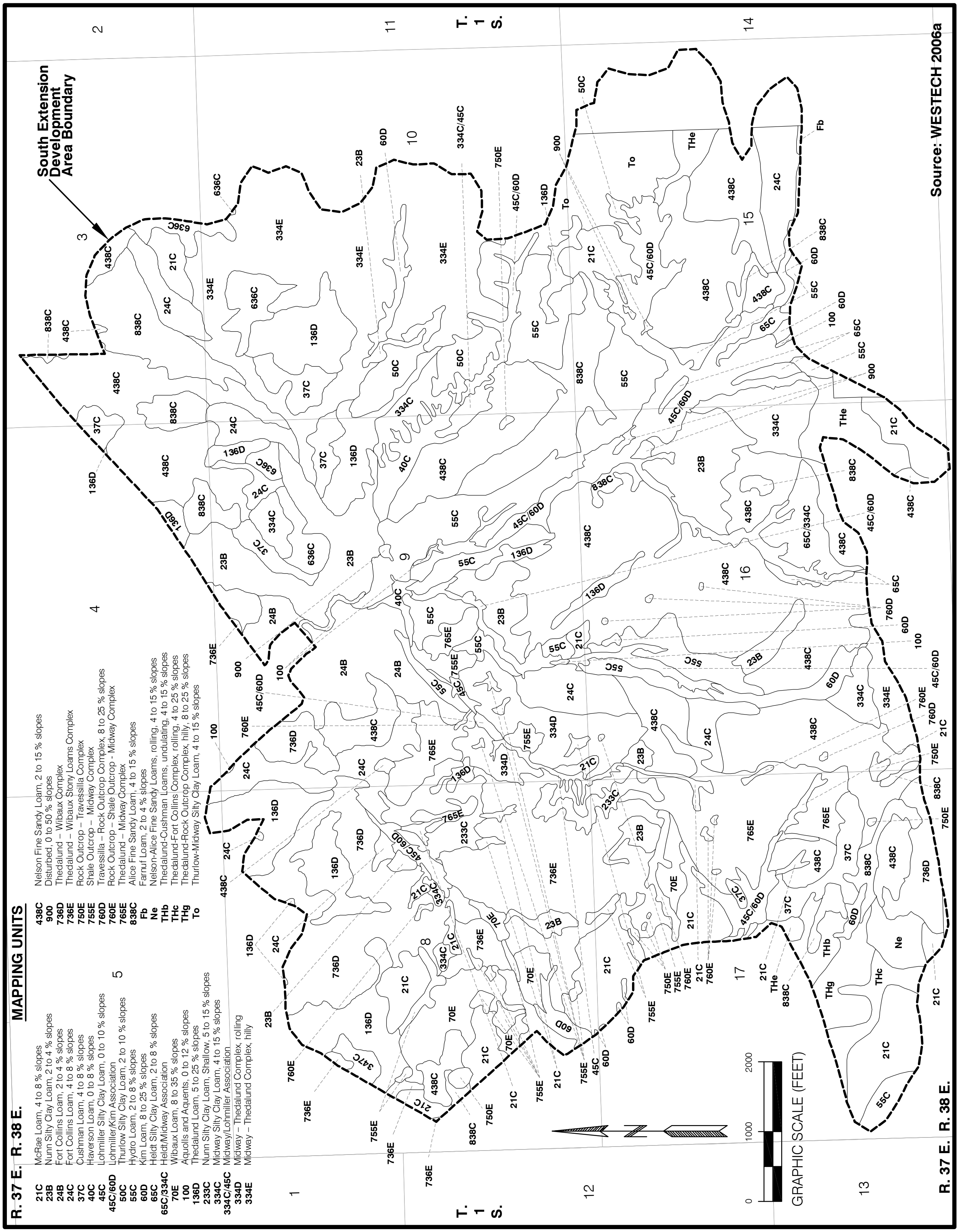


Figure 3-16. Soil Mapping Units Within the South Extension Development Area.

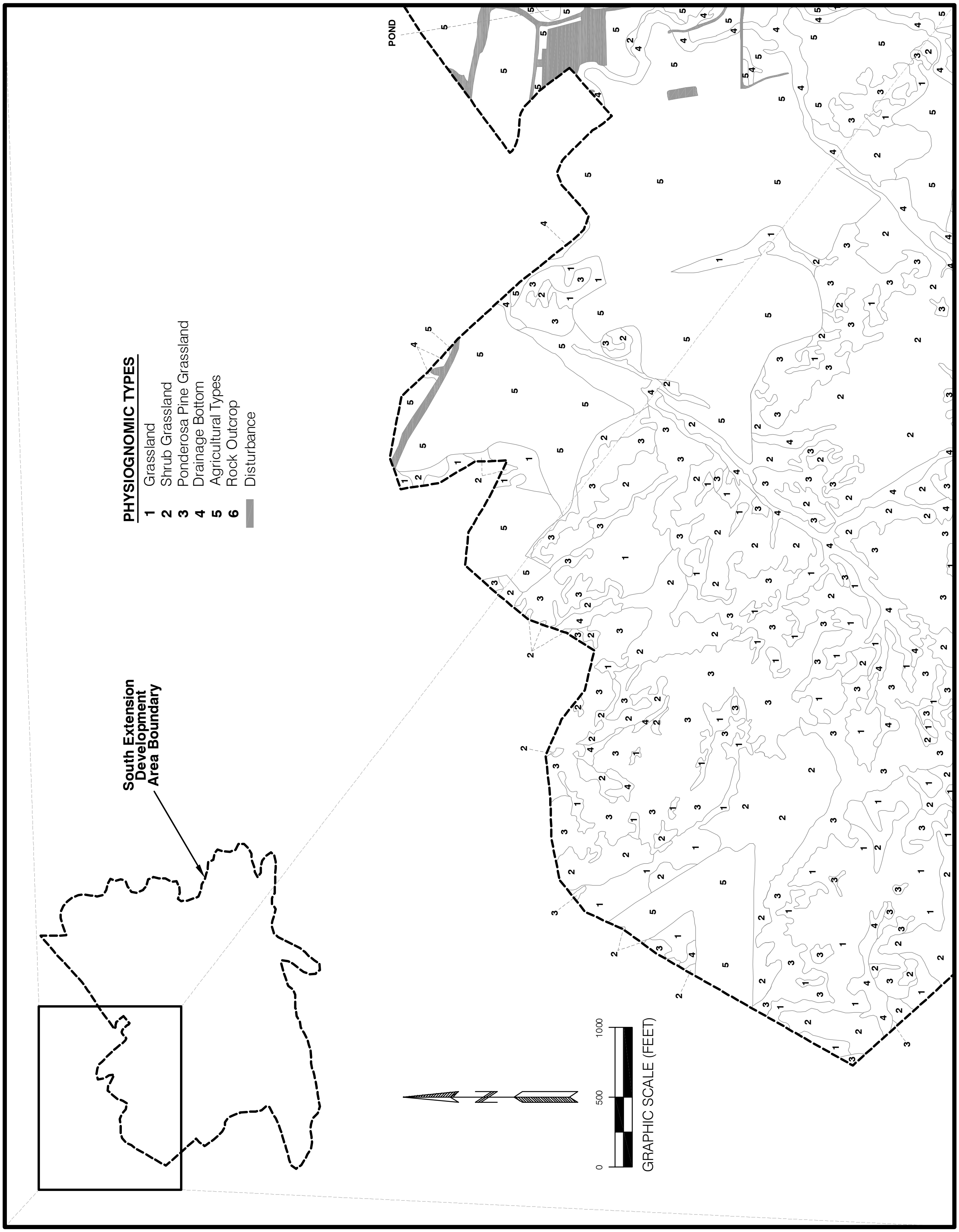


Figure 3-17a. Physiognomic Vegetation Types Within the South Extension Development Area.

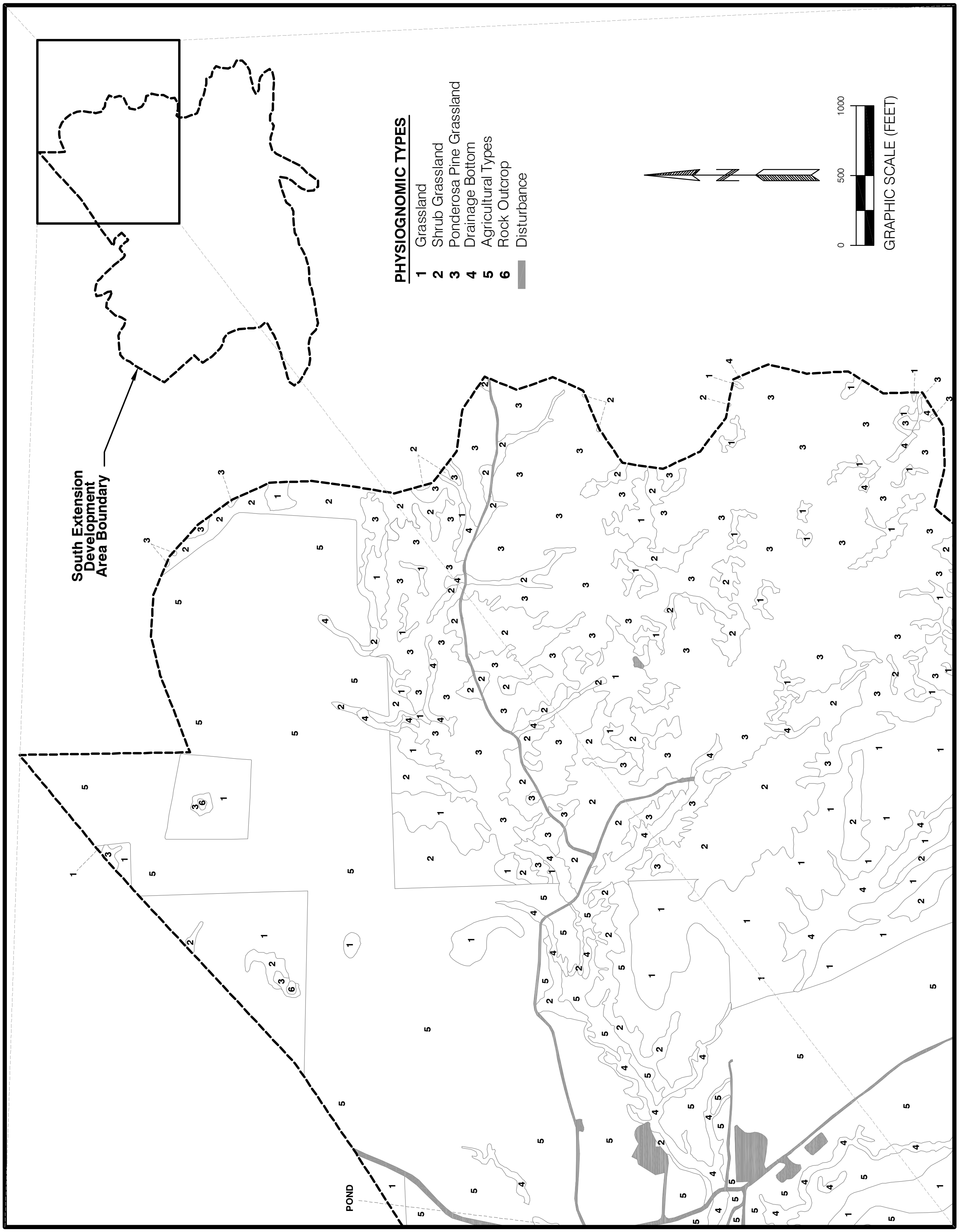


Figure 3-17b. Physiognomic Vegetation Types Within the South Extension Development Area.

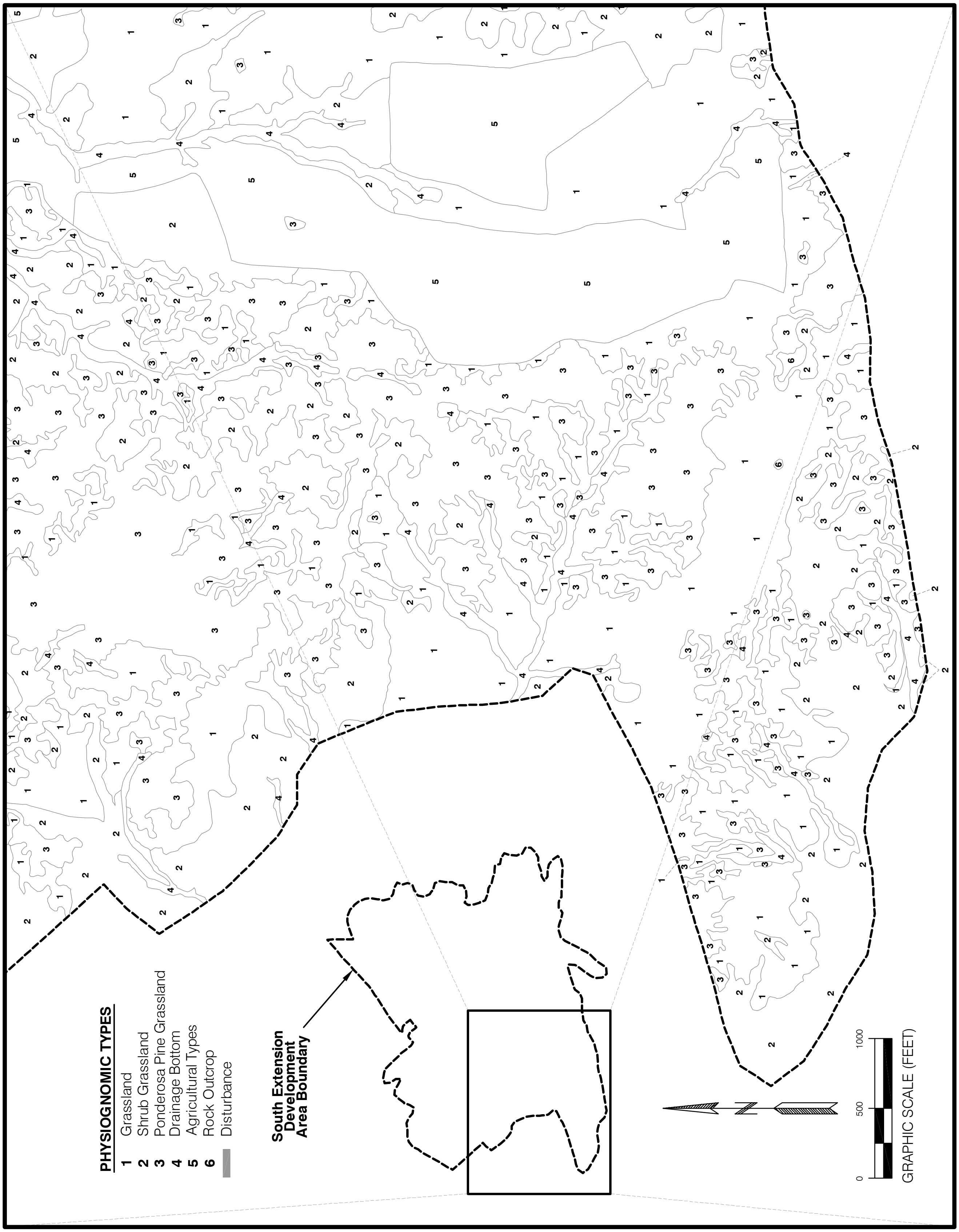


Figure 3-17c. Physiognomic Vegetation Types Within the South Extension Development Area.

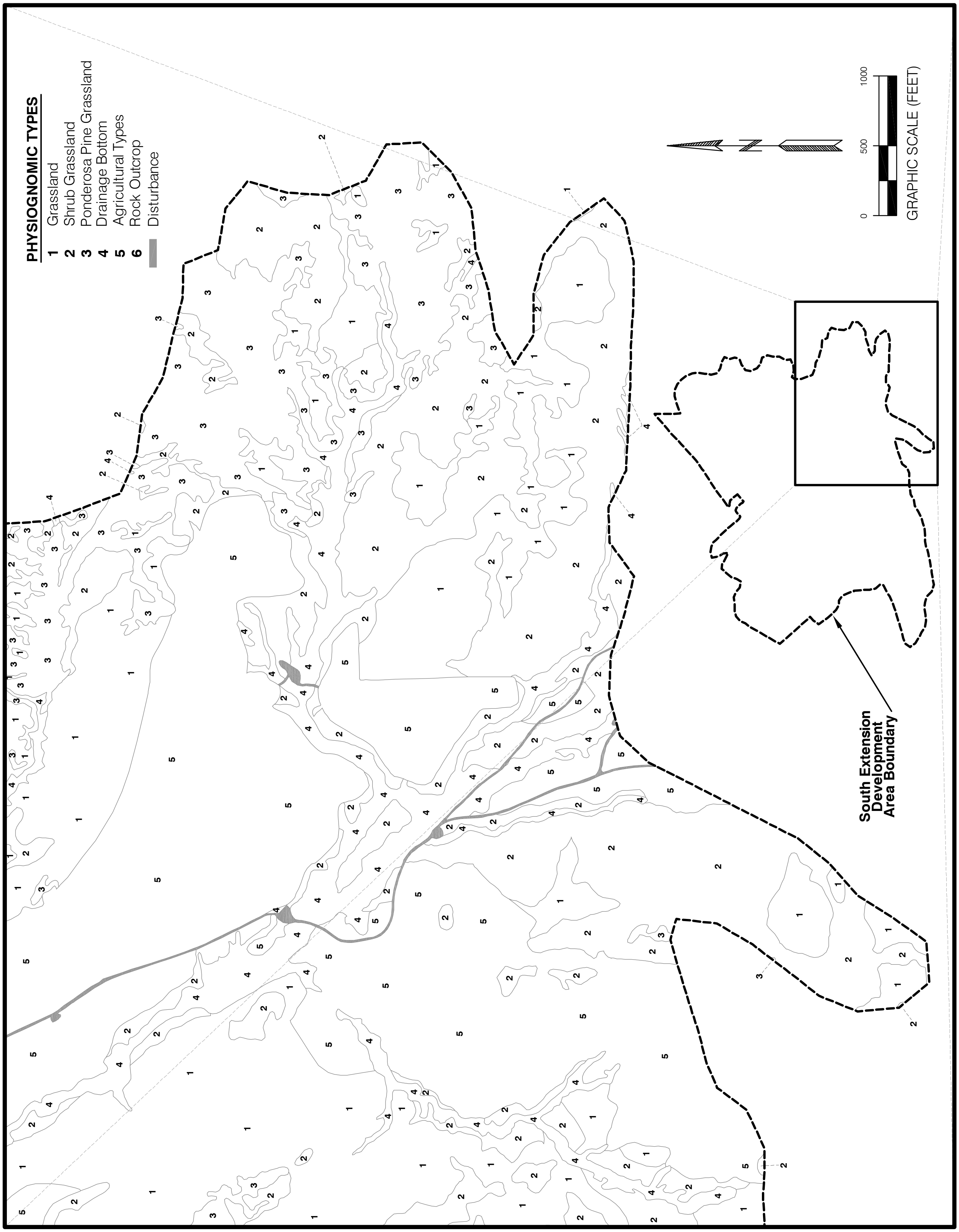


Figure 3-17d. Physiognomic Vegetation Types Within the South Extension Development Area.

dragline crossings over the channel. Therefore, only about one acre of potential wetlands, as delineated by the presence of both hydric soils and herbaceous drainage bottom vegetation, would be disturbed at the crossings (Figure 3-15, Details 2 and 4).

WRI's current mine and reclamation permit (WRI 2003) requires that mitigation measures will be implemented to replace wetland areas that are disturbed or removed by the mining operation. During mining, sediment control structures will act as seasonal wetland areas, and the reclamation plan includes drainage bottom enhancement and enhancement of dams and/or ponds for wetlands. EPA, COE, MDEQ and OSM rules require protection and enhancement of important wildlife habitats, and replacement of wetland habitats disrupted by mining is a standard permit requirement. The 0.9 acre of potential wetlands that are disturbed by the road and dragline crossings over the channel would be restored when the crossings are removed during reclamation of the South Extension development area and there would be no net loss of wetlands.

3.7.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted; coal removal and the associated disturbance to tributaries of Middle Fork Sarpy Creek would not occur within either the Tract III Revision area or the South Extension. The impacts to wetlands associated with the existing Absaloka Mine would occur as currently permitted. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mine and reclamation plan.

3.7.3 Regulatory Compliance, Mitigation and Monitoring

Waters of the United States are those water bodies subject to regulation pursuant to the Clean Water Act (CWA), which typically include lakes, streams, wetlands, and certain other types of water bodies. Wetlands subject to CWA jurisdiction are known as "jurisdictional wetlands" while those wetlands not subject to CWA jurisdiction are known as "non-jurisdictional" wetlands. Section 404 of the CWA requires a permit for the discharge of dredged or fill materials into *Waters of the United States* including jurisdictional wetlands. CWA Section 404 is administered by the U.S. Army Corps of Engineers (COE) and any required Section 404 permits must be obtained from the COE. Compliance with Section 404 and its implementing regulations requires a sequence of avoidance, minimization and mitigation of wetlands.

In addition, Executive Order (EO) 11990 – Protection of Wetlands (May 24, 1977) directs each federal agency to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for: (1) acquiring, managing, and disposing of federal land and facilities; (2) providing federally undertaken, financed, or assisted construction and improvement; and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating and licensing activities. EO 11990 is not limited in application to only those wetlands subject to CWA jurisdiction, but applies to all wetlands within scope of the EO.

Finally, the surface mining regulatory authorities (MDEQ and OSM) typically require replacement of non-jurisdictional and functional wetlands as a measure to protect and enhance wildlife habitat.

3.7.4. Residual Impacts

Replaced wetlands may not duplicate the exact function and landscape features of the premining wetland.

3.8 Soils

3.8.1 Affected Environment

Soil mapping studies of the South Extension development area were completed in 2005 by WESTECH Environmental Services, Inc. (WESTECH). Soils were mapped to the phase of series or consociations, associations and complexes, based on preliminary data collected at various sites in the development area. Mapped soils in the development area are shown on Figure 3-16.

Under the Proposed Action, the entire Absaloka Mine life-of-mine disturbance area would be about 7,472 acres. The additional disturbance of soils resource proposed for the South Extension development area is approximately 2,637 acres (Table 3-1) over the No Action Alternative.

The soils in the proposed development area are formed from the Fort Union Formation. The landscape is characterized by rolling hills that are steeply dissected by ephemeral drainages that are tributaries to Sarpy and Middle Fork Sarpy creeks. Outcrops of clinker occur along the knolls and escarpments overlooking the valleys. The Fort Union Formation is composed of stratified layers of sandstone, siltstone, and shale that weather to form sandy loam, silt loam, and clay loam soils. Salvageable soils range in depth from shallow (less than 6 inches) to deep (60+ inches). The deep soils are found primarily in the narrow alluvial valleys, with the shallow soils formed on the knolls and steep escarpments common to the area. The smoother lands in the uplands usually weather to form moderately deep soils (20 to 36 inches) and are sometimes used for agriculture (USGS 1977).

The soil depths and types in the proposed development area are similar to soils currently being salvaged and utilized for reclamation at the adjacent Absaloka Mine. Physical properties that may affect suitability for salvage include saturation percentage, texture, coarse fragment content, and organic matter content. Chemical properties potentially limiting suitability include pH, electrical conductivity (EC), sodium adsorption ratio (SAR), boron (B), and selenium (Se).

Physical limitations of soils for suitable use in reclamation are minimal. Although the Heldt silty clay loam and Hydro loam may exhibit elevated clay content in lower horizons, this in itself is not limiting because SAR values are low. The Travesilla loamy sand, which is formed at the base of sandstone outcrops, is very sandy and considered unfavorable for salvage; however, it is of quite limited extent and is considered suitable for specific reclamation objectives, such as wildlife habitat enhancement features. There are no limitations related to saturation or coarse fragment content. Organic matter is considered a beneficial soil characteristic, and soils in the area are typical of western rangelands with organic matter ranging from 0.4 to 4.0 percent.

Chemical limitations of soils for suitable use in reclamation are minimal as well. Soils in the area are typically neutral to slightly alkaline with pH in the range of 6.0 to 8.0, which is within the preferred range of 5.5 to 8.5. Although some soils (notably the Fort Collins loam and Lohmiller silty clay loam) may exhibit EC, which is a measure of salinity, exceeding the suspect levels of 4.0 in topsoil and/or 8.0 in subsoil, particularly in the lower subsoil, these soils are considered suitable due to the compensating effect of organic matter.

Several soils have potential subsoil limitations, based on boron and/or selenium levels. The Nunn silty clay loam exhibits suspect levels of boron and selenium in combination with high EC in subsoil below 24 inches in depth. Heldt silty clay loam has elevated boron below 30 inches in depth, and Hydro loam has suspect levels of selenium below 29 inches in depth. Consequently, salvage depths of these soils are to be limited accordingly.

In summary, soils within the South Extension development area are suitable for salvage and use in reclamation with very few limitations. Dominant textures are sandy loam, silt loam, and clay loam with few coarse fragments and organic matter typical of western rangeland soils. Such soils constitute a desirable growth medium with adequate infiltration and minimal erosion potential. Chemical limitations are limited to deep subsoil horizons in a few soils that comprise a relatively small proportion of the area.

The local Natural Resources Conservation Service (NRCS) office in Hardin, Montana, was contacted on January 10, 2006, concerning the potential occurrence of prime farmland in the South Extension development area. The NRCS responded to this information request on January 14, 2006 (Jodi Hastings 2006). The NRCS listed potential prime farmland soils in the proposed development area as the Haverson loam, Nunn silty clay loam, Thurlow silty clay loam and Farnuf loam on irrigated slopes less than four percent. Due to the fact that there is no irrigation, a determination was made that there is no prime farmland located within the proposed development area (WESTECH 2006a).

As shown in Figure 3-16, small areas of hydric soils and/or inclusions of hydric soils (Aquolls and Aquents, mapping unit 100), which are one component used in identifying wetlands, were mapped in the channel bottom of Middle Fork Sarpy Creek and one of its unnamed tributaries within the South Extension development area during the 2005 baseline soil survey by WESTECH (refer to Section 3.7).

3.8.2 Environmental Consequences

3.8.2.1 Proposed Action and Alternative 1

Soils would be salvaged and redistributed using rubber-tired scrapers. Salvage and redistribution would be accomplished in two lifts with the darkened "A" horizon or topsoil separated from lower subsoil ("B" and "C") horizons. This procedure avoids diluting organic matter content in the surface layer, and helps to mitigate any physical or chemical problems with subsoil. Typical depth of redistributed soil would be 24 inches, plus or minus 6 inches. WRI would vary the redistribution depth to mimic the native, undisturbed situation, with a redistribution depth being thinner on hilltops and increasing down slope toward drainage bottoms. Soil redistribution would be more uniform where cropland is to be the post-mining land use.

Soil salvaged from initial box cut development areas would be placed in stockpiles and retained for use in final pit reclamation. Once regraded acreage becomes available, soil would be hauled directly from salvage areas to the regarded backfill area. This procedure improves efficiency and maximizes retention of living plant materials (e.g., roots, rhizomes, seeds) in the soil.

Salvage and redistribution of soils during mining and reclamation would cause changes in the soil resources. In reclaimed areas, soil chemistry and soil nutrient distribution would generally be more uniform, and average topsoil quality would be improved because soil material that is not suitable to support plant growth would not be salvaged for use in reclamation. This would result in more uniform vegetative productivity on the reclaimed land.

The baseline soils analysis of the proposed development area indicates that the amount of suitable topsoil that would be available for redistribution on all disturbed acres within the soils analysis area during reclamation would vary from 0.5 foot to 5.0 feet (WESTECH 2006a). The replaced topsoil would support a stable and productive vegetation community adequate in quality and quantity to support the planned postmining land uses of grazing land with some cropland.

Wildlife habitat would be a joint land use since wildlife cannot be excluded from the area.

There would be an increase in the near-surface bulk density of the reclaimed soil resources on the proposed development area due to loss of soil aggregates. As a result, the average soil infiltration rates would generally decrease, which would increase the potential for runoff and soil erosion. Roughening the regraded backfill surface prior to soil redistribution, and soil preparation by disking or plowing prior to seeding would mitigate surface compaction.

Topographic moderation following reclamation would potentially decrease runoff, which would tend to offset the effects of decreased soil infiltration capacity. 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. The reclaimed landscape would contain stable landforms and drainage systems that would support the postmining land uses. Ephemeral stream channels would be designed and reclaimed to be erosionally stable, thereby conserving the soil resource.

Direct biological impacts to soil resources on the South Extension development area would include short-term to long-term reduction in soil organic matter, microbial populations, seeds, bulbs, rhizomes, and live plant parts for soil resources that are stockpiled before redistribution.

Under the Absaloka Mine's currently approved mining and reclamation plan, approximately 4,835 acres of soil resources will be disturbed in order to mine the coal within the existing permit area (Table 3-1, No Action Alternative). If the Tract III Revision area is mined (Alternative 1), disturbance related to coal mining would directly affect approximately 385 additional acres of soil resources, or up to approximately 2,637 additional acres under the Proposed Action (Table 3-1).

Average redistributed soil thickness would be about 24 inches across the entire reclaimed surface; however, soil redistribution depth would vary to mimic the native undisturbed situation. For example, redistribution depths would increase from hilltops to drainage bottoms, with greater depths in reclaimed drainages to mimic premine conditions. Redistribution depth will generally be more uniform in cropland and pastureland areas. The types of soils and the quantities of the soil resource included in the proposed development area under the Proposed Action and Alternative 1 are similar to the soils on the adjacent Absaloka Mine permit area.

3.8.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to soil resources described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would be confined to portions of the proposed development area that will be affected under the current mining and reclamation plan.

3.8.3 Regulatory Compliance, Mitigation and Monitoring

Soils suitable to support plant growth would be salvaged for use in reclamation. Soil stockpiles would be protected from disturbance and erosional influences. Soil material that is not suitable to support plant growth would not be salvaged. Some soils would be specially handled for use in tree planting areas.

Unsuitable materials would be buried under adequate fill prior to soil redistribution to meet guidelines for vegetation root zones. After topsoil is redistributed on reclaimed surfaces, revegetation would reduce wind erosion. Sediment control structures would be constructed as needed to detain sediments.

Regraded overburden would be sampled to verify suitability as subsoil. Redistributed soil would be sampled to document redistribution depths. Vegetation growth would be monitored on reclaimed areas to confirm vegetation establishment and acceptability for bond release. Appropriate normal husbandry practices may be implemented to achieve specific reclamation goals.

3.8.4 Residual Impacts

Existing soils would be mixed and redistributed, and soil-forming processes would be disturbed by mining. This would result in long-term alteration of soil characteristics.

3.9 Vegetation

3.9.1 Affected Environment

Vegetation community type mapping of the South Extension development area was completed by WESTECH in 2005. The plant communities present in the proposed development area are representative of the Montana Mixed Prairie Association. WESTECH identified 28 plant community types based on species dominance and ecological site, not including cropland. In order to relate plant community types to land uses and wildlife habitats, plant community types are grouped into physiognomic types, which consider both plant species composition and structure. Figures 3-17a through 3-17d depict the vegetation physiognomic types mapped of the South Extension development area. Approximately 63 percent of the area is comprised of native plant communities, with the remainder consisting of agricultural types (WESTECH 2006b). The physiognomic types and sub-types found within the proposed development area are:

- Grassland;
- Shrub/Grassland;
- Ponderosa Pine-Grassland;
- Drainage Bottom;
- Agricultural; and
- Miscellaneous.

3.9.1.1 Grassland

The grassland physiognomic type includes eight plant community types dominated by native prairie grasses. Dominant species and species composition are a function of soil texture and depth as well as topographic position and exposure. Western wheatgrass, green needlegrass, and needle-and-thread tend to dominate on clay loam and silt loam soils, while little bluestem, needle-and-thread, bluebunch wheatgrass, prairie sandreed, and sand bluestem are more typical of sandy loam soils. Approximately 22 percent of the area is comprised of grassland communities.

3.9.1.2 Shrub/Grassland

As the name implies, shrub/grassland communities are grassland types with a significant shrub component. Six distinct shrub/grassland communities were identified. Big sagebrush is not common and occurs locally on clay loam soils in association with western wheatgrass. Silver sagebrush is common, occurring primarily on silt loam soils in combination with western wheatgrass, green needlegrass and/or needle-and-thread. Skunkbush sumac is also common and occurs on sandier soils on association with needle-and-thread and/or bluebunch wheatgrass. Shrub/grassland comprises approximately 18 percent of the area.

3.9.1.3 Ponderosa Pine-Grassland

Ponderosa pine is the dominant tree species, occurring primarily on ridges and north-to-east-facing slopes. It is found on sandy loam and scoria-derived soils in association with bluebunch wheatgrass and/or Idaho fescue. Three physiognomic sub-types are identified based on canopy cover:

- Ponderosa pine savannah is grassland or shrub/grassland with widely spaced pine trees constituting less than 50 percent cover.
- Open canopy ponderosa pine has canopy cover in the 50 to 75 percent range and has a significant grassland or shrub/grassland understory.
- Closed canopy ponderosa pine stands with 75 to 100 percent canopy cover, the understory is minimal due to shading.

Shrub species associated with ponderosa pine most commonly include skunkbush sumac and snowberry. Ponderosa pine types comprise about 18 percent of the area.

3.9.1.4 Drainage Bottom

Plant communities in drainage bottoms and adjacent toeslopes and coulee banks benefit from enhanced moisture as a result of concentration of surface runoff, snow catchment, subirrigation, and/or groundwater seepage. The two drainage bottom physiognomic types are:

- Herbaceous drainage bottom is quite variable, depending on moisture regime and is most commonly dominated by cordgrass and Nebraska sedge. This vegetation type occupies 14.0 acres (0.4 percent) of the South Extension development area, most of which (about 13.1 acres) occurs along the Middle Fork Sarpy Creek stream channel within the Tract III Revision area. Only 0.9 acre of the herbaceous drainage bottom vegetation type occurs within the South Extension area. Range sites include subirrigated and wet meadow, associated with the Aquolls and Aquents soils mapping unit (refer to Section 3.7). Marshy areas with emergent vegetation – typically cattail and bulrush – are also included.
- Deciduous drainage bottom may include low shrubs (snowberry and Woods' rose), high shrubs (chokecherry, hawthorn, wild plum, serviceberry) and/or low trees, primarily boxelder. Woody plant species are found in drier areas and are not tolerant of extended inundation or soil saturation.

Approximately 5 percent of the proposed development area is comprised of drainage bottom vegetation communities, most of which is deciduous drainage bottom type.

3.9.1.5 Agricultural

Agricultural types include cropland and special use pasture. Predominant crops are dryland alfalfa-grass hay, winter wheat, and barley. Lands actively managed for crops account for about 13 percent of the area. Special use pasture is typical of areas where the native prairie vegetation was cultivated at some time in the past and the plant community is now dominated by or includes a significant component of introduced cool season perennial grasses, primarily crested wheatgrass. Early season green-up and growth is conducive to special use as spring pasture. Such areas may be typical tame pasture comprised primarily of cool season introduced grasses, or go-back lands with significant re-invasion of native species. Special use pasture comprises about 22 percent of the area.

3.9.1.6 Miscellaneous

Miscellaneous types are disturbed areas, ponds, and rock outcrops. Disturbed areas include roads, residences, corrals, etc. that support the agricultural land use and comprise about one percent of the proposed development area. Rock outcrops and ponds, or open-water areas, each comprise less than 1 percent of the proposed development area.

There are few occurrences of noxious weeds in the Absaloka Mine area; however, there are native areas adjacent to the mine permit area that are infested with noxious weeds, primarily Canada thistle and field bindweed. Canada thistle is generally restricted to drainage bottoms. Field bindweed is the most widely distributed weed in the South Extension, being most prevalent in the pasture areas. Houndstongue and burdock are also present.

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action and Alternative 1

Under the currently approved mining and reclamation plan, approximately 4,835 acres of vegetation will be disturbed in order to mine the coal within the existing permit area. Under the Proposed Action, mining of the South Extension development area would progressively remove the native vegetation on 2,637 additional acres, while mining of the Tract III Revision area (Alternative 1) would progressively remove the native vegetation on up to 385 additional acres. Vegetation removal on the proposed development area under the Proposed Action and Alternative 1 is presented as the additional mine disturbance area in Table 3-1.

Short-term impacts associated with the removal of vegetation from the South Extension development area would include increased erosion, interrupted livestock grazing, and habitat loss for wildlife. Potential long-term impacts include habitat modification or reduction of habitat carrying capacity for some wildlife species as a result of reduced plant species diversity or reduced plant density for some species, particularly shrubs, on reclaimed lands. However, grassland-dependent wildlife species and livestock would benefit from the increased grass cover and production.

Grazing restrictions prior to mining and during reclamation would temporarily remove up to 90 percent of the proposed development area 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 premining levels within several years following seeding with the approved seed mixture. Absaloka Mine's historical wildlife monitoring indicates that there would not be a substantial restriction of wildlife use of the area throughout the operations (refer to Section 3.10).

Reclamation, including revegetation of these lands, would occur contemporaneously with mining on adjacent lands, i.e., reclamation would begin once an area is mined. On average, roughly 150 acres of surface would be disturbed per year of mining. Estimates of the time elapsed from soil salvage through reseeding of any given area range from two to four years, 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. Reclamation of the final pit, roads and sediment control facilities would extend two years beyond the completion of coal removal, or approximately year 2023 for the Proposed Action and 2013 for Alternative 1.

In an effort to approximate premining conditions, the Absaloka Mine would reestablish vegetation types to reflect premine land uses and allow a reasonable comparison of relative land use valuations. Accordingly, the mine's currently approved revegetation plan emphasizes establishment of native grassland vegetation types to support grazing by domestic livestock. The objective of the reclamation plan is to establish grassland vegetation that is diverse, effective, and permanent; composed of species that are native to the area; at least equal in extent of cover to the natural vegetation of the area; and capable of stabilizing the soil surface to control erosion similar to premining conditions. The reclamation seed mix is variable depending on species availability from year to year and includes a diversity of native grass, forb, and shrub species to exploit variable topography and soils to promote vegetation diversity. Table 3-14 lists the reclamation seed mixes that are currently approved for the Absaloka Mine. Similar mixes would be used for reestablishing vegetation to reflect premine land uses within the South Extension development area.

The reclamation plan would not include a specific seed mix for pastureland, but recognizes that due to the extent of special use pasture prior to mining, establishment of introduced species from directly redistributed soil, which contains an existing introduced seed component, is probable. Seeding with the native grassland seed mix will decrease the proportion of special use pasture. Such areas would be identified after vegetation establishment and would not exceed the premining acreage.

Reclamation of cropland would be at a similar percentage to premine cropland acreage. Overall, native plant communities would increase in extent and agricultural types would be similar in extent after mining and reclamation are complete.

Wildlife habitat is not a primary post-mining land use; however, wildlife use would occur jointly with the primary land uses. To promote topographic and vegetative diversity in the short and long term for the benefit of wildlife, the reclamation plan would include establishment of wildlife habitat enhancement features in combination with the primary land uses. Such enhancement features include ponds, small depressions and seasonal wetlands; woody plant sites; rock piles;

Table 3-14. Currently Approved Reclamation Seed Mixes for the Absaloka Mine.

	GRAZING LAND SEED MIX			
	GRASSES			
	COOL SEASON	**WARM SEASON**	**FORBS**	**SHRUBS**
PRIMARY SPECIES	Western Wheatgrass Bluebunch Wheatgrass Prairie Junegrass Sandberg Bluegrass Needle-and-Thread Green Needlegrass Indian Ricegrass	Sand Bluestem Little Bluestem Sideoats Grama Prairie Sandreed	Common Yarrow Fringed Sagewort Cudweed Sagewort Black Sampson Dotted Blazingstar Prairie Coneflower Soapwell Yucca	Silver Sagebrush Prairie Rose Western Snowberry
ALTERNATE SPECIES	Thickspike Wheatgrass Streambank Wheatgrass Slender Wheatgrass Plains Reedgrass Idaho Fescue	Blue Grama Sand Dropseed	Prairie Aster Arrowleaf Balsamroot Hairy Goldenaster Purple Prairieclover Shaggy Fleabane Broom Snakeweed Stiff Sunflower Blue Flax Silverleaf Scurfpea Scarlet Globemallow	Rubber Rabbitbrush Skunkbush Sumac Woods' Rose Black Greasewood
PERCENTAGE OF MIX	20 to 40	40 to 60	10 to 20	5 to 10
	HYDROPHYTIC SEED MIX			
	GRASSES			
	COOL SEASON	**WARM SEASON**	**FORBS**	**SHRUBS**
PRIMARY SPECIES	Woolly Sedge Virginia Wildrye Reed Canarygrass American Bulrush	Big Bluestem Switchgrass Prairie Cordgrass	Common Cattail Wild Bergamot Canada Goldenrod	Woods' Rose Western Snowberry
ALTERNATE SPECIES	Nebraska Sedge Clustered Field Sedge Common Spikesedge Canada Wildrye Basin Wildrye Slender Rush Alkali Bulrush	Indian Grass Alkali Sacaton	Common Yarrow Stiff Goldenrod Hoary Verbena	Golden Currant Bristly Gooseberry
PERCENTAGE OF MIX	40 to 60	20 to 40	10 to 20	1 to 5

Source: WRI 2006 and 2007

and microtopographic features such as rock ledges, escarpments, over-steepened slopes and possibly cliffs or bluffs where appropriate to establish approximate original contour with approval of the regulatory authority. Ponds and seasonal wetlands are expected to revegetate naturally, but appropriate wetland species would be seeded or planted if necessary. Woody plant sites would be established in upland areas and along reclaimed drainageways where topographic position, aspect, and configuration serve to provide an enhanced moisture regime. Species of trees and shrubs to be planted would reflect the site characteristics with ponderosa pine, Rocky Mountain juniper, skunkbush sumac, and silver sagebrush on upland sites, and western snowberry, Woods' rose, chokecherry, plum, hawthorn, green ash, and boxelder on lowland sites.

To date, survival and establishment of woody plant seedlings planted in reclamation at the Absaloka Mine has been inconsistent. Primary reasons include competition from herbaceous vegetation and depredation by wildlife including rodents, rabbits, deer, and insects. Revegetation monitoring studies have shown significant volunteer establishment of shrub species, particularly snowberry, rose, and silver sagebrush from directly redistributed soil. Tree and shrub species are "increasers" and will tend to increase in dominance over time with livestock grazing and fire suppression. The reclamation strategy for long-term woody plant establishment is construction of suitable sites in the reclaimed landscape, planting of seedlings on those suitable sites, inclusion of shrub species in the seed mix, and direct haulage and redistribution of soils supporting shrub growth prior to mining. By providing suitable sites and a base population of woody species, tree and shrub density, vegetation diversity, and vertical structure will increase with time.

Following completion of reclamation (seeding with the approved seed mixture) and before release of the reclamation bond (a minimum of 10 years), a diverse, effective, and permanent vegetative cover would be established on the proposed development area. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas, and the proposed postmining land use of grazing land should be achieved even with the changes in vegetation composition and diversity. Following reclamation bond release, the surface owner would have the right to manipulate the reclaimed vegetation.

A reduction in shrubs would result in a long-term reduction of habitat for some species and may delay use of the reclaimed area by shrub-dependent species. An indirect impact of this vegetative change could be decreased carrying capacity for some big game species. Greater dominance of native grass species will increase livestock grazing capacity.

The reclamation plan for the existing Absaloka Mine includes steps to control invasion by weedy (invasive, nonnative) plant species (Montana Category I or Category II noxious weeds). Occurrence and control of noxious weeds would continue to be addressed in accordance with the Big Horn County Weed Board –

Noxious Weed Management Plan. The mine's existing Noxious Weed Management Plan is included in the mine's existing permit (WRI 2003), which is on file at the MDEQ offices in Helena and Billings, Montana and available for public review. Native vegetation in surrounding areas would provide a source of weed seed that would be transported by wind, wildlife, and livestock onto reclaimed land. As per the mine's Noxious Weed Management Plan, mine employees are informed and advised to be watchful for weedy plant species within the permit area. Appropriate mechanical, cultural, or chemical control would be utilized to control undesirable plant species as necessary, while assuring adequate environmental protection and mitigation measures that avoid risk of water quality contamination by chemical herbicides and adverse impacts to wildlife and sensitive plant species.

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. In such instances, reseeding may be necessary. Same-aged vegetation would be more susceptible to disease than would plants of various ages. Severe thunderstorms could also adversely affect newly seeded areas. However, these events would have similar impacts as would occur on native vegetation once a stable vegetative cover is established.

WRI would be required by MDEQ and OSM to post a reclamation bond to assure success of reclamation. This bond must remain in place for a minimum of 10 years after seeding. The 10-year minimum bonding period assures vegetation establishment and serves to support confidence that revegetation is permanent and that long-term landscape stability is achieved.

Changes expected in the surface water network on the proposed development area as a result of mining and reclamation would affect the reestablishment of vegetation patterns on the reclaimed areas to some extent.

There are no jurisdictional wetlands in the proposed development area. Functional wetlands would be restored in accordance with the requirements of the surface landowner or MDEQ and OSM.

3.9.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal and associated disturbance and impacts to vegetation would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated removal and replacement of vegetation resources described above would continue as permitted on the Absaloka Mine's existing permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would be confined to portions of the proposed development area that will be affected under the current mining and reclamation plan.

3.9.3 Threatened, Endangered, Proposed and Candidate Plant Species and Other Plant Species of Concern

Surveys for Threatened and Endangered (T&E) plant species have been performed for the Absaloka Mine area. The only T&E plant species that could potentially occur in the area is the Ute ladies'-tresses (Appendix C). This plant has not been documented in southeastern Montana and was not found on the proposed development area during baseline studies.

USFWS does not anticipate impacts to any T&E, candidate, or proposed species or critical habitat, and that no further review under Section 7 of the Endangered Species Act is necessary. A copy of the letter from the USFWS Montana Field Office to the BIA Rocky Mountain Regional Office stating that the USFWS has reviewed the proposed development area and has acknowledged that the Proposed Action would have no effect on listed species in the area is included in Appendix D.

The Montana Natural Heritage Program (MTNHP) listed "plant species of concern" for Montana including the region encompassing the South Extension development area (Appendix C) (MTNHP 2007). Two of the taxa listed were identified in the South Extension development area during the 2005 baseline vegetation inventory (WESTECH 2006b). MTNHP lists pregnant sedge (*Carex gravida*) as a "peripheral" species (occurs in Montana at the outer margins of its contiguous range); a global rank of "G5" (demonstrably secure, though it may be quite rare in parts of its range); and a state rank of "S1S2" (at high risk because of extremely limited and potentially declining population numbers and/or habitat, making it highly vulnerable to extirpation in the state (S1) and at risk because of very limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state (S2)). In the South Extension development area, pregnant sedge occurs only in or at the margins of densely wooded drainage bottom sites. The Proposed Action may affect, but is not likely to adversely affect the pregnant sedge.

MTNHP also lists little Indian breadroot (*Psoralea hypogaea*) as a "plant species of concern". It is listed as "G5T4" (the species is globally demonstrably secure, the variety is apparently secure) and a state rank of "S2S3" (at risk because of very limited and/or potentially declining population numbers, range and/or habitat, making it vulnerable to global extinction or extirpation in the state (S2) and limited abundance or distribution in Montana, but not presently considered to be at risk (S3)). Little Indian breadroot was found in the southwestern portion of the South Extension development area, in association with sandy aprons skirting sandstone outcrops, a habitat of very limited extent. The Proposed Action may affect, but is not likely to adversely affect the little Indian breadroot.

3.9.4 Native American Use of Plants

Native American use of plants was assessed through literature review. Snell (2006) reviewed Crow Indian use of some 70 species of plants. Plant use by other Northern Great Plains tribes was derived from numerous published sources (Moerman 1998, Kindscher 1987 and 1992, Hart 1976, and Gilmore 1977).

Plants were separated into three primary use categories: food, medicinal, and other. Food plants consist of those used for human consumption including beverages. Medicinal plants include those used to prevent or treat various maladies including coughs, sore throats, earaches, eye disorders, skin problems, toothaches, respiratory problems, snakebites, and a myriad of other minor and major ailments. The "other" use category is a catchall that consists of uses that don't fit the food or drug categories. It includes fibers, dyes, cleaning agents, containers, tools, decorations, ceremonial items, fuel, hunting items, incense, fragrances, insecticides, charms, sacred items, smoking, soap, toys, games, weapons, and many other uses found for plants (WESTECH 2006c).

The Absaloka Mine area, prior to white colonization, was open to plant harvesting by resident and/or nomadic Native Americans. With the advent of the Reservation system, the sale of lands within Reservation, and the development of private property, access has been substantially modified. Whereas the mine area once was easily accessible to Native Americans, that access is now at the discretion of private landowners. As such, actual use of the plants of the area by Native Americans is likely much different than it was prior to the 1800s (WESTECH 2006c).

Although the plants found on the Absaloka Mine and South Extension development area are important historically and currently to Native Americans, actual use of these plant resources on private lands within and adjacent to the Crow Reservation is likely quite limited (WESTECH 2006c).

3.9.5 Regulatory Compliance, Mitigation and Monitoring

Reclaimed areas would be revegetated as specified in the approved mine plan using reclamation seed mixtures that would be approved by MDEQ and/or OSM. Woody plant density goals are to establish a sufficient base population to ultimately provide vertical structure and vegetation diversity in association with post-mining land uses of grazing land, pastureland, and cropland.

Steps to control invasion by weedy plant species (Montana Category I or Category II noxious weeds) using cultural, chemical, and mechanical methods are included in the Big Horn County Weed Board – Noxious Weed Management Plan, which is included in Absaloka Mine's existing mine permit. These methods would be incorporated in the new mine permit for the South Extension (WRI 2007a). The methods outlined in the current Noxious Weed Management Plan, if utilized on the proposed development area, should be adequate to avoid the spread of noxious weeds.

The COE would ensure no net loss of jurisdictional wetlands and their associated vegetation occurs within the total disturbance area (refer to Section 3.7). Non-jurisdictional and functional wetlands would be reestablished in accordance with the requirements of the surface landowner or as required by MDEQ or OSM.

Revegetation growth and diversity would be monitored until the final reclamation bond is released (a minimum of 10 years following seeding with the approved seed mixture). Erosion would be monitored to determine if there is a need for corrective action during establishment of vegetation. Controlled grazing would be used following revegetation to manage the vegetation and determine the suitability and effectiveness of the reclaimed land for the primary post-mining land use.

3.9.6 Residual Impacts

Reclaimed vegetative communities may never completely match the surrounding native plant community due to changes in soils and topography.

3.10 Wildlife

3.10.1 General Setting

This section discusses the affected environment and environmental consequences to wildlife in general. The subsequent sections address the potential impacts to specific groups of wildlife species.

3.10.1.1 Affected Environment

In an undisturbed condition, the major vegetation types in the general Absaloka Mine area provide habitats for many species. Vegetation types tend to occur in a mosaic across the landscape; therefore, many wildlife species can be expected to utilize more than one habitat type. Predominant wildlife habitat types classified in the proposed development area and adjacent area correspond with the major plant communities identified during the vegetation baseline study and consist primarily of grassland, shrub/grassland, and ponderosa pine-grassland. Other habitats present in limited extent include drainage bottom (riparian), cropland, special use pasture, disturbance, rock outcrops, and open water. No designated critical, crucial, or unique habitats are present (refer to Section 3.9).

The Absaloka Mine has collected extensive wildlife data. Wildlife resources in the Absaloka Mine area have been monitored since 1974. The following information is derived from baseline data and subsequent studies and annual monitoring reports that have been completed for the Absaloka Mine. Intensive wildlife monitoring on and adjacent to the South Extension development area was completed in 2005 by

WESTECH. More recent (2006 and 2007) data were collected on raptors and sharp-tailed grouse in the area.

3.10.1.2 Environmental Consequences

3.10.1.2.1 Proposed Action and Alternative 1

If the South Extension development plan is permitted under the Proposed Action or Alternative 1, the areas of mining disturbance would extend onto the proposed development area, and mining activities would be extended by up to 12 years at the Absaloka Mine.

Mining directly and indirectly impacts local wildlife populations. These impacts are both short term (until successful reclamation is achieved) and long 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 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, or occupy poorer quality habitat than that from which they were displaced. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. If the South Extension development plan is permitted and mined, the direct impacts related to mine traffic and mine operations would be extended within the area by up to 12 years.

The indirect impacts are longer term. If the South Extension development plan is permitted, mined, and reclaimed, alterations in the topography and vegetative cover, particularly the reduction in shrub density, would cause a decrease in carrying capacity for some species and a decrease in vegetation diversity. Trees and shrubs would gradually become reestablished on the reclaimed land, but the topographic changes would be permanent. Microhabitats may be reduced on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in shrub density.

3.10.1.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated impacts to wildlife and wildlife habitat associated with coal removal described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would be confined to portions of the proposed development area that will be affected under the current mining and reclamation plan.

3.10.2 Big Game

3.10.2.1 Affected Environment

Six species of big game (mule deer, white-tailed deer, elk, pronghorn, black bear, and mountain lion) are known to occur at least occasionally in the South Extension development area. Big game distribution and habitat use were monitored through incidental observations of animals or their evidence recorded throughout the year, and by vehicle routes, aerial surveys, and nonsystematic pedestrian routes conducted seasonally. The big game survey area included the proposed development area.

Mule deer are year-round residents of the proposed development area when winters are mild. Mule deer winter range is primarily defined by southern exposures and steep slopes in “normal” to severe winters in the vicinity of the Absaloka Mine (Dames and Moore 1975). Consequently, there is little suitable winter range in the South Extension, and even in the comparably mild 2004-2005 winter there were no observations of mule deer from the South Extension study area (WESTECH 2006d). Tracks in the snow observed during the winter aerial survey suggested that a few deer were present, but tracks were less common than north of Middle Fork Sarpy Creek.

Typically, mule deer were the most commonly seen big game species in the Absaloka Mine wildlife monitoring area (WRI 1986, WESTECH 2006d). A comparatively small percentage of the annual total number of sightings (usually less than 10 percent) was recorded south of Middle Fork Sarpy Creek. This result appears to be influenced by: 1) more field effort was usually expended in the vicinity of the mine (i.e., north of the Middle Fork) than south of the Middle Fork; 2) mule deer near the mine were more observable due both to their use of reclaimed habitat and their habituation to human activity; 3) ponderosa pine, although still a dominant habitat south of the Middle Fork Sarpy Creek, is less abundant than north of the creek. For example, only about 18 percent of the South Extension combined study areas was mapped as this habitat; and 4) there are fewer water sources and cool/moist habitats south of the stream, resulting in lower mule deer use during dry seasons and/or years (WESTECH 2006d).

Pronghorn were the second most commonly seen big game species in the Absaloka Mine wildlife monitoring area (WESTECH 2006e), but were the most commonly observed species in the South Extension area in 2004-2005 (WESTECH 2006d). This appeared to be a function of the greater amount of open habitat, particularly silver sagebrush and grassland, in the South Extension compared to the area north of Middle Fork Sarpy Creek. Pronghorn in the South Extension area were generally distributed throughout the non-forested, non-agricultural portions of the study area.

White-tailed deer are common but not abundant in the Absaloka Mine vicinity and are usually observed along creek bottoms and adjacent habitats. There was one observation of white-tailed deer in the South Extension aerial survey area in 2004-2005 (WESTECH 2006d).

Although there were no sightings of elk in the South Extension development area in 2004-2005, evidence (tracks, hair and pellet groups) of elk was observed nearby. Elk or their evidence have been recorded with increasing frequency in the Absaloka Mine wildlife monitoring area since the late 1990s (WESTECH 2006d). The distribution of sightings over the years has demonstrated that elk may occur at any time in any portion of the monitoring area, including the South Extension, although they appear to be more common in late winter/early spring. A landowner reported that elk commonly fed at haystacks in the eastern portion of the South Extension (Ron Crum, personal communication, May 4, 2005).

Black bears are a comparatively recent addition to the study area species list, but have been sighted in three of the last five years (WESTECH 2006d). It is likely that black bears in the Absaloka Mine vicinity, including the South Extension, are dispersals or transients from other areas; the mine vicinity does not appear to support an endemic population of this species (WESTECH 2006d).

Mountain lions or their evidence have been occasionally recorded in the Absaloka Mine vicinity since the late 1990s (WESTECH 2006d). Although no mountain lion sightings or evidence were recorded in the South Extension in 2004-2005, one was seen about 2.5 miles north of the Absaloka Mine, and it is likely that this elusive species hunts regularly through the South Extension (WESTECH 2006d). The most suitable habitat for mountain lions in the South Extension is the ponderosa pine-covered steep hills in the northeast corner of the study area.

3.10.2.2 Environmental Consequences

3.10.2.2.1 Proposed Action and Alternative 1

Under the Proposed Action and Alternative 1, big game would be displaced from portions of the South Extension development area to adjacent ranges during mining. Pronghorn and mule deer would be most affected; however, no areas classified as crucial pronghorn or mule deer habitat occur on or within 2 miles of the proposed development area. White-tailed deer are usually observed along creek bottoms and their adjacent habitats but are not likely to be affected since the mining process will avoid these areas. Elk, mountain lion, and bear have been observed in the proposed development area but are not likely to be affected due to the limited use of the area by these species.

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. Big game have continued to occupy areas adjacent to and within active mining operations, verifying that some animals do become habituated to such disturbances.

Big game animals are highly mobile and can move to undisturbed areas. There would be more restrictions on big game movement on or through the South Extension development area, however, due to the construction of additional fences, spoil piles, and pits related to mining. During winter storms, pronghorn may not be able to negotiate these barriers. Fences and other structures would be designed and constructed to permit passage of large mammals.

Following reclamation, topographic moderation and changes in vegetation should not result in a long-term reduction in big game habitat carrying capacity. Potential impact to mule deer should be minimal as favorable habitat for mule deer in the South Extension area is not presently abundant, and impact to pronghorn should be minimal as topographic moderation may be favorable to them.

3.10.2.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to big game described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would be confined to portions of the proposed development area that will be affected under the current mining and reclamation plan.

3.10.3 Other Mammals

3.10.3.1 Affected Environment

Other mammals common year round to the Absaloka Mine area include porcupine, western harvest mouse, bushy-tailed woodrat, striped skunk, cottontail rabbit, white tailed jackrabbit, deer mouse, prairie vole, and least chipmunk. Coyote, red fox, and badger are also common year round residents. All of these species could potentially occur within the South Extension development area.

Mammals designated as species of concern that could potentially occur in the area include the black-tailed prairie dog, Townsend's big-eared bat, spotted bat, long-legged myotis, long-eared myotis, pallid bat, western spotted skunk, swift fox, Merriam shrew, and Preble shrew. These mammals are on the BLM's list of Designated Sensitive Species for Montana and the Dakotas and/or the MTNHP list of animal species of concern potentially occurring in the area (Appendix C). None of these species were recorded during the 2004-2005 wildlife surveys (WESTECH 2006b). No prairie dog colonies are currently present on or within ¾ mile of the South Extension development area.

3.10.3.2 Environmental Consequences

3.10.3.2.1 Proposed Action and Alternative 1

Medium-sized mammals (such as rabbit, coyote, and fox) would be temporarily displaced to other habitats by mining, potentially resulting in increased competition and mortality. However, these species commonly exhibit large population fluctuations and would rebound as forage is developed or small mammal prey species recolonize the reclaimed areas. Direct losses of small mammals would be higher than for most other wildlife, since the mobility of small mammals is limited and many would retreat into burrows when disturbed. Therefore, populations of such prey animals as voles, ground squirrels and mice would decline during mining. However, these animals have a high reproductive potential and tend to reoccupy 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 recolonization by small mammal communities are being achieved (Shelley 1992). That study evaluated sites at five separate mines.

Although bats (probably big brown bats and unidentified *myotis* species) were seen at dusk at the water source at the upper end of Middle Fork Sarpy Creek in the South Extension, this group of small mammals may be somewhat more limited in the South Extension than north of Middle Fork Sarpy Creek due to the relative scarcity of surface water (WESTECH 2006d). Due to the lack of reliable water sources in the proposed development area, it is unlikely that the Proposed Action or Alternative 1 would have an adverse effect on this particular species of concern.

Excluding the swift fox, suitable habitat is present for all of the other species of concern identified as potentially occurring in the area. The Proposed Action and Alternative 1 may affect, but is not likely to adversely affect those species of concern.

3.10.3.2.2 No Action Alternative

The impacts to medium and small mammals under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.4 Raptors

3.10.4.1 Affected Environment

The baseline wildlife studies completed in the Absaloka Mine area, which includes the South Extension development area, show that 25 species of raptors could potentially nest, winter, or migrate through the region. Twenty-two species have been documented within the study area (WESTECH 2006d).

Three raptor species (red-tailed hawk, American kestrel, and great horned owl) are monitored in conjunction with Absaloka Mine's approved raptor monitoring plan. All three of these raptor species have nested on or within one mile of the proposed development area. Figure 3-18 shows the locations of the existing and former raptor nests within and adjacent to the South Extension development area, as well as WESTECH's extensive raptor study area (WESTECH 2006d). Two existing raptor nests (a red-tailed hawk nest and a great horned owl nest) are located within the South Extension development area and four nests are within one-half mile of the proposed development area (Figure 3-18).

Raptors designated as species of concern that could potentially occur in the area include the burrowing owl, ferruginous hawk, northern goshawk, peregrine falcon, Swainson's hawk, and golden eagle. These species are all on the BLM's list of Designated Sensitive Species for Montana and the Dakotas and/or the MTNHP list of animal species of concern potentially occurring in the area (Appendix C). These birds have all been observed in the vicinity of the proposed development area prior to 2005, but use is infrequent and no nests have been documented in the area. None of these species were recorded in the South Extension development area during the 2005 survey (WESTECH 2006d).

3.10.4.2 Environmental Consequences

3.10.4.2.1 Proposed Action and Alternative 1

Mining the South Extension development area would not impact regional raptor populations; however, individual birds or pairs may be impacted. Mining activity could cause raptors to abandon nests proximate to disturbance.

The USFWS approval would be required before taking active raptor nests. The Absaloka Mine annually monitors territorial occupancy and nest productivity on and around the existing permit boundary. Raptor nesting activity has previously occurred in active mining and construction areas and the Absaloka Mine has consulted with the USFWS to secure proper raptor nest take permits, if necessary.

Mining near raptor territories would minimally impact availability of raptor prey species. The lack of nesting habitat for many raptor species that nest in trees or

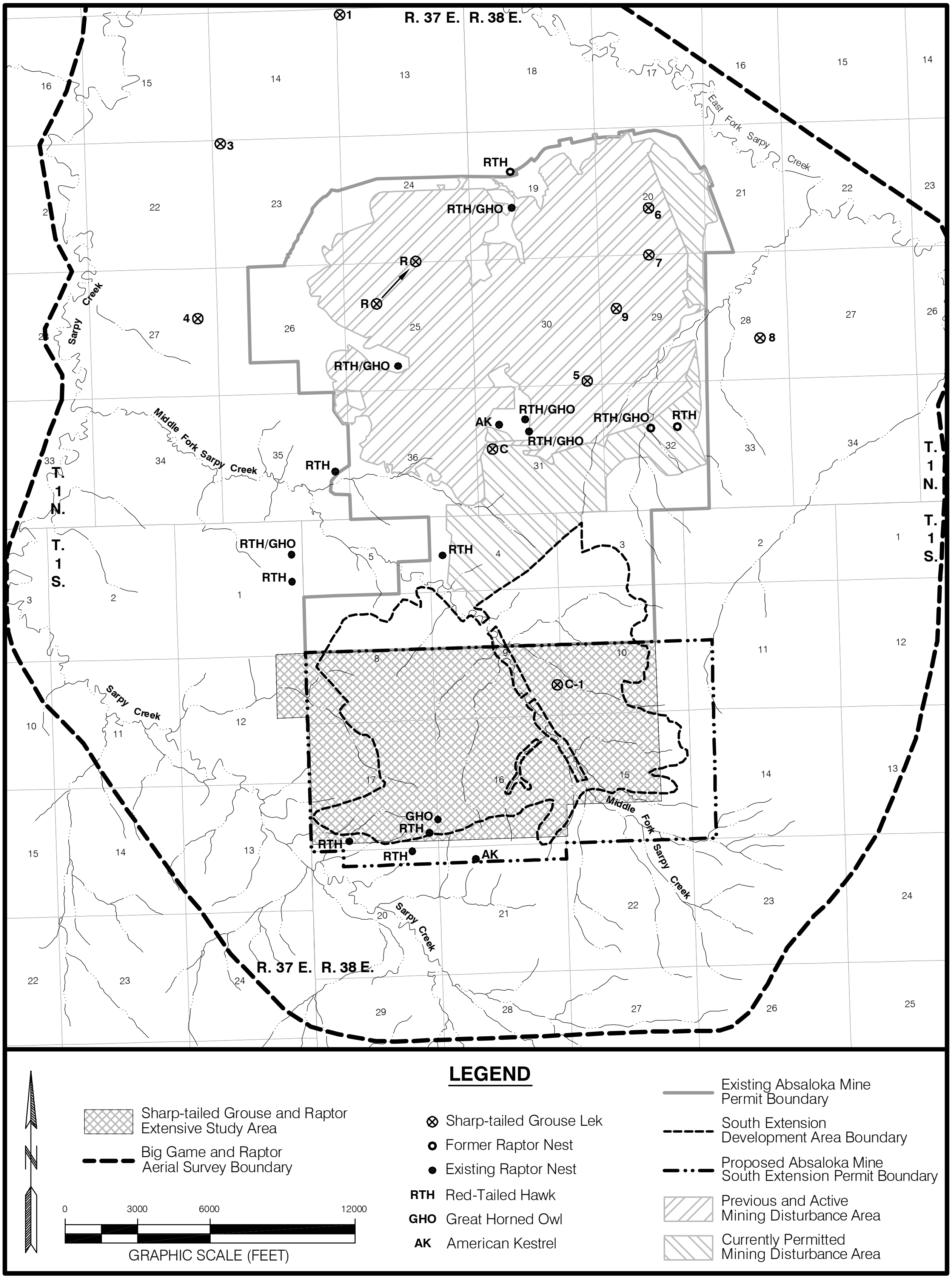


Figure 3-18. Raptor Nest Sites and Sharp-tailed Grouse Leks Within and Adjacent to the South Extension Development Area.

on cliffs, not a lack of hunting area, is likely the most important limiting factor within the South Extension development area.

No ferruginous hawk, northern goshawk, Swainson's hawk, and golden eagle nests have been documented in the Absaloka Mine and South Extension development area (Figure 3-18) and these raptors are seldom observed in the area; therefore, it is unlikely that the Proposed Action or Alternative 1 would have an adverse effect on these particular species of concern. No suitable nesting habitat is available in the proposed development area for either the burrowing owl or peregrine falcon (Appendix C); therefore, no adverse effect on either of these species of concern would occur under the Proposed Action or Alternative 1.

3.10.4.2.2 No Action Alternative

The impacts to raptor species under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.5 Upland Game Birds

3.10.5.1 Affected Environment

Four species of game birds have been observed in the Absaloka Mine area. These include sharp-tailed grouse, ring-necked pheasant, turkey, and gray partridge.

Sharp-tailed grouse are present year-round in the general Absaloka Mine area, using shrub and tree habitats for feeding and wintering, and shrub/grasslands for nesting. Eleven sharp-tailed grouse lek (strutting ground) locations have been identified in the past within or near the Absaloka Mine (Figure 3-18). The C-1 lek is the only historic sharp-tailed grouse dancing ground within the South Extension development area (WESTECH 2006d). The C-1 lek has not been active since at least 1985 (Table 3-15). This site and adjacent areas were rechecked in early May 2007, but no evidence of displaying sharp-tailed grouse (e.g., trampled ground, tracks, feathers, droppings) was found.

There were 13 sightings of ring-necked pheasant in the Absaloka Mine area during 2005 wildlife monitoring. Pheasants are a common species preferring riparian habitats in the general Absaloka Mine area (WESTECH 2006e).

A small population of gray (Hungarian) partridge has occupied the Absaloka Mine area in the past. Gray partridge were not observed on the wildlife study area in 2005 (WESTECH 2006e).

There were 23 sightings totaling 92 wild turkeys in 2005 in the Absaloka Mine area (WRI 2006e). The winter count of turkeys, which is usually determined during aerial surveys, is used to monitor the trend in the wild turkey population

Table 3-15. Peak Counts of Sharp-Tailed Grouse at Leks in the Vicinity of the Absaloka Mine, 1985-2007.

	Lek										
Year	**1**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**R**	**C**	**C-1**
1985	0[a]	4	0[b]	0	0	0	NO[h]	0	18	--	--
1986	0	3	0	0	0	0	NO	0	16	--	--
1987	0	2	0[c]	0	0	0	NO	0	13	--	--
1988	0[d]	5	0[e]	0	0	0	NO	0	19	--	--
1989	0	10	0	0	0	0	NO	0	13	--	--
1990	0	9	0	0	0	0	NO	0	11	--	--
1991	? [f]	13	0	0	0	0	NO	0	7	--	--
1992	3	12	0	0	0	0	NO	0	11	--	--
1993	3	0	0	0	0	0	NO	0	27	--	--
1994	0	0	0	0	0	0	NO	0	42	--	--
1995	0	0	0	0	3	0	NO	0	40	--	--
1996	0	0	3	0	2	0	NO	0	54	--	--
1997	0	0	0	0	0	0	NO	0	11	--	--
1998	0	0	0	0	2	0	NO	D	25	--	--
1999	0	0	0	0	1	0	NO	D	33	--	--
2000	? [f]	0	2	0	1	0	NO	D	35	--	--
2001	2	0	0	D[g]	0	0	9	D	15	21	--
2002	0	0	0	D	2	0	NO	D	10	12	--
2003	0	0	0	D	0	D	9	D	9	6	--
2004	3	0	0	D	D	D	8	D	11	8	--
2005	0	0	0	D	D	D	6	D	4	8	0[i]
2006	0	0	0	D	D	D	9	D	1	0	0
2007	0	0	0	D	D	D	9	D	15	D	0

[a] 2 males displaying within ½-mile on two occasions.
[b] 1 bird observed within ½-mile on one occasion.
[c] 2 males displaying within ½-mile on one occasion.
[d] 3 displaying males, 3 females within ½-mile on one occasion.
[e] 3 males displaying within ½-mile on one occasion.
[f] May have been active.
[g] D=Disturbed
[h] NO=Not observed
[i] Reportedly inactive “for many years”.

in the Absaloka Mine wildlife monitoring area. The trend in winter observations of turkey has been gradually declining since its peak in the early 1990s (WRI 2006e).

The only game bird designated as a species of concern that could potentially occur in the area is the greater sage-grouse. Sage-grouse are found in sagebrush and shrub-land habitat, and sagebrush is essential for sage-grouse during all seasons of the year. The greater sage-grouse is included on both the BLM’s list of Designated Sensitive Species for Montana and the Dakotas and the MTNHP’s list of animal species of concern potentially occurring in the area (Appendix C). Habitat preferable to sage-grouse is present but not common within the South

Extension development area. Sage-grouse have not been documented in the vicinity of the Absaloka Mine, and there are no sage-grouse strutting grounds within the South Extension development area.

3.10.5.2 Environmental Consequences

3.10.5.2.1 Proposed Action and Alternative 1

Mining within the South Extension development area would affect potential habitat for turkey, ring-necked pheasant, and gray partridge; however, the area does not provide unique habitat for these species. Mining the proposed development area would also affect potential habitat for sharp-tailed grouse. One historic sharp-tailed grouse lek (C-1) is located within the South Extension, although this lek has been inactive for many years. Sharp-tailed grouse adapt to reclaimed lands for nesting and breeding, if reclamation quickly follows mining (Yde and Waage 1996).

Although habitat exists in the area for the greater sage-grouse, it is not common. No sage-grouse have been observed on or adjacent to the Absaloka Mine since monitoring began in 1974; therefore, it is unlikely that the Proposed Action and Alternative 1 would have an adverse effect on this particular species of concern.

3.10.5.2.2 No Action Alternative

The impacts to upland game birds under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.6 Other Birds

3.10.6.1 Affected Environment

Waterfowl and shorebird use of the Absaloka Mine area is seasonal with greatest abundance and diversity occurring in the spring and fall. A variety of waterfowl have been observed on impoundments and along Sarpy Creek and Middle Fork Sarpy Creek in the Absaloka Mine area. Waterfowl tend to use these areas for foraging and loafing (WESTECH 2006d). The amount of use within the proposed development area is negligible due to the lack of reliable water sources and a limited amount of suitable habitat.

Waterfowl and shorebird species of concern that could potentially occur in the area include Franklin's gull, mountain plover, and long-billed curlew. These three species are on both the BLM's Designated Species list for Montana and Colorado and the MTNHP's list of animal species of concern potentially occurring in the area (Appendix C). Suitable habitat is not available for either the Franklin's gull or mountain plover and neither species has been recorded in the area. The long-billed curlew is the only one of these species that has suitable habitat and has been observed in the area, although it was not recorded in the South Extension in 2005 (WESTECH 2006b).

A total of 86 species of land birds have been identified within and adjacent to the proposed development area. Common species include the western meadowlark, vesper sparrow, Brewer's sparrow, chipping sparrow, lark bunting, red-winged blackbird, northern flicker, mourning dove, mountain bluebird, and black-billed magpie (WESTECH 2006d).

The passerine birds designated as animal species of concern that are on the BLM's Designated Sensitive Species list for Montana and Dakotas and/or the MTNHP list of animal species of concern that could potentially occur in the area include the dickcissel, loggerhead shrike, chestnut-collared longspur, McCown's longspur, sage thrasher, Baird's sparrow, Brewer's sparrow, red-headed woodpecker, yellow-billed cuckoo, Lewis' woodpecker, Cassin's kingbird, lark bunting, grasshopper sparrow, and grey-crowned rosy finch. The loggerhead shrike, chestnut-collared longspur, Brewer's sparrow, red-headed woodpecker, Lewis' woodpecker, Cassin's kingbird, and lark bunting have been observed in the area, but only the red-headed woodpecker, Brewer's sparrow, and lark bunting were recorded in the South Extension in 2005 (Appendix C).

3.10.6.2 Environmental Consequences

3.10.6.2.1 Proposed Action and Alternative 1

The existing habitat for avian species in the South Extension development area would be sequentially disturbed during mining. The habitat loss would be short term for grassland species, but would last longer for tree- and shrub-dependent species. Absaloka Mine's current reclamation practices are designed to provide a mosaic of upland grass and shrub habitats that would potentially host most of these species (refer to Section 3.9). 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 was less than on adjacent undisturbed areas, although their overall numbers were greater (Shelley 1992).

Mining the South Extension development area would have a negligible effect on migrating and breeding waterfowl and shorebirds, including those species of concern, due to the lack of reliable water sources and a limited amount of suitable habitat. Sedimentation ponds created during mining would provide interim habitat for these fauna. Absaloka Mine's tentative mine plan for the proposed development area would leave Middle Fork of Sarpy Creek intact. If the replaced functional wetlands on the proposed development area do not duplicate the exact function and/or landscape features of the premine wetlands, waterfowl and shorebirds could be beneficially or adversely affected as a result.

Displaced land birds and songbirds, including those species of concern, would have to compete for available adjacent territories and resources when their habitats are disturbed by mining operations. Where adjacent habitat is at carrying capacity, this competition would result in some mortality. Losses would also occur when habitat disturbance coincides with egg incubation and rearing of young. Concurrent reclamation would minimize these impacts. Habitat enhancement practices include the restoration of diverse landforms, direct topsoil redistribution, and the construction of brush piles, snags, and rock piles.

3.10.6.2.2 No Action Alternative

The impacts to other birds under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.7 Reptiles, Amphibians, and Aquatic Species

3.10.7.1 Affected Environment

Reptiles and amphibians identified in the South Extension development area include the bull snake, prairie rattlesnake, northern short-horned lizard, boreal chorus frog, Great Plains toad, Woodhouse toad, plains spadefoot toad, and tiger salamander (WESTECH 2006d).

Habitats that would support aquatic species are limited within the proposed development area or lands immediately adjacent to this area. Therefore, specific surveys for fish have not been conducted. The fathead minnow was the only fish species recorded in the vicinity of the South Extension during the 2004-2005 wildlife survey (WESTECH 2006d).

The amphibian, reptile, and aquatic species of concern that are on BLM's Designated Sensitive Species list for Montana and Dakotas and/or the MTNHP list of animal species of concern that could potentially occur in the area include the Great Plains toad, greater short-horned lizard, milk snake, northern leopard frog, plains spadefoot toad, snapping turtle, spiny softshell turtle, western hog-nosed snake, and sagebrush lizard (Appendix C). Habitat for the snapping turtle, Great Plains toad, and Northern Leopard frog is limited in the proposed development area. The western hog-nosed snake, northern leopard frog, sagebrush lizard, and snapping turtle have been observed in the Absaloka Mine area and adjacent lands, but none of these species were recorded in the South Extension development area during the 2004-2005 wildlife survey (WESTECH 2006d).

3.10.7.2 Environmental Consequences

3.10.7.2.1 Proposed Action and Alternative 1

Losses to amphibians, reptiles, and aquatic species would be higher than for most other wildlife, since the mobility of these species is limited, and many would generally not be able to avoid disturbance. Mining the South Extension development area would remove habitat for aquatic and amphibian species in small discrete portions of Middle Fork Sarpy Creek and sections of the ephemeral tributaries (refer to Section 3.5). Under natural conditions, habitat for aquatic and amphibian species is quite limited; however, as discussed above, a variety of aquatic, amphibian, and reptile species have been observed in the proposed development area and adjacent lands. Mining the South Extension development area would temporarily remove habitat for reptiles throughout the proposed development area.

Reclamation of the ephemeral stream channels and disturbed portions of Middle Fork Sarpy Creek would restore surface water flow quantity and quality after mining to approximate premining conditions, thus restoring the habitat areas important to the aquatic and amphibian species. Restoration of upland areas after mining to approximate premining conditions would restore habitats important to the amphibian and reptile species.

3.10.7.2.2 No Action Alternative

The impacts to reptile, amphibian, and aquatic species under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.8 Threatened, Endangered, Proposed and Candidate Animal Species, and Other Animal Species of Concern

3.10.8.1 Affected Environment

Special status animal species are those species for which federal or state agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species (species that are protected under the Endangered Species Act), BLM Sensitive Species, U.S. Forest Service Sensitive Species, and MTNHP Animal Species of Concern. Appendix C contains lists of animal species of concern and effect determinations for the Proposed Action. The USFWS list of T&E species for the State of Montana and the BLM list of designated sensitive species that are currently known to occur in the states of Montana and North and South Dakota are included in Appendix C, Tables C-1 and C-2, respectively. Table C-4 in Appendix C lists the animal species of concern potentially occurring or recorded in the habitats of the South Extension inventory area.

The MTNHP Animal Species of Concern are native Montana animals that are considered to be “at risk” due to declining population trends, threats to their habitats, and/or restricted distribution. These status determinations are made jointly by MRNHP and Montana Department of Fish, Wildlife, and Parks (MDFWP) biologists in consultation with representatives of the Montana Chapter of Wildlife Society, the Montana Chapter of American Fisheries Society and other experts.

Threatened and Endangered (T&E) species that could potentially occur in the area (Big Horn, Rosebud, and Treasure counties, Montana) include the least tern and black-footed ferret, both of which are designated as endangered (Appendix C). Suitable habitat for the least tern and black-footed ferret is not available on or near the South Extension development area (Appendix D). The bald eagle was removed from the USFWS list of T&E species June 28, 2007, but prior to that date it was the only listed T&E species that had been observed in the Absaloka Mine area.

Specific bald eagle surveys have not been conducted within the Absaloka Mine’s monitoring area, but the eagles were documented when observed. Other than occasionally flying over the area, bald eagles have not been associated with the proposed development area. The bald eagle is a common winter migrant but no bald eagle nests are located within 5 miles of the South Extension (WESTECH 2006d).

The preceding sections address individual groups of wildlife species. WESTECH (2006d) identified four mammals, 24 birds, six reptiles, three amphibians, and no fish that are species of concern that could potentially occur or have been recorded from 1975 through 2005 in the habitats of the South Extension development area and adjacent areas (Appendix C, Table C-4). Of these, habitat for four mammals, 16 birds, four reptiles, and one amphibian is available in the South Extension area. Of these, only four (red-headed woodpecker, Brewer’s sparrow, lark bunting, and grasshopper sparrow) were recorded in the wildlife study area in 2005. The red-headed woodpecker and lark bunting were considered uncommon breeders in appropriate habitat, while the Brewer’s sparrow and grasshopper sparrow were considered common. Since several more species of concern have been recorded in the adjacent Absaloka Mine/Tract III wildlife monitoring area, it is likely that more of these species could occur at least occasionally in the South Extension (WESTECH 2006d).

3.10.8.2 Environmental Consequences

3.10.8.2.1 Proposed Action and Alternative 1

USFWS does not anticipate impacts to any threatened, endangered, candidate, or proposed animal species or their identified critical habitats, and no further review under Section 7 of the ESA is necessary. A copy of the letter from the USFWS Montana Field Office to the BIA Rocky Mountain Regional Office stating that the

USFWS has reviewed the proposed development area and has acknowledged that the Proposed Action would have no effect on listed species in the area is included in Appendix D.

Species of concern are discussed in the preceding sections addressing individual groups of wildlife species.

3.10.8.2.2 No Action Alternative

The impacts to T&E species and other species of concern under the No Action Alternative would be similar to the impacts described in Section 3.10.1.2.2, above.

3.10.9 Regulatory Compliance, Mitigation and Monitoring

Regulatory guidelines and requirements are designed to prevent or reduce surface coal mining impacts to wildlife. Mitigation measures taken by the Absaloka Mine to minimize direct impacts to wildlife include:

- Fencing around the mine permit boundary designed to allow passage of wildlife to the extent possible, and fencing of roadways to restrict wildlife movement is not necessary;
- Obtaining a permit for removal of active raptor nests;
- Creation of nesting habitat through enhancement efforts (e.g., tree plantings);
- Reestablishment of the ground cover necessary for the return of a suitable raptor prey base after mining;
- Required use of raptor-safe power lines;
- Restoration of diverse habitat and wildlife habitat enhancement features such as the construction of ponds, brush piles, snags, and rock piles;
- Restoration of habitat provided by seasonal wetlands and small depressions;
- Reclamation of stream channels and restoration of surface water flow quantity and quality after mining to approximate premining conditions;
- Water impounded in sediment control structures is accessible to wildlife, but the sewage lagoon and water treatment lagoon are fenced to prevent wildlife access;
- Revegetation plan that creates a mosaic of habitats utilized by species common to the area, including tree and shrub plantings in suitable area;

- Access to livestock watering tanks in reclaimed areas; and

- Considerable forest edge habitat associated with undisturbed ponderosa pine stands bordering reclaimed areas is readily available.

WRI's current mining and reclamation permit requires that reclaimed ephemeral drainageways approximate the configuration of premine ephemeral drainageways, and that reclaimed drainageways blend with the existing drainage system above and below the area disturbed by mining related activities. The average gradient will exhibit a concave longitudinal profile. Restoration will be achieved by salvaging sufficient material from channel terrace alluvium to reconstruct naturally occurring features. Designated drainage soils will be utilized for wetland reconstruction. All of these listed mitigation measures would be included in the revised Absaloka Mine permit and the Crow Reservation South Extension Mine permit if the proposed development area is mined.

In compliance with state and federal regulations, wildlife monitoring surveys have been conducted in the Absaloka Mine area since the mid-1970s. The wildlife monitoring surveys cover the area included in the mine permit area and a perimeter beyond the permit area that varies in size according to the species being surveyed. As a result, a portion of the proposed development area has been surveyed as part of the required monitoring surveys for the Absaloka Mine.

The goals of Absaloka Mine's wildlife monitoring are to:

- Continue to document the presence/absence and status of species such as raptors that may be governed by separate federal laws or regulations;

- Continue to collect information on the relationship of big game and upland game to mined and reclaimed areas; and

- Provide information to support final bond release applications.

Absaloka Mine's annual wildlife monitoring program includes:

- Species/habitat occurrence: all vertebrate wildlife species, or their evidence, will be recorded by the habitat in which they are observed;

- Species of special concern: the location of any observation of any vertebrate species on the current list of Montana Animal Species of Concern (MTNHP 2007) will be mapped and recorded by the habitat in which it is observed. Appropriate forms will be completed and submitted to MTNHP;

- Big game winter distribution and minimum numbers: big game (mule deer, white-tailed deer, pronghorn, elk) winter distribution and minimum numbers will be counted during two aerial surveys flown during winter;

- Raptors: all observations of raptors will be mapped and recorded by the habitat in which they are observed. Territorial owls will be surveyed during late winter / early spring by listening for displaying birds. The raptor nest survey area, identified in previous monitoring reports, will be surveyed for territorial species, stick nests or other evidence of nesting each spring;

- Sharp-tailed grouse: lek surveys will be conducted in spring with each active lek surveyed at least three times from late March through mid-May;

- Landbirds: in areas proposed for phase III bond release, landbird diversities will be monitored during late-May through June of the same year that vegetation is sampled;

- Waterfowl and shorebirds: use of ponds, particularly reclamation ponds, will be recorded when observed, primarily during regular pond surveys;

- Reptiles and amphibians: as with other vertebrate species, all reptiles will be recorded by the habitat in which they are observed. Amphibian use of ponds, particularly reclamation ponds, will be monitored in spring/early summer;

- Small mammals: small mammals have been monitored in reclaimed and unmined habitats for many years. Monitoring has documented the trend in small mammal occupancy of habitats following reclamation. WRI will summarize this information and submit it to the regulatory authority for review; and

- Bats: use of water developments (e.g., ponds and springs) will be sampled annually, with at least one site sampled per year.

These monitoring measures would be included in the revised Absaloka Mine permit and Crow Reservation South Extension Mine permit, if the proposed development area is mined.

3.11 Land Use and Recreation

3.11.1 Affected Environment

The surface of the Tract III Revision area is owned by WRI, and the surface of the South Extension is owned by the Crow Tribe (32 percent), allotted Indian owners (14 percent), and non-Indian fee owners (54 percent). Surface ownership for the proposed development area is shown on Figure 3-19. All trust surface estate (Tribal acres and individual allotted acres) within the Crow Reservation South Extension tract is currently leased for agricultural uses. Through its IMDA lease agreement for the South Extension, WRI has the right of surface use for mining on Tribal lands. WRI has negotiated surface use agreements with allotted Indian

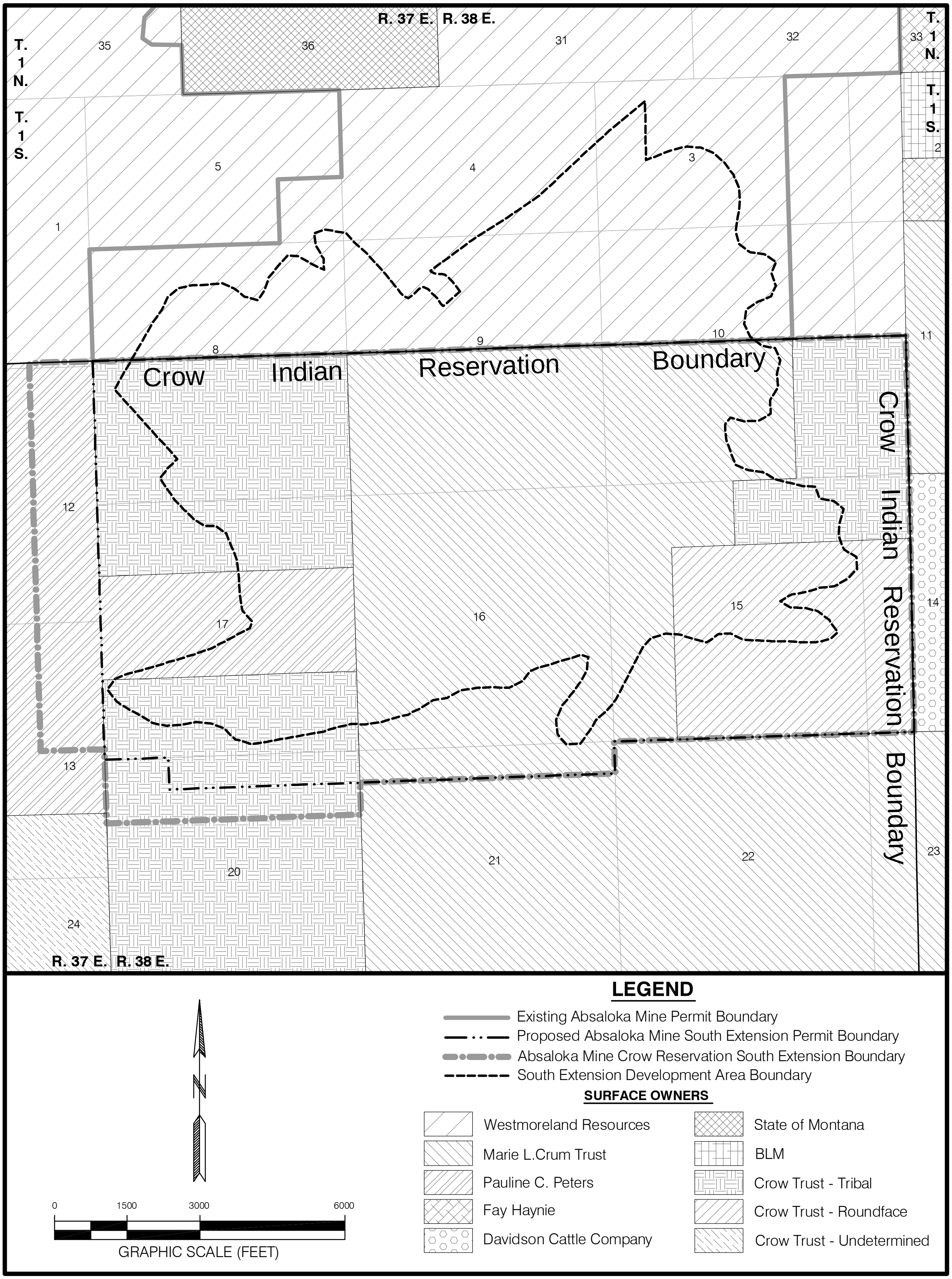


Figure 3-19. Surface Ownership Within and Adjacent to the South Extension Development Area.

owners and the largest fee surface owner, and negotiation with the remaining fee surface owner is in progress.

Areas of disturbance within and near the proposed development area are generally associated with roads, surface mine-related facilities, and ranching operations.

Premining land use within the Absaloka Mine area, including the proposed development area, includes grazing land, pastureland (for grazing or occasional hay production), cropland (primarily dryland alfalfa and small grains) and associated land use support facilities such as building complexes, stock reservoirs, and roads. Potentially harvestable stands of ponderosa pine are not presently managed for timber production, but logging in the general area has increased in recent years as availability of timber from national forests has declined. A variety of commonly occurring wildlife species utilize the area.

Grazing land for livestock is the primary land use in the mine area, with essentially all native plant communities used for that purpose. Condition class of identified range sites, as determined from vegetation sampling data, ranged from poor to excellent with typical conditions of fair to good. Livestock grazing capacities range between 0.05 animal unit month (AUM) per acre on the poorest shale upland sites and 1.43 AUMs per acre on highly productive subirrigated and wet meadow sites, with an overall recommended stocking rate of 0.3 AUM per acre. Portions of the South Extension development area would be fenced to limit access to the disturbance areas.

Pastureland provides forage for livestock grazing or occasional hay production. Pastureland was generally established by seeding introduced perennial grasses on low capability cropland. Because pastureland is dominated by cool season, introduced grasses (primarily crested wheatgrass), such areas are typically utilized as spring pasture.

Cultivation was a major requirement to convert homestead claims to patents when the area was settled in the 1910s. Much of the acreage that was originally cultivated in the area was marginally suited, or unsuitable, for sustained dryland crop production. Capabilities of soil types in the area are principally limited by erosion potential, exacerbated by unpredictable precipitation.

Ponderosa pine is the only tree species that exists in harvestable quantities in the area. Local timber was used extensively for building material during the settlement period in the 1910s. Timber harvest was conducted where ponderosa pine occurred in sufficient volume and density. The result is that the majority of ponderosa pine in the area date to the time of settlement and are less than 100 years old.

Due to the dry climate, ponderosa pine stands in the area are not highly productive and are not managed as commercial forests. Based on 1991 volume estimates, the predicted annual timber production rate in the area is 17.9 cubic feet/acre/year (WRI 2003). Due to the slow growth rate, the wood is typically knotty and of relatively poor quality. Historically, interest in logging was minimal, and harvested logs were sawn to rough lumber for use in constructing corrals, sheds and similar facilities to support livestock production. More recently, however, with sharply reduced logging opportunities on the national forests, interest in logging these marginal sites has been much higher and has provided significant supplemental income for landowners while at the same time increasing grazing capacities. Since the early to mid-1990s, extensive logging has occurred or is contracted on private lands in the Sarpy Creek area. Still, because of the slow growth rates, ponderosa pine stands are managed primarily as grazing land.

The Crow Tribe owns all minerals within the South Extension development area. The federal government, through the BIA, holds these minerals in trust for the Tribe. The coal within the Tract III Revision area (Alternative 1) is currently leased by WRI. The approval of the lease of coal within the South Extension within the Crow Reservation is the subject of this document. There are no valid oil and gas leases within the South Extension development area at this time.

3.11.2 Environmental Consequences

3.11.2.1 Proposed Action and Alternative 1

The major adverse environmental consequences on land use as a result of leasing and mining the proposed development area would be the temporary reduction of livestock (cattle) grazing and crop production, incremental loss of wildlife habitat (particularly big game) while the area is being mined and reclaimed, and alteration of wildlife habitat after reclamation. Livestock grazing, and to a lesser extent wildlife use, would be displaced while the area is being mined and reclaimed. Access for ranching and other (i.e., recreational) activities would be restricted during mining operations. There are no public surface lands within the proposed development area under the Proposed Action or Alternative 1. The loss of accessibility to lands within the area is long term (during mining and reclamation), but is not permanent. Estimated disturbance areas for the Proposed Action and Alternative 1 configurations are presented in Table 3-1.

Oil and gas (conventional and CBNG) development is not occurring on or adjacent to the proposed development area. No mineral leasing/mining conflicts have been identified within the proposed development area.

WRI is in the process of negotiating surface use agreements for the fee lands within the South Extension. Current lessees of trust land within the proposed development area will be displaced while the coal is being mined and during reclamation.

The northern portion of the South Extension development area is within big game Hunting District (HD) 702 (Yellowstone Pine Hills). The southern portion of the proposed development area is within the Crow Reservation. Unless otherwise provided for in agreements between the State of Montana and the Crow Tribe, big game hunting within the Crow Reservation boundary is limited to tribal members only (MFWP 2006). Hunting on the proposed development area would not occur during mining and reclamation.

Following reclamation, the land would be suitable for grazing by domestic livestock or occasional hay production (i.e., grazing land and pasture land), which are the historic land uses. The reclamation standards required by the federal Surface Mining Control and Reclamation Act of 1977 (SMCRA) and Montana State Law meet the standards and guidelines for healthy rangelands.

3.11.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to land use and recreation described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would affect portions of the proposed development area only to the extent permitted under the current mining and reclamation plan.

3.11.3 Regulatory Compliance, Mitigation and Monitoring

Mined areas would be reclaimed as specified in the approved mining and reclamation plan to support the anticipated post-mining land uses of grazing land, pasture land, and crop land, which are premining land uses. The reclamation procedures would include stockpiling and redistributing soil, using reclamation seed mixtures approved by MDEQ/OSM, and replacing stock water sources. Reclamation success criteria for bond release would include productivity standards to demonstrate reestablishment of land uses similar to premining conditions.

Steps to control invasion by weedy plant species (Category I or Category II noxious weeds) are described in Section 3.9.5.

3.11.4 Residual Impacts

No residual impacts to land use and recreation are expected.

3.12 Cultural Resources

3.12.1 Affected Environment

Cultural resources, which are protected under the National Historic Preservation Act of 1966 as amended, are defined as the nonrenewable, physical remains of past human activity generally inclusive of all manifestations more than 50 years old. Cultural resources can be classified as artifacts, features, sites, districts, or landscapes. The goal of cultural resource management is conservation of archaeological and historical remains and information for research, public interpretation and enjoyment, and for appreciation by future generations.

Several culture chronologies are pertinent to evaluating occupations from early to late periods. Frison's (1978, 1991) chronology for the Northwestern Plains divides occupations from early to late periods as follows:

- Paleoindian period (13,000 to 7,000 years B.P.)
- Early Archaic period (7,000 to 5,000-4,500 years B.P.)
- Middle Archaic period (5,000-4,500 to 3,000 years B.P.)
- Late Archaic period (3,000 to 1,850 years B.P.)
- Late Prehistoric period (1,850 to 400 years B.P.)
- Protohistoric period (400 to 250 years B.P.)
- Historic period (250 to 120 years B.P.)

The proposed development area is located in the Pine Breaks region. The Pine Breaks extend roughly from the Musselshell River in central Montana southeastward to the western foothills of the Black Hills. The Pine Breaks area is distinguished from neighboring areas on the plains by its more rugged topography, a relatively abundant fuel and water supply, and by its more diverse ecology, which provides a variety of opportunities for resource procurement (Fredlund 1981).

The Pine Breaks region is known to contain cultural remains spanning the past 9,000 years (Brumley and Dickerson 2000). 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 periods to the Late Prehistoric period. The Protohistoric period refers to the post-European contact period, marked by the acquisition of iron, firearms, and horses among the Plains Indians, some time around A.D. 1700. Throughout the prehistoric past, the area was used by highly mobile hunters and gatherers who exploited a wide variety of resources.

Prehistoric site types common to the region include campsites, rockshelters, rock structures (i.e., eagle trapping pits, hunting blinds, vision quests, or fortification structures), lithic quarries, stone (tipi) rings, stone cairns, stone alignments, ceramic remains, rock art, bison processing areas, and lithic reduction areas.

Historic cultural resources identified in the vicinity of the proposed development area include homesteads, ranches, and refuse dumps.

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 at one site in the study area. Also found in the area are numerous high quality lithic sources that drew prehistoric people into the local area. There is a relatively high frequency of porcellanite rock quarries and extensive lithic reduction sites in the region. Porcellanite occurs within certain scoria deposits and it 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 80 percent or more of the material represented. 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.

A summary of archaeological investigations completed at the Absaloka Mine is included in Appendix E. The existing baseline cultural resource studies exceed the Data Adequacy Standards that require a Class I (literature and records search) and a Class II (sample survey) level of evaluation of 10 percent as sufficient for planning purposes. The South Extension development area has received a Class III (intensive and comprehensive inventory) level of evaluation. The goal of the Class III survey is to locate and evaluate for the National Register of Historical Places (NRHP) all cultural resources within the project area. WRI contracted with GCM, Inc. of Butte, Montana to perform Class III surveys of the Tract III Revision area and the South Extension in 2004 and 2005. The cultural resource survey area is comprised of two separate surveys that were conducted in 2004 covering the Tract III Revision area (Meyer 2004, Meyer and Munson 2004), and a third survey that was conducted in 2005 covering the South Extension (Meyer and Ferguson 2005). On the South Extension area, GCM personnel were assisted by a Crow Tribal Historic Preservation Office (THPO) representative.

A total of 62 cultural sites were documented in the three survey areas. Of the 62 cultural sites, 46 are prehistoric, seven are historic, seven are multi-component, one is a cairn of unknown age, and one is a rock shelter of unknown age. Prehistoric components were classified into six types based on the cultural remains that were found: camp, kill, lithic scatter, material testing locations, porcellanite sources, and combination lithic/groundstone scatter. The historic component types included three abandoned homesteads and three historic graffiti panels.

Forty-one of the 62 sites have been evaluated for NRHP eligibility by the cultural site recorder, and nine of the evaluated sites in the three survey areas are recommended as eligible. Twenty-one sites would need further investigation prior to evaluation for NRHP eligibility, none of these would be affected by mining disturbances associated with the Proposed Action or Alternative 1. Table 3-16 summarizes the number of cultural resource sites identified within the three Class III cultural resource survey areas, and the status of those sites with respect to NRHP evaluation and eligibility.

Table 3-16. Cultural Resource Sites Associated With the Entire Survey Area and the South Extension Development Area.

Sites Associated With the Entire Cultural Resource Survey Area	Survey Area: Tract III South	Survey Area: Tract III South Addendum	Survey Area: South Extension	Total
Number of Sites Within Survey Area	35	2	25	62
Number of Sites Evaluated for NRHP	19	2	20	41
Number of Sites Not Evaluated for NRHP	16	0	5	21
Number of Sites Recommended Eligible for NRHP thus far	4	0	5	9
Number of NRHP Sites Currently Mitigated	1	--	0	1
Sites Associated With the South Extension Development Area				
Number of Sites Within Proposed Development Area	11	0	19	30
Number of Sites Not Evaluated for NRHP Within Proposed Development Area Under the Proposed Action	0	0	0	0
Number of Sites Not Evaluated for NRHP Within Proposed Development Area Under Alternative 1	0	0	0	0
Number of Sites Recommended Eligible for NRHP Within Proposed Development Area Under the Proposed Action	3	0	5	8
Number of Ineligible Sites Within Proposed Development Area Under Proposed Action	8	0	14	22
Number of Sites Recommended Eligible for NRHP Within Proposed Development Area Under Alternative 1	0	0	0	0
Number of Ineligible Sites Within Proposed Development Area Under Alternative 1	6	0	0	6

Traditional Cultural Properties (TCPs) are defined by King (1998) as "a district, site, building, structure, or object that is valued by a human community for the role it plays in sustaining the community's cultural heritage. Generally a place that figures in important community traditions or in culturally important activities." TCPs can be prehistoric or historic in age and can be associated with any ethnic group, but are usually associated with Native American or other minority groups. Some may be presently in use as offering sites, fasting or vision quest sites. Other sites of cultural interest and importance may include certain stone features, fortifications, battle sites, or burials. Locations that have no manmade features but are considered sacred or part of the oral history and heritage may also qualify as TCPs. No sites were found within the three survey areas that are classified as a TCP.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action and Alternative 1

Data recovery plans are required and would be prepared for any sites recommended eligible to the NRHP. Such plans would be drafted in consultation with Crow THPO, the Montana State Historic Preservation Office (SHPO) and the BIA. Any other tribes who have expressed an interest in these sites would also be consulted when preparing plans. Until consultation with SHPO has occurred and agreement regarding NRHP eligibility has been reached, all sites would be protected from disturbance.

Disturbance associated with the Proposed Action would impact 30 cultural sites, whereas disturbance associated with Alternative 1 would disturb six cultural sites. All cultural sites within the entire South Extension development area (the entire proposed disturbance area) have been evaluated for NRHP eligibility. Eight sites recommended eligible to the NRHP would be impacted by disturbance associated with the Proposed Action, and no NRHP eligible sites would be impacted by disturbance associated with Alternative 1. One of the eight NRHP eligible sites has been mitigated.

Specific testing and mitigation measures vary widely depending upon the characteristics of each site. Several of the eligible sites in the area are quite sparse and are located in deflated upland environments, while others are large and complex with areas of soil development that may harbor subsurface components.

Full consultation with SHPO and Crow THPO must be completed prior to revisions to and/or approval of a mine permit according to SMCRA and Montana State Law. At that time, those sites determined to be unevaluated or eligible for the NRHP through consultation would receive further protection or treatment. Impacts to eligible or unevaluated cultural resources cannot be permitted without mitigation or evaluation. If unevaluated sites cannot be avoided, they must be evaluated prior to disturbance. If eligible sites cannot be avoided, a data recovery plan must be implemented prior to disturbance. Ineligible properties may be destroyed without further work.

WRI submitted an archeological data recovery plan that was approved by MDEQ, OSM, and SHPO in 2003. Potential adverse effects to known cultural sites and incidental discoveries that could occur over the life of the existing mine permit were addressed in the Memorandum of Agreement (MOA). Adherence to this MOA will be specifically stipulated in any permit revision/application. The MOA would cover cultural sites within the current Absaloka Mine permit boundary that are recommended eligible to the NRHP. A new MOA between BIA, THPO, SHPO, OSM, and WRI would be formulated to cover eligible sites within the portion of the proposed development area in the Crow Indian Reservation if the South Extension development plan is permitted.

3.12.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to cultural resources described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would affect portions of the proposed development area only to the extent permitted under the current mining and reclamation plan.

3.12.3 Native American Consultation

BIA and MDEQ are conducting Native American consultation and coordination on the South Extension development plan as part of the NEPA and MEPA environmental analyses required for this EIS. This consultation is also required pursuant to the National Historic Preservation Act, Archaeological Resources Protection Act, and American Indian Religious Freedom Act.

Native American heritage sites, or traditional cultural properties, can be classified as prehistoric or historic. Some may be presently in use as offering, fasting, or vision quest sites. Other sites of cultural interest and importance may include rock art, stone (teepee) rings, various rock features, fortifications or battle sites, burials, and locations that are sacred or part of the oral history and heritage but have no man-made features.

Because this proposed project is located in traditional Crow territory and a portion of the project is within the boundaries of the Crow Indian Reservation, Crow tribal representatives participated in the cultural resource inventory and site evaluations. The Crow Tribe will continue to be consulted as mitigation plans are developed. Other tribes that have been identified as potentially having concerns about actions at the Absaloka Mine include the Blackfeet, Gros Ventre-Assiniboine, Assiniboine-Sioux, Chippewa-Cree, Northern Cheyenne, and Arapaho-Shoshone. These tribal governments and representatives have been sent copies of the EIS. They will also be provided with more specific information about the known cultural sites on the tract in this analysis, if requested. Their help is being requested in identifying potentially significant religious or cultural sites in the proposed development area before approval of WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract.

Based on recent cultural resource inventories and site evaluations (Section 3.12.1) that were conducted with the assistance of Crow tribal representatives, no Native American heritage, traditional cultural, special interest, or sacred sites have been formally identified and recorded to date within the proposed development area. However, the geographic position of the general analysis area between mountains considered sacred by various Native American cultures (e.g., the Bighorn Mountains to the southwest, and the Black Hills and Devil's Tower to the southeast) creates the possibility that existing locations may have special religious or sacred significance to Native American groups. Well-known sites offer some indication of the types of places valued by the Plains horse cultures in the historic period. Any identification of sacred or traditional localities must be verified in consultation with authorized tribal representatives and appropriate action must be taken to address concerns related to those sites if such sites or localities are identified at a later date.

3.12.4 Regulatory Compliance, Mitigation and Monitoring

At the time an individual project is permitted, the development activities considered would be subject to the following regulations relative to cultural resources. Section 106 of the National Historic Preservation Act of 1966 as amended, its implementing regulations, including but not limited to 36 CFR 800, 36 CFR 61, Executive Order 11593, and NEPA and its implementing regulations, including 40 CFR 1500 - 1508, provide the legal environment for documentation, evaluation, and protection of historic properties (i.e., cultural resources eligible for inclusion on the NRHP) that may be affected by development activities. In cases of split estate, surface resources such as cultural sites belong to the surface owner. The surface owner must be consulted about investigation, mitigation, or monitoring.

Class I, II and III surveys are conducted to identify cultural properties on all lands affected by federal undertakings or with federal oversight. Prior to any mining disturbance, SHPO and THPO are consulted to evaluate the eligibility of the cultural properties for inclusion in the NRHP. Cultural properties that are determined to be eligible for the NRHP would be avoided or, if avoidance is not possible, a data recovery plan would be implemented prior to disturbance.

If WRI's IMDA lease agreement with the Crow Tribe for the South Extension tract is approved, and the South Extension development plan is approved, a stipulation would be added to the mining permit requiring WRI to notify appropriate federal and tribal personnel if previously unidentified cultural materials are inadvertently uncovered during mining operations.

3.12.5 Residual Impacts

Cultural sites that are determined to be eligible for the NRHP would be avoided if possible. Eligible sites that cannot be avoided could be removed by surface coal mining after data from those sites are recovered. Sites that are not eligible for the NRHP would be removed without conducting additional data recovery.

3.13 Visual Resources

3.13.1 Affected Environment

Visual sensitivity levels are determined by people's concern for what they see and the frequency of travel through the area. Landscapes within the general Absaloka Mine and Sarpy Creek area include moderately rugged areas of pine-covered ridges bordering open stream valleys of gentle slope. The dissected hills, plateaus, and ridges of moderate to low relief were formed by drainages cutting into near-flat lying sedimentary strata. Resistant sandstone and clinker beds cap most of the upland areas and form steep cliff escarpments and isolated knobs at the highest elevations. Relatively small, isolated, semi-mountainous areas, such as the nearby Little Wolf and Sarpy Mountains, are scattered throughout southeastern Montana. The natural vegetation is predominated by rolling grassland, shrub/grassland, and scattered ponderosa pine stands. A significant portion of the area has been impacted by agricultural activities, particularly cultivation, within many portions of the open stream valleys. There are also areas of altered landscape, such as surface coal mining and ranching activities (e.g., ranch buildings, fences, older homesteads, and livestock), transportation facilities (roads and railroads), environmental monitoring installations, road signage, and electrical power transmission lines.

The natural scenic quality in and near the immediate proposed development area is fairly high due to its relatively remote location, and the natural character of the landscape has not been materially altered. Relatively few activities that attract visual attention are evident in the proposed development area despite the fact that it is adjacent to an existing mining operation. The Middle Fork Sarpy Creek valley is separated from the Absaloka Mine by a low ridgeline and from the valley, mining operations cannot be seen.

3.13.2 Environmental Consequences

3.13.2.1 Proposed Action and Alternative 1

The Absaloka Mine facilities and mining activities are not visible from Montana Highway 384, a paved road providing access to Hardin, Montana, which lies about 30 miles west of the mine. Under the currently approved mine plan, mining has not approached this public road and is not visible to passers-by. The relocated Sarpy Basin Road runs along the northern boundary of the current mining operations. Under the currently approved mine plan, mining has approached this public road and is visible to passers-by. The proposed development area is located over 2.5 miles from these two public roads and is not visible to the general public from either of these roads. Most of the traffic on Highway 384 is associated with the Absaloka Mine and the local ranching community. Landscapes found within and adjacent to the Absaloka Mine area, and visible from Highway 384 and the Sarpy Basin Road, include moderately rugged, ponderosa pine-covered ridges separated from gently sloping stream valleys by grass- and shrub-covered slopes. Many of the larger stream valleys are predominated by agricultural development such as hay and cropland. Major man-made intrusions include ranching facilities, transportation facilities, fencing, electrical power lines, and existing mine related activities and facilities. A local cafe (Spring Creek Cafe), fire hall, and mobile home park are located near the intersection of the Sarpy Basin Road and Highway 384 (Figure 3-8). No visual resources that are unique to this area have been identified on or near the proposed development area.

Reclaimed terrain would be almost indistinguishable from the surrounding undisturbed terrain. Slopes might appear smoother (less intricately dissected) and gentler (less steep) than undisturbed terrain and shrubs 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.

3.13.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated potential impacts to visual resources described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would be confined to portions of the proposed development area that will be affected under the current mining and reclamation plan.

3.13.3 Regulatory Compliance, Mitigation and Monitoring

Landscape character would be restored during reclamation to approximate original contour and would be seeded with an approved seed mixture of native species, except for cropland and pastureland areas.

Refer to Sections 3.2 and 3.9 for additional discussion of the regulatory requirements, mitigation, and monitoring for topography and vegetation.

3.13.4 Residual Impacts

No residual impacts to visual resources are expected.

3.14 Noise

3.14.1 Affected Environment

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 U.S. for the measurement of community and transportation noises. Figure 3-20 shows A-weighted decibel (dBA) readings for some typical sounds commonly heard in daily life.

Existing noise sources in the South Extension development area are coal mining activities, agricultural activities, and traffic on Montana Highway 384 and the Sarpy Basin Road on calm days. Montana Highway 384 and the Sarpy Basin Road are over 2.5 miles from the proposed development area. The public highway is the primary route to and from work for the mine employees and is also used by large semi-trailer trucks transporting coal from the Absaloka Mine to the Hardin Generating Station just north of Hardin. Traffic on Highway 384 is heaviest during the daylight hours and at mine shift changes.

No site-specific noise level data are available for the proposed development area. OSM has determined that the noise level from coal crushers and a conveyor would not exceed 45 dBA at a distance of 1,500 feet. The air overpressure created by blasting is estimated to be 123 dBA at the location of the blast. At a distance of approximately 2,500 feet, the intensity of this blast would be reduced to 55 dBA. A noise level below 55 dBA does not constitute an adverse impact (OSM 1980).

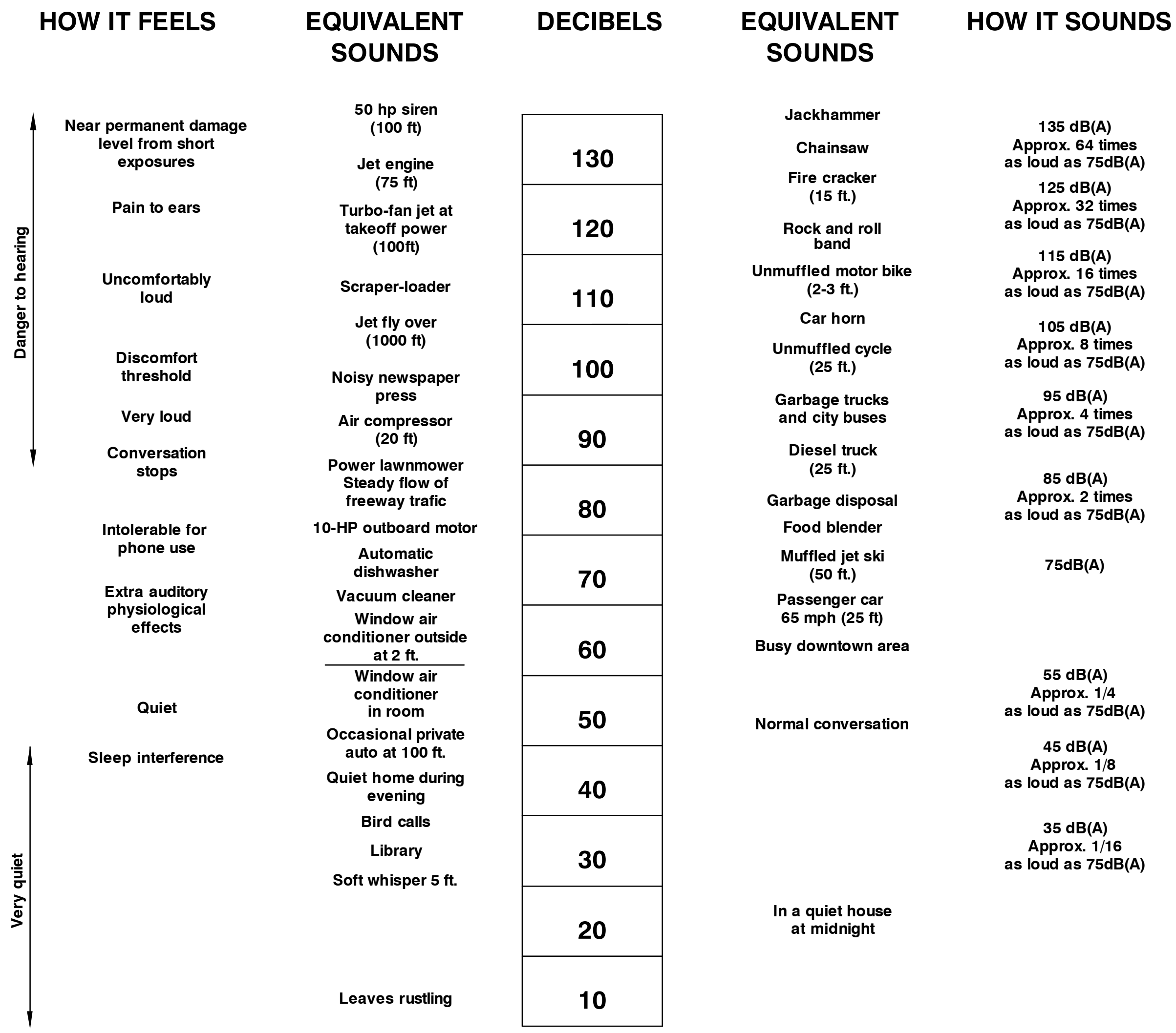
Based on 2005 activity levels at the Absaloka Mine, blasting frequency in the South Extension development area is estimated to average 1.3 blasts (coal and overburden combined) per day (Bison Engineering 2007).

The nearest occupied dwellings in the vicinity of the proposed development area include two residences that are located within the boundary of the South Extension development area. The next closest occupied dwelling to the proposed development area is a single residence that is located more than 6,000 feet from the proposed development area. Figure 3-8 depicts the locations of occupied residences and public facilities with respect to the South Extension development area.

3.14.2 Environmental Consequences

3.14.2.1 Proposed Action and Alternative 1

Noise levels in the proposed development area would be increased by mining activities such as blasting, loading, hauling, regrading, and reclamation activities. Since the South Extension development area would be mined as an extension of existing operations under the Proposed Action or Alternative 1, no rail car loading



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

Figure 3-20. Relationship Between A-Scale Decibel Readings and Sounds of Daily Life.

would take place on the area. The Noise Control Act of 1972 indicates that a 24-hour equivalent level of less than 70 dBA prevents hearing loss, and that a level below 55 dBA, in general, does not constitute an adverse impact.

The nearest public facilities are the Spring Creek Café and a community Fire Hall that is located close to the café. The nearest occupied dwellings are two residences located within the proposed development area. The residents of these two dwellings would relocate if the South Extension development plan is permitted. Therefore, noise impacts at these two occupied dwellings are not considered in this analysis. There would be no adverse noise impacts since mining activities (particularly blasting) would occur nearly 5 miles from the nearest public facilities and over a mile from the closest occupied dwelling under either the Proposed Action or Alternative 1.

Because mining is already ongoing in the area, noise impacts would not be noticeably different than existing conditions off-site. Wildlife in the immediate vicinity of mining may be adversely affected by the noise of the mining operations. Anecdotal observations at the Absaloka Mine and other surface coal mines in the PRB suggest that some wildlife adapt to increased noise associated with coal mining activity. Blasting will have no effect on fisheries since habitats that would support fish populations are very limited within the proposed development area or lands immediately adjacent to this area. There are no game fish or aquatic species of concern within the proposed development area or lands immediately adjacent to this area. After mining and reclamation are completed, noise would return to premining levels.

3.14.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. Absaloka Mine's currently approved mining operations and the associated noise impacts described above would continue as permitted until about 2009. Noise impacts related to mining operations at the Absaloka Mine would affect portions of the proposed development area only to the extent permitted under the current mining and reclamation plan.

3.14.3 Regulatory Compliance, Mitigation and Monitoring

Mine operators are required to comply with the Federal Mine Safety and Health Act of 1977 (MSHA) regulations concerning noise, which include protecting employees from hearing loss associated with noise levels at the mines. MSHA periodically conducts mine inspections to ensure compliance with the requirements of MSHA.

Blasting would be conducted in accordance with ARM 17.24.624 and 30 CFR 816.61. These administrative rules were established to minimize adverse effects including property damage or safety hazards resulting from blasting.

3.14.4 Residual Impacts

No residual impacts to noise resources are expected.

3.15 Transportation Facilities

3.15.1 Affected Environment

There are no primary transportation systems in the South Extension development area. Nearby transportation facilities include Montana Highway 384, Sarpy Basin Road, Sarpy Creek Road, a railroad spur, which is owned by Burlington Northern Santa Fe (BNSF) Railway, the Absaloka Mine's railroad loop, which is owned by WRI and used by BNSF, several improved and unimproved local roads and accesses, and numerous two-track trails. Montana Highway 384 is a paved highway, while all other improved roads in the area are gravel surfaced county roads. There are also power/utility lines and associated rights-of-way (ROWs) into the mine and local residences. Figure 3-8 depicts the current transportation facilities within and near the proposed development area.

3.15.2 Environmental Consequences

3.15.2.1 Proposed Action and Alternative 1

A majority of the coal mined on the South Extension development area would be transported to utilities in the Upper Midwest region of the United States, particularly in Minnesota, Wisconsin, and Michigan, by rail. Since the proposed development area would be an extension of the existing Absaloka Mine operations, the existing rail infrastructure would be used during mining of the Tract III Revision area and South Extension. BNSF has upgraded and will continue to upgrade its rail capacities to handle the increasing coal volume projected for the PRB (BNSF 2007), with or without BIA's approval of the South Extension tract lease and the regulatory agencies' approval of the mine permits for the South Extension development plan.

Approximately 1,600 tons per day of coal from the Absaloka Mine are currently transported to the Hardin Generating Station located just north of Hardin via Montana Highway 384. This equates to approximately 40 trucks per day traveling a round trip from the mine facilities area via Sarpy Basin Road and Highway 384 to the power plant and back (Figure 3-8). The amount of coal transported daily to the power plant would not change as a result of mining the proposed development area; however, mining the proposed development area under the Proposed Action and Alternative 1 would likely extend the impacts of semi-trailer trucks hauling coal to the Hardin Generating Station by 3 to 12 years, depending on which alternative is selected.

The Proposed Action and Alternative 1 would impact no pipelines or power/utility transmission lines. Utility services (power and telephone) to the residences that are presently located within the proposed development area would be removed upon approval of the mine permits for the South Extension development plan.

3.15.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal would not occur within either the Tract III Revision area or the South Extension. Currently approved mining operations and the associated potential impacts to transportation facilities described above would continue until about 2009. Impacts related to mining operations at the Absaloka Mine would affect portions of the proposed development area only to the extent permitted under the current mining and reclamation plan.

3.15.3 Regulatory Compliance, Mitigation and Monitoring

The regulatory requirements regarding transportation facilities require that existing pipelines and utility lines be relocated, if necessary, in accordance with specific agreements between the coal lessee and the pipeline and utility owners. There are no non-mine related pipelines within the proposed development area. Mid-Yellowstone Electric Cooperative and Range Telephone Cooperative own the utility distribution lines that service the residences that are presently located within the proposed development area.

3.15.4 Residual Impacts

No residual impacts to transportation facilities are expected.

3.16 Hazardous and Solid Waste

3.16.1 Affected Environment

Wastes produced by current mining activities at the Absaloka Mine and how they are handled according to the procedures described in the approved mine permit (WRI 2003) are addressed in Chapter 2, Section 2.6. Under the Proposed Action and Alternative 1, the procedures and requirements for handling hazardous and solid wastes would be the same as the procedures and requirements for the existing mining operation and in accordance with MDEQ/OSM-approved waste disposal plans. Potential sources of hazardous or solid waste on the South Extension development area would include spilled, leaked, or dumped hazardous substances, petroleum products, and/or solid waste associated with coal exploration, utility line installation or maintenance, or agricultural activities. No such hazardous or solid wastes are known to be present on the proposed development area at this time.

Non-hazardous waste, which is similar to domestic or municipal solid waste, is removed from the mine site by a contractor for disposal in a regulated landfill near Hardin. Ash from the coal-fired heating boilers is hauled to a mined out area of the pit where it is blended with backfilled overburden during regrading. Similarly, waste material from the secondary crusher feed is transported to a mined out area of the pit where it is buried during the backfilling operation. Haulroad surfaces are periodically scraped and the materials are then hauled and dumped into mined out portions of the pit areas where it is buried during regrading.

At the Absaloka 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 recycled where practicable or disposed of at an off-site EPA-permitted hazardous waste facility. No noteworthy impacts are anticipated as a result of the Proposed Action or Alternative 1.

3.16.2 Environmental Consequences

3.16.2.1 Proposed Action and Alternative 1

The existing mine office, shop, warehouse, and coal processing facilities would not be relocated; therefore, most of the wastes requiring disposal would continue to be generated on the Tract III Coal Lease and would not be applicable to the South Extension area. However, all wastes that would be generated in the course of mining the proposed development area would be handled in accordance with the existing regulations using the procedures currently in use and in accordance with MDEQ/OSM-approved waste disposal plans at the Absaloka Mine. If the South Extension development plan is permitted, the wastes that would be generated by the Absaloka Mine in the course of mining the proposed development area would continue to be the same as those currently being generated by the existing mining operation. These wastes (hazardous and/or solid) would be handled according to the procedures described in Absaloka Mine's approved mine permits.

3.16.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal and associated impacts would not occur within either the Tract III Revision area or the South Extension. Mining operations and the associated generation of, and potential impacts from, hazardous and solid waste materials described above would continue as permitted on the Absaloka Mine's permit area until about 2009. Impacts related to mining operations at the Absaloka Mine would affect portions of the proposed development area only to the extent permitted under the current mining and reclamation plan.

3.16.2.3 Regulatory Compliance, Mitigation and Monitoring

The regulatory requirements regarding production, use, and/or disposal of hazardous or extremely hazardous materials are discussed in Exhibit B-17 in the approved MDEQ Surface Mine Permit No. 85005 document and OSM Surface Mine Permit No. MT-0007F (WRI 2003). All mining activities involving hazardous materials are, and would continue to be, conducted so as to minimize potential environmental impacts.

3.16.2.4 Residual Impacts

No residual hazardous and solid waste impacts are expected.

3.17 Socioeconomics

The Absaloka Mine is unique from other Montana surface coal mines in that the coal reserves being mined are held in trust by the United States for the Crow Tribe. As a result, all royalties and production taxes from this in-trust coal are paid directly to Crow Tribe. The cumulative royalty payments from WRI to the Crow Tribe through December 2006 total $71,141,795 (Montana Coal Council 2007). Production taxes are collected by the tribe at a rate similar to mineral severance and gross proceeds taxes collected by the state. The State of Montana receives only corporate income tax revenues and Resource Indemnity Trust tax from WRI, as well as personal income taxes from mine employees. Big Horn County receives only property tax revenues from the Absaloka Mine.

Due to their proximity, the communities on or near the Crow Indian Reservation are currently experiencing the greatest impact from WRI's Absaloka Mine. The towns of Hardin, Crow Agency, and Lodge Grass would most likely continue to experience social and economic impacts under the Proposed Action and Alternative 1. The smaller communities of Hysham, Wyola, St. Xavier, Fort Smith, and Pryor are also likely to continue to experience some social and economic impacts.

3.17.1 Local Economy

3.17.1.1 Affected Environment

The State of Montana's annual coal production, as reported by the U.S. Energy Information Administration (USEIA), was 40.0 million tons in 2004 and 40.4 million tons in 2005, an increase of 0.9 percent (USEIA 2006). The Montana Coal Council (2007) reported the State's total coal production in 2006 was 41.8 million tons, an increase over 2004 of 4.5 percent and an increase over 2005 of 3.5 percent. Although annual coal production in Montana has been increasing recently, the record level of 42.8 million tons was set in 1998 (USEIA 2006).

Montana was the sixth-largest coal producer among the 50 states in 2005 (Montana Coal Council 2007).

The annual rate of coal production at the Absaloka Mine has varied, but in recent years it has stabilized at around 6.5 to 7.0 million tons.

Unlike a tax paid to government on the production of coal or its realized profits, royalties are a monetary payment to the owner of the coal as agreed upon in the terms of premining leases. The Crow Tribal government is the major beneficiary of royalty payments from coal production at the Absaloka Mine. The State of Montana has collected royalties on state-owned coal from the late 1970s to the early 1990s. 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. The royalty rate for tribal coal is confidential; however, it is commensurate to federal coal leases and must cap at the current federal royalty rate. The Crow Tribe also collects coal production taxes, which are collected at the same rates as the Montana severance and gross proceeds taxes. Currently, the Crow Tribe collects approximately 20 percent of the price of the coal as production tax.

In 2005, approximately 7.2 percent of the total employment and 8.0 percent of the total payroll in Big Horn County were attributed to the mining sector, which also includes oil and gas employment. Big Horn County's largest employment sectors in 2005 were government (36 percent), agriculture (12 percent), services (10.3 percent), and construction (8 percent). The fastest growing employment sectors in the county from 1998 to 2005 were government and construction, while the mining sector remained relatively stable (Montana Department of Commerce 2007a). According to the Montana Department of Labor and Industry, the total labor force in Big Horn County as of May 2007 was 5,106 and the unemployment rate was 2.9 percent (Montana Department of Labor and Industry 2007).

Agriculture has been the historical base of the economy of the Crow Indian Reservation. The economy also includes production of natural resources as a base of employment and income for the reservation. Tribal and federal governments are the largest employers (BLM 2002). The Absaloka Mine has employed between 70 and 130 Crow tribal members, depending on variable annual levels of production at the mine (WRI 2007b). Based on the ceded area's mineral trust status, the Absaloka Mine employs tribal members under requirements of the Crow Tribal Employment Rights Office. The Crow Indian Reservation has been classified as an economically distressed and disadvantaged area by the federal government (BLM 2002).

In the 2000 census, total employment on the reservation was 2,310. Agriculture, including forestry, fishing and hunting, and mining (412, or 17.8 percent), education (765, or 33.1 percent), and retail trade (187, or 8.1 percent) were the largest sectors of employment. Private wage and salary (1,016, or 44 percent) and government (1,075, or 46.5 percent) were the largest classes of employment. According to the 2000 census, the reservation's labor force (16 years and older) was 2,786 with an unemployment rate of 17.1 percent (Montana Department of Commerce 2007b).

The Montana Department of Labor and Industry-Research and Analysis Bureau and the BIA use different criteria, which therefore yield different results for calculating the labor force rates and unemployment rates for Montana's Indian Reservations. The Department of Labor and Industry reports that the total labor force on the Crow Indian Reservation in 2005 was 2,886, and the unemployment rate was 12.4 percent. Unemployment rates on the reservations as measured by the BIA are based on self-reported information from tribal leaders. BIA's statistics represent labor characteristics of the tribe, not the reservation. The unemployment rates calculated in this manner are greater than those calculated by the Montana Department of Commerce; they indicate the total available labor force on the Crow Indian Reservation in 2005 was 4,593, and the unemployment was 47 percent (Montana Department of Labor and Industry 2007).

Crow tribal member's per capita income was $9,440 in 1999. By comparison, the per capita income for Big Horn County in 1999 was $10,792, and the state average that year was $17,151. In 1999, the median household income for the reservation was $27,044, compared with $27,684 for Big Horn County, and $33,024 for the state average. About 23.7 percent of families and 29.2 percent of the population were below the poverty level in the county in 1999 (Montana Department of Commerce 2007b). Poverty level on the reservation as determined by the BIA for 1999 was 38 percent (BIA 1999). The poverty threshold for a single person in Montana as of 2005 is an annual income of $9,570, for a family of three it is an annual income of $16,090, and for a family of six it is an annual income of $25,870 (HRDC 2007).

The Crow Tribe receives government revenues from its natural resources through numerous land leases, boundary settlement allotments, and income-producing trusts generated through coal, mineral, oil, gas, and timber reserves. The majority of these trusts are administered by the U.S. Government's Office of Trust Funds Management (BLM 2006a).

The Crow Tribal Government is financed by Tribal Priority Allocation Funds for tribal administration granted by the federal government, interest income from a judgment fund, coal trust royalties and coal production taxes, and numerous leases, ROWs and other encumbrances of tribal lands. The trust assets of the Tribe are jointly managed with the BIA, and all funds derived from tribal trust assets are managed by the Department of the Interior, Office of Trust Funds Management (BLM 2002).

3.17.1.2 Environmental Consequences

3.17.1.2.1 Proposed Action and Alternative 1

Crow tribal revenues that would be generated by leasing and mining the South Extension development area would depend on which alternative is selected and the sale price of the coal. The price per ton at the various mine sites depends on the quality of coal. Actual sale prices will vary by contract. The average Montana coal price in 2005 was $6.99 per ton and $6.96 per ton in 2006 (Montana Coal Council 2006).

Aggregate coal royalty and production taxes paid to the Crow Tribe from Absaloka Mine's production in 2006 were $16.6 million. If the IMDA lease for the South Extension is approved by the BIA and the South Extension development plan is permitted and mined, the potential annual aggregate revenues paid to the tribe from the Absaloka Mine (using coal tonnages shown in Table 3-1) would continue for from five up to 15 additional years (post 2007), depending on which alternative is selected.

If the proposed development area is leased and mined under the Proposed Action, the total potential additional tribal revenues (post 2009) would be approximately $200 million through year 2021. Under Alternative 1, the total potential additional tribal revenues would be about $33 million through year 2011.

Montana's surface mining industry furnishes some of the highest-paying and most sought-after jobs in the state. In 2006, the Absaloka Mine employed 161 people with an estimated payroll of approximately $13 million (Montana Coal Council 2007), which equates to an average annual wage of about $80,000 per employee. The 2006 average annual wage may be somewhat higher than normal due to a large number of overtime hours worked that year (Simpson 2007).

The base of economic activity provided by wages and local purchases would continue for from two up to 12 additional years (post 2009), depending on which alternative is selected.

3.17.1.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. The coal included in the proposed development area (from about 13 million tons under Alternative 1 up to as much as 76.6 million tons under the Proposed Action) would not be recovered and the economic benefits associated with mining that coal would not be realized by the Crow Tribe and the economy of the local communities. Currently approved mining operations and the associated economic benefits would continue as permitted on the Absaloka Mine's permit area until about 2009.

3.17.2 Population

3.17.2.1 Affected Environment

The population of Big Horn County is sparse, and prior to the 1970s when large-scale surface coal mines began operations in the county, the population had been relatively constant for decades. According to the decennial census data, Big Horn County's population was 10,007 in 1960 and 10,057 in 1970. By 1980, the county's population had increased to 11,096, which was a 10.3 percent increase (U.S. Census Bureau 2007). The 1990 population of Big Horn County was 11,337, and as of the 2000 census, there were 12,671 people residing in county, which was a 10.5 percent increase. In 2005, the county's population was estimated to be 13,149, representing a 3.8 percent growth rate since 2000. Hardin, the county seat and the state's 22nd largest city, had a population of 3,384 in 2000 and an estimated population in 2005 of 3,510, which represents a 3.7 percent growth rate. The racial makeup of the county in 2005 was 34.5 percent White, 63.3 percent Native American, and 2.3 percent all other (Montana Department of Commerce 2007b).

The Crow Indian Reservation covers approximately 64 percent of Big Horn County. In the 2000 Census, the reservation's population was 6,890. Also in 2000, 6,510 (94 percent) of the reservation's residents lived in the Big Horn County portion of the reservation. The reservation's total population in 2000 included 5,170 (75 percent) Native Americans, which is the largest population group living on the Crow Indian Reservation and Big Horn County. Between 1980 and 2000, the population of the reservation increased by 900 (15 percent), compared with a population growth of 1,575 (14 percent) for all of Big Horn County (Montana Department of Commerce 2007b).

3.17.2.2 Environmental Consequences

3.17.2.2.1 Proposed Action and Alternative 1

Approval of the South Extension development plan would extend the life of the Absaloka Mine, and current employment at the mine, from two to as many as 12 years at the current rate of production, depending on which alternative is selected. Average yearly employment at the mine would not increase under the Proposed Action or Alternative 1. It is likely that any additional employees needed at the Absaloka Mine would be available from the existing workforce in Big Horn County and no influx of new residents would occur as a result of filling those new positions. The Proposed Action and Alternative 1 would have no impact on the population of Big Horn County or the Crow Indian Reservation.

3.17.2.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. Currently approved mining operations and associated employment levels would continue at the existing Absaloka Mine until approximately 2009.

3.17.3 Employment

3.17.3.1 Affected Environment

The total labor force in Big Horn County in 2005 stood at 5,171 with an unemployment rate of 8.1 percent, compared to a total labor force of 5,446 with an unemployment rate of 9.4 percent in 2000. The unemployment rate in Big Horn County has improved since 1990, when it stood at 13.6 percent and the total labor force was 4,051 (Montana Department of Labor and Industry 2007).

The unemployment rate within the Crow Reservation was significantly higher than the county rate in 2005. According to the Montana Department of Labor and Industry, the 2005 unemployment rate on the reservation was 12.4 percent. Much higher unemployment rates are reported by the Bureau of Indian Affairs, which estimated the unemployment rate at 47 percent (Montana Department of Labor and Industry 2007).

In 2005, the total employment in Big Horn County was 4,443 people, and around 278 people were directly employed by the mining industry (excluding oil and gas) that year in the county, representing about 6.3 percent of the employed labor force. In 2005, the total annual average wage in Big Horn County was $30,720, and the average annual wage earned per job on the Crow Indian Reservation that year was $27,930. The average annual wage paid by the mining industry (except oil and gas) is among the highest in Big Horn County, at $63,556 (Montana Department of Labor and Industry 2007).

3.17.3.2 Environmental Consequences

3.17.3.2.1 Proposed Action and Alternative 1

Approval of the South Extension development plan would extend the life of the Absaloka Mine, and current employment at the mine, from two to as many as 12 years at the current rate of production, depending on which alternative is selected. Average yearly employment at the mine would not increase under the Proposed Action or Alternative 1. The economic stability of the communities in Big Horn County and the Crow Indian Reservation would benefit by having the current Absaloka Mine workforce living in the communities and employed at the mine for up to 12 additional years (post 2006). The number of employees at the mine would then decline during the final reclamation phase, which would occur over about a two-year period, until all jobs have been completed.

3.17.3.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. The coal included in the proposed development area would not be mined and mining operations would not be extended by as much as 12 additional years. Currently approved mining operations and associated employment would continue at the existing Absaloka Mine for approximately 2 years (post 2007). Upon completion of the currently permitted coal removal plan in 2009, the number of employees required for the mine's final reclamation would decline to approximately 50. Employment would continue to decline during the mine's final reclamation phase until all jobs have been completed, which would likely be by year 2011 (Simpson 2007).

3.17.4 Housing

3.17.4.1 Affected Environment

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 (Montana Department of Commerce 2007b).

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.

The Crow Indian Reservation has a shortage of adequate housing for the needs of the population. In 2002, the Crow Tribal Housing Authority identified 250 homes with more than one family in the households and a waiting list of 300 families in need of housing. Relatively low homeowner and vacancy rates are indicative of the housing shortage on the reservation (BLM 2002).

3.17.4.2 Environmental Consequences

3.17.4.2.1 Proposed Action and Alternative 1

As discussed above, average yearly employment at the mine would not increase under the Proposed Action and Alternative 1. Current employment levels would continue for up to 12 additional years (post 2009), but no additional demands on the existing infrastructure or services in the communities on or near the Crow Indian Reservation would be expected. If any additional employees are needed at the Absaloka Mine, it is likely that housing would be available off of the reservation, particularly in Hardin.

3.17.4.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted. The employees needed to recover the coal included in the proposed development area would not be needed and would therefore not affect housing occupancy for up to 12 additional years. Currently approved mining operations and associated employment levels would continue at the existing Absaloka Mine until approximately 2009.

3.17.5 Local Government Facilities and Services

3.17.5.1 Affected Environment

Public services, 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 2004 county tax revenues in Big Horn County (38.9 percent) came from sales and use taxes and property taxes (BLM 2006a). Mineral production provided a minor source of revenues to local governments in Big Horn County (BLM 2003).

Public facilities in Big Horn County are, depending on the facility and location, meeting current needs. Many systems, particularly those on the Crow Indian Reservation, are in need of maintenance and repair. The BIA, Indian Health Service (IHS) and the tribal government provide most of the public services for communities within the reservation. The BIA has jurisdiction for providing law enforcement services on the reservation, although Big Horn County Sheriff's Office has jurisdiction for non-Indians on the reservation. The BIA also manages the reservation's natural resources, is responsible for the roads, and oversees all real estate transactions involving trust acreage (BLM 2003).

3.17.5.2 Environmental Consequences

3.17.5.2.1 Proposed Action and Alternative 1

As discussed above, average yearly employment at the mine would not increase under the Proposed Action and Alternative 1. Current employment levels would continue for up to 12 additional years, but no additional demands on the existing infrastructure or services in the community would be expected. If any additional employees are needed at the Absaloka Mine, it is likely that the demand for public facilities and services would be no greater than are currently being experienced in

Big Horn County. Tax revenues to the county that are generated by the Absaloka Mine would continue for up to 12 additional years to help fund government facilities and public services.

3.17.5.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and the employees needed to recover the coal included in the proposed development area would not be needed and local government facilities and services would therefore not be affected by up to 12 additional years. Currently approved mining operations and associated employment levels would continue at the existing Absaloka Mine until approximately 2009. The reduction in mine life by up to 12 years would reduce tax revenues to the county that help to fund government facilities and public services.

3.17.6 Environmental Justice

3.17.6.1 Affected Environment

Environmental Justice issues are concerned with actions that unequally impact a given segment of society as a result of physical location, perception, design, noise, or other factors. On February 11, 1994, Executive Order 12898, "Federal Action to Address Environmental Justice in Minority and Low-Income Populations" was published in the *Federal Register* (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 Big Horn County, 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. Attitudes toward coal development are complex. The Crow Tribal Administration views leasing of tribal coal reserves as a way for the tribe to raise money to save its land base and to enhance the tribe's ability to govern itself. If the tribe can generate its own revenues, it can determine how that money is spent and will no longer have to depend on the federal government to address problems (BLM 2003). There may, however, be disparate views among both tribal and non-tribal members of the local communities. Communities potentially impacted by the presence or absence of a coal mine have been identified in this EIS. The population is largely rural with strong ties to the land and to the small communities. Residents generally value the rural character of their lifestyles, including appreciation of the natural landscapes, fresh air, and solitude. The Crow place high value on natural resources, and hold sacred many landscapes and places. By treating all things in a respectful way, they can continue to survive. Tribal members who have a strong desire to preserve many elements of their heritage often do not wish to become integrated into the non-Indian culture. In addition, those members of the tribe who oppose the Proposed Action may feel that not all tribal members would receive equal benefits of development.

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. In the 2000 Census, approximately 94 percent of the Crow Indian Reservation's 6,890 residents lived in the Big Horn County part of the reservation, and the population in Big Horn County in 2000 (12,671 people) was over 60 percent Native American (Montana Department of Commerce 2007b). Few Native Americans reside in close proximity to the Absaloka Mine and none live within or near the proposed development area.

When compared to other counties across the United States, Big Horn County can be considered to have a very high rate of poverty among its population, which was about 29 percent of the individuals existing in families with incomes under the poverty level in 1999. This figure compares to a statewide figure of 15.5 percent and reflects the relatively large number of persons below the poverty level living on the Crow Indian Reservation. Poverty level on the reservation as determined by the BIA for 1999 was 38 percent (BIA 1999).

Compliance with Executive Order 12898 concerning Environmental Justice was accomplished through opportunities for the public to receive information on this EIS in conjunction with consultation and coordination described in Section 1.4 of this document. This EIS and contributing socioeconomic analysis provide a consideration of the impacts with regard to disproportionately adverse impacts to minority and/or low-income groups, including Native American.

3.17.6.2 Environmental Consequences

3.17.6.2.1 Proposed Action and Alternative 1

No new employees would be added as a result of mining as outlined in the South Extension development plan and there would be no direct or indirect effects on the local workforce. Mine employees would travel from Hardin or other local communities and residences on or near the Crow Indian Reservation. The Proposed Action or Alternative 1 would not require employees to move into or near the proposed development area. No significant adverse human health or environmental effects are falling disproportionately on minority or low-income populations as a result of current mining activities at the Absaloka Mine. Consequently, implementation of the proposed South Extension development plan would extend the current health and environmental effects created by the Absaloka Mine, but not adversely affect the environmental justice considerations in the area.

3.17.6.2.2 No Action Alternative

Under the No Action Alternative, the South Extension development plan would not be permitted and coal removal and associated impacts would not occur within either the Tract III Revision area or the South Extension. The employment opportunities associated with mining the coal in the South Extension development area would be reduced. The loss of employment opportunities and royalty and tax revenues as a result of the Absaloka Mine's early closure could have significant social and economic impacts within the Crow Indian Reservation and Big Horn County. Mining operations and the associated potential impacts described above would continue as permitted on the Absaloka Mine's existing permit area until about 2009. Disturbance related to mining operations at the Absaloka Mine would not be extended onto portions of the proposed development area that will not be affected under the current mining and reclamation plan.

3.17.7 Regulatory Compliance, Mitigation and Monitoring

The Absaloka Mine is required to pay royalty and taxes as required by tribal lease agreements and by state and local regulations. The BLM must approve mining plans to assure maximum economic recovery of coal for the benefit of the Crow Tribe. BLM is delegated this authority and responsibility under 30 CFR Part 750. This BLM function is a part of the permit review and approval process by OSM. BLM, as designated federal agency for coal conservation issues outside and within the reservation, compares the amount of coal reported as produced with the estimated amount of coal in the ground to verify that the trust coal is efficiently mined and royalties are paid on all of the coal that is recovered. The Minerals Management Service (MMS) audits royalty payments on behalf of the Crow Tribe to assure that royalty obligations under the coal lease are met.

3.17.8 Residual Impacts

No socioeconomic residual impacts are expected.

3.18 The Relationship Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

After 2007, the Absaloka Mine would be able to produce coal at an average production level of 6.5 to 7.0 mmtpy for about two more years under the No Action

Alternative, compared with an average of 6.5 to 7.0 mmtpy for up to 14 years under the Proposed Action, or an average of 6.5 mmtpy for up to 4 years under Alternative 1 (Table 2-2).

As the coal is mined, almost all components of the present ecological system, which have developed over a long period of time, would be modified. In partial consequence, the reclaimed land would be slightly lower topographically, and although it would resemble original contours, it would lack some of the original diversity of geomorphic form.

The forage and associated grazing and wildlife habitat that the proposed development area provides would be temporarily and incrementally disturbed during mining and reclamation. During mining of the proposed development area, there would be a loss of vegetation on a total of 385 acres (Alternative 1) up to a maximum of 2,637 acres (Proposed Action) with an accompanying disturbance of grazing land and wildlife habitat. This disturbance would occur incrementally over a period of years. The mine site would be returned to equivalent or better forage production capacity for domestic livestock before the performance bond is released. Long-term productivity would depend largely on postmining range management practices, which to a large extent would be controlled by private landowners.

Mining would disturb pronghorn and mule deer habitat. There would be loss and displacement of wildlife during mining, but it is anticipated that reclaimed habitat would support a diversity of wildlife species similar to premining conditions. The diversity of species found in the undisturbed lands would not be completely restored on the leased lands for an estimated 50 years after the initiation of disturbance.

Coal is a major source of electricity generation in the U.S. Coal demand is driven by the electric power sector, which accounts for about 92 percent of consumption. Approximately 50 percent of electric power in the U.S. was provided by coal in 2005 and 2006 (USDOE 2007a). Coal-fired power plant emissions include greenhouse gasses that contribute to global warming. According to the Energy Information Administration (USDOE 2006 and 2007b):

- CO_2 emissions represent about 84 percent of the total U.S. greenhouse gas emissions.

- Estimated energy-related CO_2 emissions in the U.S. totaled 5,955 million metric tons in 2005 and 5,877 million metric tons in 2006, which was a 1.2 percent decrease.

- Estimated energy-related CO_2 emissions in the U.S. from coal totaled 2,141 million metric tons in 2005 and 2,121 million metric tons in 2006, or about

36 percent of total U.S. energy-related CO_2 emissions in both 2005 and 2006.

- Coal consumed by only the electric power sector in the U.S. in 2005 was 1,037 million tons and 1,026 million tons in 2006.

The Absaloka Mine plans to produce the coal included in the proposed development area at currently permitted levels using existing production and transportation facilities. As a result, mining of the proposed development area as planned under the Proposed Action or Alternative 1 would not be expected to result in increased emissions of CO_2 from coal-fired power plants. Assuming coal would be produced from the Absaloka Mine at a rate of 7.0 mmtpy and it all goes to electric power generation, and coal consumed by the electric power sector in the U.S. continues to be approximately 1,030 million tons per year, then burning coal from the Absaloka Mine would account for approximately 0.68 percent of the estimated CO_2 emissions produced by coal electric power generation and 0.25 percent of the estimated total energy-related CO_2 emissions in the U.S.

Coal also releases mercury into the air when it is burned. According to the EPA, coal-fired power plants account for more than 40 percent of all domestic human-caused mercury emissions. Mercury in the air settles into water or onto land, where it can be washed into the water. Certain microorganisms can convert elemental mercury into methyl mercury, which is a highly toxic mercury compound that builds up in fish and shellfish when they feed. There are adverse health effects to both humans and other animals that consume these fish and shellfish. Research has shown that most people's fish consumption does not cause a health concern, but high levels of methyl mercury in the bloodstream of unborn babies and young children may harm the developing nervous systems of those children (EPA 2006). As indicated previously, the Absaloka Mine plans to produce the coal included in the South Extension development area at currently permitted levels using existing production and transportation facilities. As a result, mining of the proposed development area as planned under the Proposed Action or Alternative 1 would not be expected to result in increased emissions of mercury from coal-fired power plants.

There are new technologies being developed that would produce electricity from coal with fewer emissions and sequester CO_2. Plants using those technologies may be in operation by the time the coal in the South Extension lease area is actually mined and sold. There is no commitment at the time of lease approval and mine permit approvals as to how the coal would be used when it is mined.

Regulatory limits on emissions by coal-fired power plants have been and will continue to be enacted. Congress is proceeding with proposals to limit U.S. emissions linked to global warming and the likelihood that this will happen is already affecting plans to build new pulverized coal power plants and proposals to build coal gasification plants. The EPA implemented rules in 2005 to reduce emissions of mercury by power plants, which were challenged by various states and interest groups who want more stringent rules. Regulatory limits will likely continue to be imposed on emissions of greenhouse gases and those limits will affect the use of and emissions from the coal in the South Extension development area at the time it is actually mined.

Development of alternate technologies for producing power and technologies for using energy more efficiently are progressing based on economic feasibility, technical merit, current and future restrictions on emissions that limit the use of fossil fuel-based technologies, and concerns about global warming. A decision by BIA to not approve the IMDA lease for the South Extension and/or decisions by MDEQ and OSM to not approve the Tract III Revision permit application or the South Extension permit application would not affect that progress, and would not result in changing the amount of coal burned to produce electricity because there are other sources of coal available to coal-fired power plants.

If the South Extension lease is approved, the proposed development plan is permitted, and the area is mined and reclaimed, there would be a deterioration of the groundwater quality in the lease area; however, the water quality would still be adequate for livestock and wildlife. Groundwater models predict that drawdown effects during mining would be very localized and limited to areas near the mine pits. The depth to groundwater in the Rosebud-McKay coal seams would increase 5 feet or more during mining within an area extending roughly 1,200 feet east of the South Extension tract boundary, and a maximum of about 40 feet of drawdown is projected at the eastern edge of the easternmost mine pit. Essentially no groundwater level drawdowns are expected south and west of the proposed development area. Groundwater levels in the overburden aquifer would also increase during mining around the mine pits at roughly the same amount and areal extent as the underlying coal seam aquifers. Groundwater flow through the undisturbed aquifers near the backfilled mine pits would be interrupted until saturation levels in the backfill have risen and the rates of recharge to and discharge from the backfill equilibrate. Water levels are predicted to still be rising 50 years after mining is complete (Section 3.5.1).

Mining operations and associated activities would degrade the air quality and visual resources of the mine area on a short-term basis. Following coal removal, removal of surface facilities, and completion of reclamation, there would be no long-term impact on air quality. The long-term impact on visual resources would be minor.

Short-term impacts to recreation values may occur from reduction in big game populations due to habitat disturbance and reduction in access to the proposed development area. However, reclamation would result in a wildlife habitat similar to that which presently exists and access to lands would be restored. There should be no long-term adverse impacts on recreation.

The long-term economy of the region would be enhanced as a result of the Proposed Action and Alternative 1. The Proposed Action and Alternative 1 would extend the life of the Absaloka Mine and the associated economic benefits to Big Horn County, the Crow Tribe, and the local communities from 3 to 12 years.

3.19 Irreversible and Irretrievable Commitments of Resources

The major commitment of resources would be the mining and consumption of 13.0 million tons (Alternative 1) up to a maximum of 76.6 million tons (Proposed Action) of coal to be used for electrical power generation. It is estimated that 1 to 2 percent of the energy produced would be required to mine the coal, and this energy would be irretrievably lost.

The characteristics of topsoil on approximately 385 acres (Alternative 1) up to a maximum of approximately 2,637 acres (Proposed Action) would be irreversibly changed. Soil formation processes, although continuing, would be irreversibly altered during mining-related activities. Newly formed soil material would be similar but not identical to that in the natural landscape.

Direct and indirect wildlife deaths caused by mining operations or associated activity, albeit incidental, would be an irretrievable loss.

Disturbance of all known historic and prehistoric cultural sites eligible for the NRHP would be mitigated. However, accidental destruction of presently unknown archeological or paleontological values would be irreversible.

3.20 Regulatory Restrictions Analysis

Under the MEPA, state agencies must disclose any regulatory impacts on the lease applicant's private property rights. Since the state's permitting action under Alternative 1 is the same as under the Proposed Action, and the state does not propose additional conditions, a regulatory restrictions analysis is not needed.

4.0 CUMULATIVE ENVIRONMENTAL CONSEQUENCES

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts can result from individually minor, but collectively significant, actions occurring over time.

This section summarizes the cumulative impacts that are occurring as a result of existing development in the northern Powder River Basin (PRB[1]) and considers how those impacts would change if other projected development in the area occurs and if the South Extension lease is approved and mined and/or the Tract III Revision is approved and mined. For purposes of this Environmental Impact Statement (EIS), the northern PRB refers primarily to the Montana portion of the PRB.

Several existing National Environmental Policy Act (NEPA) documents discuss the cumulative impacts of energy development in the Montana PRB. The Bureau of Land Management (BLM) completed two regional Resource Management Plans (RMPs) (Billings and Powder River) in the mid-1980s and the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* in 2003 evaluating the potential cumulative impacts of surface coal development and coal bed natural gas (CBNG) development. Since the regional RMPs and the Montana Statewide Oil and Gas FEIS were prepared, BLM has prepared a Draft Supplement to the Oil and Gas EIS and a number of NEPA analyses evaluating CBNG development proposals in the northern PRB. Each of these NEPA analyses includes an analysis of cumulative impacts. The BLM is currently merging the Powder River and Big Dry RMPs into one comprehensive plan called the Miles City Field Office RMP, which is scheduled for completion in 2007 or 2008.

The BLM is also completing a regional technical study, called the PRB Coal Review, to help evaluate the cumulative impacts of coal, coal-related, and other industrial development in the PRB. The PRB includes portions of northeastern Wyoming and southeastern Montana. The PRB Coal Review consists of three tasks:

- Task 1 identifies current resource conditions in the PRB and, for applicable resources, updates the BLM's 1996 status check for coal development in the PRB. The baseline year for the Task 1 evaluation of the current conditions is 2003.

- Task 2 defines the past and present development activities in the PRB and their associated development levels as of 2003 and develops a forecast of reasonably foreseeable development in the PRB through 2020. The reasonably foreseeable activities fall into three broad categories: coal development (coal mine and coal-related), oil and gas development

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

(conventional oil and gas, CBNG, and major transportation pipelines), and other development, which includes development that is not energy-related as well as other energy-related development.

- Task 3 predicts the cumulative impacts that could be expected to occur to air, water, socioeconomic, and other resources if the development occurs as projected in the forecast developed under Task 2.

A series of reports has been prepared to present the results of the PRB Coal Review task studies. The Task 1, 2, and 3 reports represent components of a technical study of cumulative development in the PRB; they do not evaluate specific proposed projects, but they provide information that the BLM and other agencies are using to evaluate the cumulative impacts that would be expected to occur if specific projects or applications are approved, such as the Absaloka Mine's Tract III Revision and South Extension lease. The Task 1 reports, which include air quality conditions, water resource conditions, social/economic conditions and other resource conditions, and the Task 2 reports have been completed. The Task 3 reports for air quality conditions, social/economic conditions and other resource conditions have been completed. The Task 3 evaluation of water resource conditions is in progress. Information in these reports relevant to this analysis is summarized in this chapter, and the completed reports are available from the BLM offices in Casper and Cheyenne, Wyoming, and on the Wyoming BLM website at http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs.htm.

The Wyoming portion of the PRB is the primary focus of the PRB Coal Review reports, but the Montana portion of the PRB is included in the Task 2 (Past, Present, and Reasonably Foreseeable Development Activities) Report and in the Task 1 and 3 air resources reports. For some components of the Task 2 report and for the Task 1 and 3 air resource studies, the Montana portion of the PRB Coal Review study area includes portions of Big Horn, Custer, Powder River, and Rosebud counties. As mentioned above, the BLM Miles City Field Office has started a revision of their RMP and will use the Task 2 development forecasts for that effort.

For purposes of the PRB Coal Review study, coal mining activities in the PRB were geographically grouped by subregion. Mines in the Sheridan, Wyoming and Decker, Montana areas are included in Subregion 4, while Subregion 5 encompasses mining activity in the Ashland/Colstrip, Montana areas (Figure 4-1).

In general, Section 4.1 summarizes the past, present, and reasonably foreseeable development information presented in the PRB Coal Review Task 1 and 2 reports (BLM 2005c) and/or the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* and the Draft Supplement of that study (BLM 2003 and 2006a). Section 4.2 summarizes the predicted cumulative environmental and socioeconomic

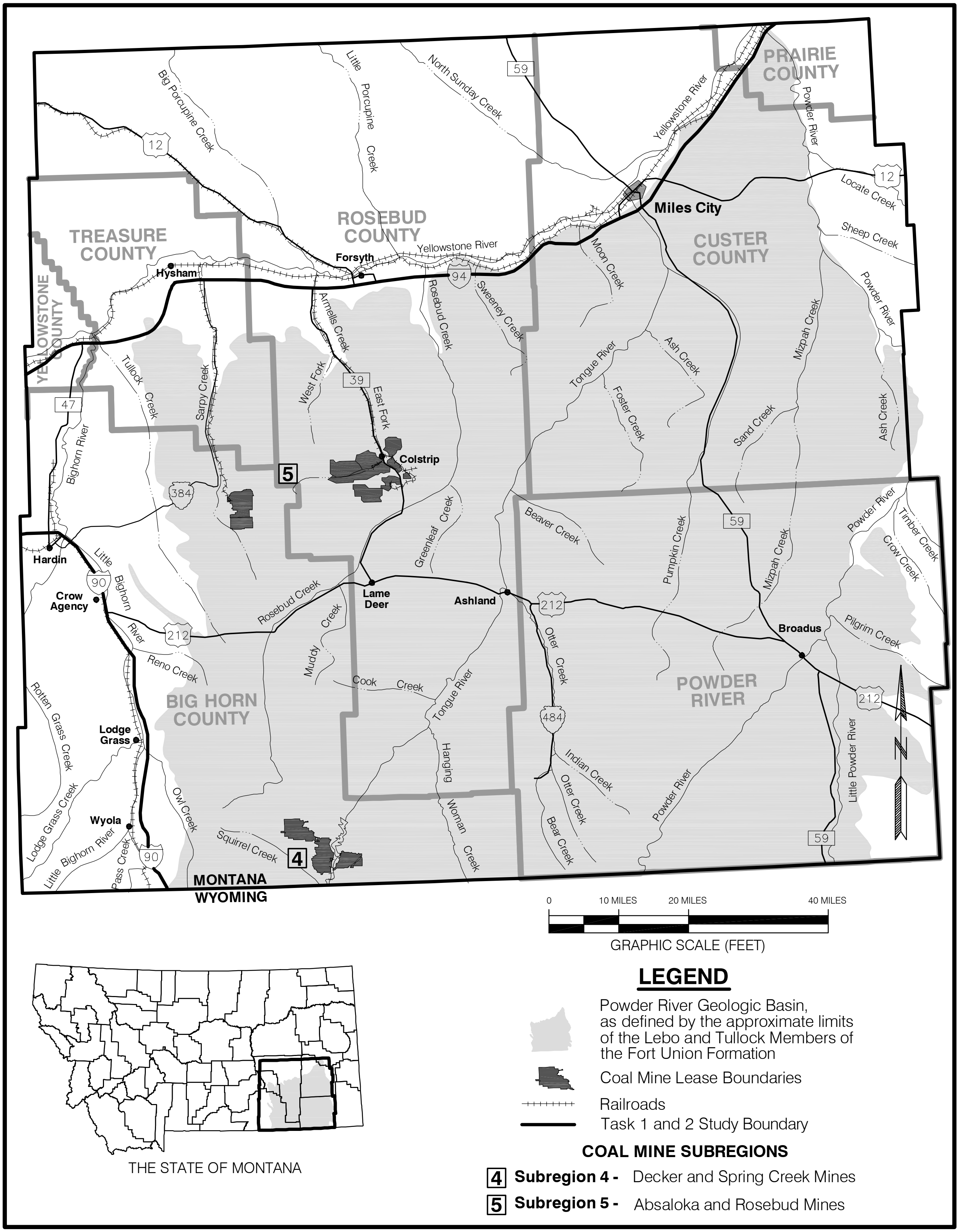


Figure 4-1. Montana Study Area for PRB Coal Review Studies Evaluating Current and Projected Levels of Development.

impacts as a result of these past, present, and reasonably foreseeable development activities in the Montana portion of the PRB.

4.1 Past, Present, and Reasonably Foreseeable Development

4.1.1 Coal Development

4.1.1.1 Coal Mine Development

Currently, there are 30 federal and tribal coal leases in the Montana portion of the PRB totaling approximately 58,900 acres. This represents approximately 0.54 percent of the total area within the Montana PRB. Of these 30 leases, 16 produced coal in 2005 resulting in approximately 32.6 million tons of federal and tribal coal (Spurgin 2007). Total Montana PRB coal production in 2005 from federal, tribal, state, and privately owned coal was approximately 39.9 million tons (Energy Information Administration 2006). The PRB mines located in Big Horn and Rosebud counties produce around 99 percent of the coal produced in the State of Montana each year (Montana Coal Council 2006 and 2007).

Presently, there is one active surface coal mine within Rosebud County (Rosebud Mine) and three surface coal mines in operation within Big Horn County (Spring Creek, Decker Coal, and Absaloka Mines) (Figure 4-2). A surface coal mine in Rosebud County (the Big Sky Coal Mine) recently ended mining operations, relinquished the federal coal leases, and is reclaiming areas of disturbance. Table 4-1 provides information about the current (2006) status, ownership, production levels and maximum annual permitted production rates for the existing surface coal mines in the Montana PRB (Subregions 4 and 5 of the PRB Coal Review). There are currently no active mines in the Wyoming portion of Subregion 4. Operations at the Big Horn, PSO Ash Creek, and Welch Mines near Sheridan are completed, the disturbed areas have been reclaimed, and monitoring of the reclaimed areas is ongoing. Mining rates are expected to remain relatively constant at these four active surface coal mines in the Montana PRB in the near future, depending upon market conditions.

Since 1989, coal production in the entire PRB has increased by an average of six percent per year. The increasing production is primarily due to increasing sales of low-sulfur, low-cost PRB coal to electric utilities that must comply with the Phase II requirements of Title III of the 1990 Clean Air Act Amendments. Electric utilities account for about 95 percent of Montana’s coal sales. In 2005, approximately 3.5 percent of the coal mined in the United States came from the Montana PRB (Energy Information Administration 2006).

Task 2 of the PRB Coal Review projected future coal development for the years 2010, 2015, and 2020. Due to the variables associated with future coal production, two projected coal production scenarios (representing an upper and a lower production level) were developed to bracket the most likely

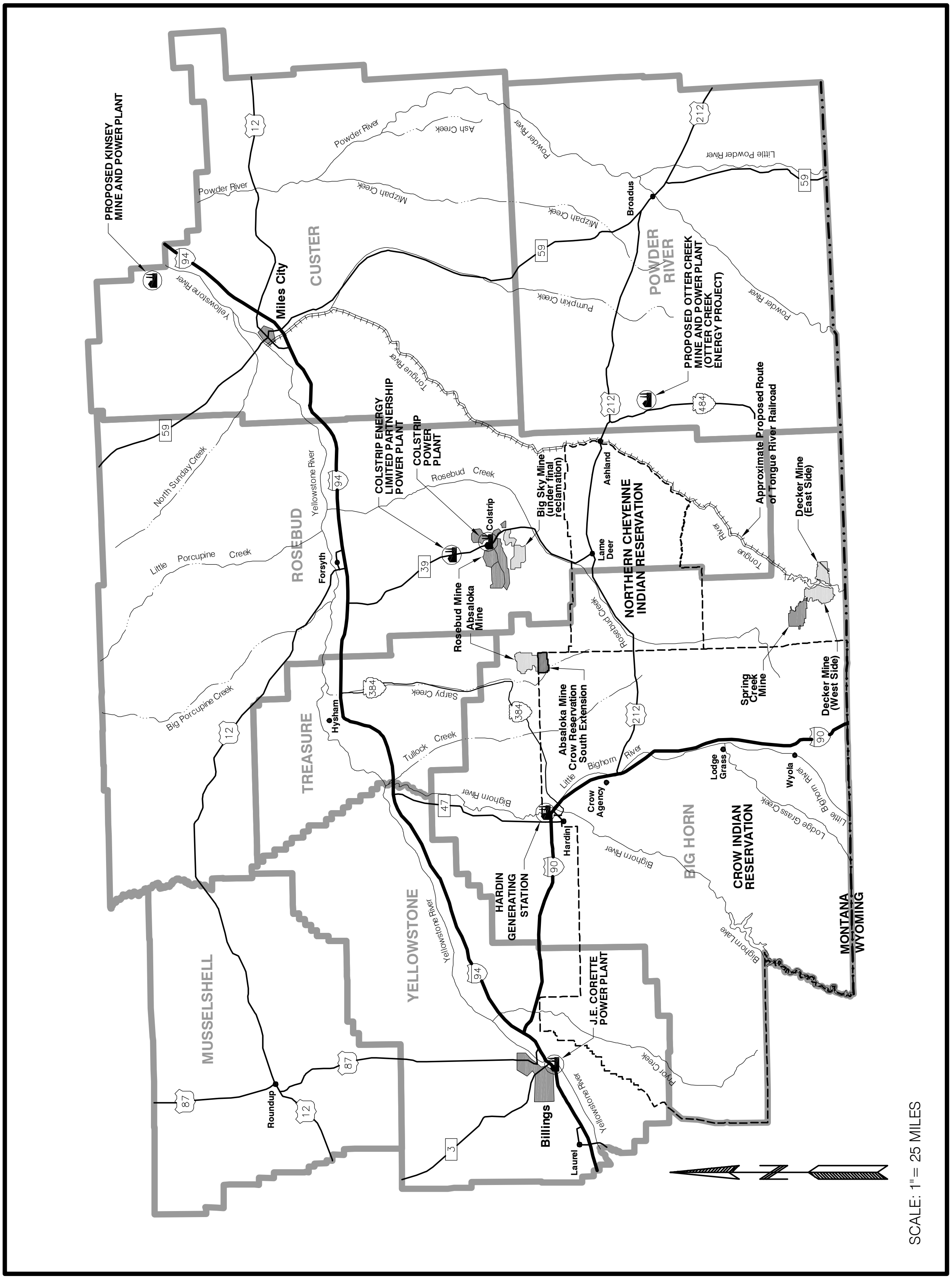


Figure 4-2. Existing and Proposed Surface Coal Mines and Power Plants in the Vicinity of the Crow Reservation South Extension.

Table 4-1. Current Status, Ownership and Production of Wyoming and Montana PRB Coal Mines.

Mine	**Owner**	**2006 Coal Production (mm Tons)**	**2006 Permitted Coal Production (mm Tons)[1]**	**2006 Status and Additional Comments**
PRB Coal Review Subregion 4 (Sheridan/Decker)				
Big Horn	Kiewit Mining Group, Inc.	0	--	In final reclamation, awaiting final bond release. Located in Wyoming.
PSO Ash Creek	Pittsburg & Midway Mining Co.	0	--	In final reclamation, awaiting final bond release. Located in Wyoming.
Welch	Pittsburg & Midway Mining Co.	0	--	In final reclamation, awaiting final bond release. Located in Wyoming.
Decker	Decker Coal Co.	7.0	16.4	Active. Located in Montana.
Spring Creek	Rio Tinto Energy America	14.6	20.0	Active. Located in Montana.
Total		**21.6**	**36.4**	
PRB Coal Review Subregion 5 (Ashland/Colstrip)				
Absaloka	Westmoreland Resources, Inc.	6.8	11.0	Active. Located in Montana.
Rosebud	Western Energy Co.	12.7	21.0	Active. Located in Montana.
Big Sky	Big Sky Coal Co.	0.0	0.0	In final reclamation, awaiting final bond release. Located in Montana.
Total		**19.5**	**32.0**	
TOTAL FOR 2 MINE GROUPS		**41.1**	**68.4**	

[1] WDEQ/MDEQ permitting levels.

foreseeable regional coal production level. The projected upper and lower production levels subsequently were allocated to the Montana PRB subregions and to individual mines based on past market shares. Individual mine production levels were reviewed relative to potential future production constraints (e.g. loadout capacities), permitted production levels, mining costs, and coal quality. The actual 2003 production level and the two projected coal production scenarios in five-year increments through 2020 are shown in Figure 4-3 and Tables 4-2 and 4-3. Tables 4-2 and 4-3 also show the cumulative coal mining disturbance as of the baseline year and the cumulative coal mine disturbance projected for the future years for the lower and upper production scenarios, respectively.

According to the Task 2 report for the PRB Coal Review, three potential new coal mine developments have been identified in the Montana PRB study area. Those proposed new mines are the P&M Ash Creek Mine, which is located near Sheridan in Wyoming, and the Otter Creek and Kinsey Mines, which are both located in Montana (Figure 4-2). 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. For example, it was assumed that the development of the Otter Creek Mine would require construction of the proposed Tongue River Railroad and a power plant near Miles City, Montana. Also, it was assumed that the Kinsey Mine would be developed in response to construction of a mine-mouth power plant. No applications have been filed for new mines or power plants at these locations at this time (BLM 2005c).

Affiliates of CONSOL Energy, Inc. and P&M Coal Mining Co. announced that they entered into a joint venture to develop the proposed P&M Ash Creek Mine on April 24, 2007. The joint venture, called the Youngs Creek Mining Co., will develop and operate the proposed mine (renamed Youngs Creek Mine). Feasibility studies indicate that the Youngs Creek Mine has the potential to reach 15 million tons per year at full production, and the companies anticipate that permit applications for the proposed mine will be submitted in late 2008 (Sheridan Press 2007).

Under the PRB Coal Review's lower production scenario, it was assumed that the Youngs Creek Mine would initiate production by 2010, but the Otter Creek and Kinsey Mines would not be developed. Under the upper production scenario, it was assumed that production would begin by 2010 at both the Youngs Creek and Otter Creek Mines and by 2015 at the Kinsey Mine.

As discussed in Section 1.2, based upon the current projected annual coal production over the life of the mine, Westmoreland Resources, Inc. (WRI) estimates that the existing recoverable reserves at the Absaloka Mine will be depleted by the end of 2009 at an average production rate of approximately 6.5 to 7.0 million tons per year. If the South Extension development plan is approved and permitted by federal and state agencies with Indian trust and coal mine permitting responsibilities, WRI anticipates that the average rate of

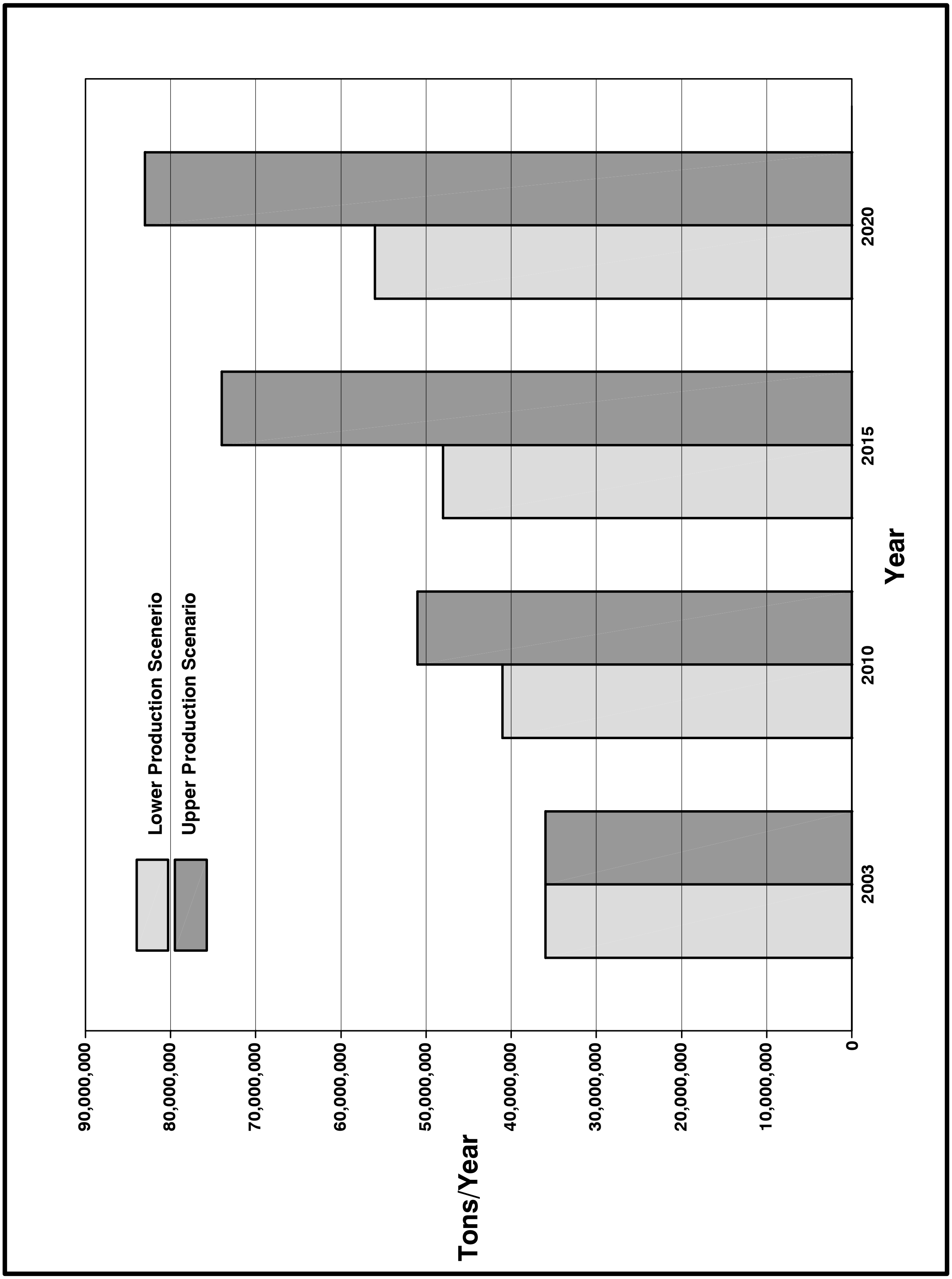


Figure 4-3. Projected Total Coal Production from Mines in Subregions 4 and 5 Under the Lower and Upper Production Scenarios.

Table 4-2. Current and Projected Montana PRB Coal Mine Development, Lower Production Scenario.

Subregion	Annual Production (million tons)	Cumulative Disturbed Area (acres)	Cumulative Permanently Reclaimed Area (acres)	Cumulative Active Mining Area and Unreclaimed Mined Area (acres)	Cumulative Area Disturbed and Unavailable For Reclamation[1] (acres)	Total Mine Employment
Baseline year (2003)						
4 - Sheridan/Decker	17	12,054	2,474	6,151	3,430	277
5 - Ashland/Colstrip	19	33,355	11,318	19,149	2,888	456
Total for 2003	**36**	**45,409**	**13,792**	**25,300**	**6,318**	**733**
Reasonably Foreseeable Development for 2010						
4 - Sheridan/Decker	21	13,770	3,614	6,506	3,650	316
5 - Ashland/Colstrip	20	36,462	15,718	17,836	2,908	432
Total for 2010	**41**	**50,232**	**19,332**	**24,342**	**6,558**	**748**
Reasonably Foreseeable Development for 2015						
4 - Sheridan/Decker	28	15,354	4,764	6,905	3,685	400
5 - Ashland/Colstrip	20	38,782	18,924	16,941	2,918	411
Total for 2015	**48**	**54,136**	**23,688**	**23,846**	**6,603**	**811**
Reasonably Foreseeable Development for 2020						
4 - Sheridan/Decker	36	17,028	6,089	7,218	3,720	492
5 - Ashland/Colstrip	20	41,359	22,303	16,720	3,327	391
Total for 2020	**56**	**58,387**	**28,392**	**23,948**	**6,047**	**883**

[1] Area unavailable for reclamation includes disturbed areas occupied by permanent or long-term facilities such as buildings, roads, topsoil stockpiles, etc.
Source: PRB Coal Review Task 2 Report (BLM 2005c)

Table 4-3. Current and Projected Montana PRB Coal Mine Development, Upper Production Scenario.

Subregion	Annual Production (million tons)	Cumulative Disturbed Area (acres)	Cumulative Permanently Reclaimed Area (acres)	Cumulative Active Mining Area and Unreclaimed Mined Area (acres)	Cumulative Area Disturbed and Unavailable For Reclamation[1] (acres)	Total Mine Employment
Baseline Year (2003)						
4 - Sheridan/Decker	17	12,054	2,474	6,151	3,430	277
5 - Ashland/Colstrip	19	33,355	11,318	19,149	2,888	456
Total for 2003	**36**	**45,409**	**13,792**	**25,300**	**6,318**	**733**
Reasonably Foreseeable Development for 2010						
4 - Sheridan/Decker	27	13,813	3,614	6,849	3,650	342
5 - Ashland/Colstrip	24	36,764	15,718	17,989	3,058	476
Total for 2010	**51**	**50,577**	**19,332**	**24,838**	**6,708**	**848**
Reasonably Foreseeable Development for 2015						
4 - Sheridan/Decker	35	15,949	4,764	7,501	3,685	444
5 - Ashland/Colstrip	39	40,090	18,880	17,842	3,368	707
Total for 2015	**74**	**56,039**	**23,644**	**25,343**	**7,053**	**1,151**
Reasonably Foreseeable Development for 2020						
4 - Sheridan/Decker	42	17,818	6,089	8,009	3,720	491
5 - Ashland/Colstrip	41	44,871	22,302	19,443	2,977	676
Total for 2020	**83**	**62,689**	**28,391**	**27,455**	**6,697**	**1,167**

[1] Area unavailable for reclamation includes disturbed areas occupied by permanent or long-term facilities such as buildings, roads, topsoil stockpiles, etc.
Source: PRB Coal Review Task 2 Report (BLM 2005c)

annual production would not increase, and that the mine would extend its productive life to 2020 or 2021. The existing and projected coal development levels and associated disturbance shown in Tables 4-2 and 4-3 include production at the Absaloka Mine during the baseline year (2003) and projected production at the mine for 2010, 2015, and 2020. As discussed above, the projected development levels shown in Tables 4-2 and 4-3 are based on projected demand and coal market forecasts, which are not affected by approval and permitting of the South Extension development plan. Cumulative impacts would be a function of disturbance of additional land to sustain current production over an extended time rather than new or increased coal production.

<u>4.1.1.2 Coal-Related Development</u>

For purposes of this analysis, coal-related development includes railroads, coal-fired power plants, and major (230-kilovolt and more) power transmission lines. The following sections summarize the existing coal-related development in the Montana PRB and the reasonably foreseeable development considered in the PRB Coal Review.

<u>4.1.1.2.1 Coal Transportation</u>

As mentioned previously, electric utilities account for 95 percent of Montana's coal sales. Most of the coal sold to electric utilities is transported to coal-fired power plants by rail. The existing coal mines in Subregions 4 and 5 are served by Burlington Northern Santa Fe (BNSF) rail line (Figure 4-1). The PRB Coal Review determined that future production rates from the currently operating mines in Subregion 4 would not exceed the capacity of the existing rail line through 2020. In addition, the existing capacity (100 million tons per year) of the current BNSF rail line would be sufficient to accommodate the additional production from the proposed Youngs Creek Mine in Wyoming. Any upgrades would be minor and related to spur track construction (BLM 2005c).

The PRB Coal Review determined that the only reasonably foreseeable railroad development within the Montana PRB study area related to coal transportation would be the construction of the proposed Tongue River Railroad Company (TRRC) rail line between Miles City and Decker, Montana. The proposed route for TRCC's rail line would generally follow the Tongue River from near the Spring Creek Mine to Miles City (Figure 4-2). The construction right-of-way would be 130 miles long and 100 feet wide.

The proposed TRRC rail line would provide 100 million tons per year of new transportation capacity of coal from existing and future mines to markets in the midwest and northeastern states. This new rail line would supplement existing transportation choices available to the Decker and Spring Creek Mines, and as mentioned above, it would be required to facilitate development of the proposed Otter Creek Mine. Based on the inter-dependency of this rail line with the development of the Otter Creek Mine, it was assumed, for purposes of the PRB Coal Review, that development of the rail line would not occur under the lower development scenario. Under the upper development scenario, it was assumed that the rail line would be operational by 2010; however, a low likelihood was assigned to that action (BLM 2005c).

The Federal Surface Transportation Board (STB) has approved two applications for the construction and operation of the TRRC rail line. The Section of Environmental Analysis (SEA) issued a Final Supplemental EIS (SEIS) in October, 2006 that considers realignment of 17.3 miles of the southernmost portion of the 41-mile Ashland-to-Decker section (STB 2006). The SEIS addressed comments received on the Draft SEIS, which was made available for comment in October, 2004. The PRB Coal Review assumed that the TRRC rail line would be not constructed unless the Otter Creek Mine is developed, and that the initial use of the rail line would be for transport of coal from the Otter Creek Mine to a yet to be proposed power plant near Miles City, Montana. At present, plans for the Otter Creek Mine are not clear.

Rail access to the proposed Kinsey Mine would not be required, as it is assumed that mine would support a mine-mouth power plant.

4.1.1.2.2 Electric Power Generation

Currently, there are three coal-fired power plants in the Montana PRB study area (Figure 4-2). The Colstrip Power Plant, located adjacent to the town of Colstrip, Montana, consists of four generating units capable of producing a total of up to 2,094 megawatts (MW) of electricity. Units 1 and 2 each have about 307 MW of power generation capacity and Units 3 and 4 each have about 740 MW of generation capacity. The Colstrip Power Plant is owned by PPL Montana LLC, a subsidiary of PPL Generation LLC; Puget Sound Energy Inc.; Portland General Electric Company; Avista Corporation; PacifiCorp; and NorthWestern Energy LLC.

A smaller coal-fired power plant, the Colstrip Energy Limited Partnership facility, is located approximately six miles north of Colstrip and has a capacity of approximately 42 MW. This facility generally burns waste coal and has operated below maximum capacity in recent years.

The Hardin Generating Station is located on the northeastern outskirts of Hardin and adjacent to the Crow Indian Reservation. This 119-MW facility is owned by Rocky Mountain Power, LLC, a subsidiary of Centennial Power, Inc., a subsidiary of independent power producer Bicent Power, LLC. Colorado Energy Management, as subsidiary of Bicent Power, provides operation and management services. The Hardin Generating Station began operating in April 2006. This is the first pulverized coal-fired power plant to be built in Montana in over 20 years and it is the cleanest burning plant in the state (Colorado Energy Management 2007). The Absaloka Mine provides coal for the plant and it is hauled 30 miles from the mine to the plant by over-the-road trucks.

Any proposed coal-fired power plant that plans to initiate operation by 2010 currently would have to be undergoing an air permit review in order to obtain the required construction permits and complete construction by 2010. Emissions from coal-fired power plants are intensely scrutinized by regulatory agencies, environmental groups, and the general public. Recent proposed legislation in the U.S. Congress and proposed regulations by the U.S. Environmental Protection Agency (EPA) may influence air emissions, including limits on carbon dioxide, which is not currently regulated, and mercury emissions, which are now regulated (EPA 2007). All new power plants would be required, under air permitting rules, to install Best Available Control Technology (BACT) on their air emissions components for maximum controls.

The PRB Coal Review assumed that under the lower coal production scenario, only the Hardin power plant and one 750-MW unit at the Otter Creek Energy Project area would be constructed and operating by 2015. As discussed above, the Hardin Generating Station has been constructed and is currently in operation. Under the upper development scenario, in addition to the Hardin plant, it was assumed that two 750-MW units would be developed at or near the Otter Creek Energy Project area by 2020. No formal application has been submitted for the Otter Creek Energy Project power plant and the project was considered a low likelihood for both 2015 and 2020 in the PRB Coal Review study (BLM 2005c). The PRB Coal Review assumed that all existing power plants would remain operational through 2020.

As discussed above in Section 4.1.1.1, construction of a new power plant near Miles City would be required for development of the Otter Creek Mine and construction of a mine-mouth power plant would be required for development of the Kinsey Mine. No permit applications have been submitted and the likelihood of their development is unknown at this time.

4.1.1.2.3 Power Transmission Lines

Major power transmission lines in the Montana PRB study area that support the regional distribution system are associated with the existing power plants located near Colstrip and Hardin. These 230-kilovolt (kV) transmission lines have been in place for several years, and their associated permanent disturbance is minimal. Two 500-kV power transmission lines linking the Colstrip power plants to the Pacific northwest have also been in place for several years, and their associated permanent disturbance is minimal as well.

Transmission lines are a necessary supporting infrastructure for power generating facilities to provide connection to the grid. No specific proposals for power transmission lines have been identified; however, it is assumed they would be required as part of the overall system development for the reasonably foreseeable power plants identified above in Section 4.1.1.2.2.

4.1.2 Oil and Gas Development

4.1.2.1 Conventional Oil and Gas

Conventional oil and gas development includes all non-CBNG development activity. The PRB Coal Review (BLM 2005c) does not address the past, present, and reasonably foreseeable development of conventional oil and gas resources in the Montana PRB area in detail. However, a detailed discussion of conventional oil and gas production trends and the reasonably foreseeable development scenarios and cumulative effects can be found in the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* and the Draft Supplement of that study (BLM 2003 and 2006a).

Big Horn County has nine oil and gas fields, the closest of which to Absaloka Mine's proposed South Extension development area is the Snyder field, located approximately 20 miles to the west. Approximately 844 conventional oil and gas wells, including producing and non-producing wells, have been drilled to date in Big Horn County. One hundred seventy-two of those wells have been drilled on the Crow Indian Reservation. Rosebud County has 18 identified oil and gas fields and approximately 1,147 wells, both producing and non-producing, have been drilled to date. There are no identified oil and gas fields in Treasure County, although 32 conventional oil and gas wells have been drilled in that county to date. No conventional oil and gas fields are known to exist on the Northern Cheyenne Indian Reservation, and 20 conventional oil and gas wells have been drilled on the reservation to date (BLM 2006a).

Montana's oil production for 1999 was down by approximately eight percent (from 16.61 million barrels of oil [mmbo] to 15.27 mmbo) from 1998. The oil production trend has been in place since 1984 when oil production began to decrease because of commodity prices. Due to increases in commodity prices and the improvements in drilling and enhancement techniques, this downward trend started to reverse itself in 2000. By the end of 2004, production had increased to 24.7 mmbo statewide. In the State of Montana, conventional oil and gas activity increased by approximately 27.2 percent from 2003 to 2004 (BLM 2006a).

Based on historical drilling activity and oil and gas price projections, the BLM (2006a) has predicted that approximately 200 to 800 conventional oil and gas wells would be drilled in the Powder River RMP area, regardless of the mineral ownership, over the next 20 years. The probability for new oil and gas activities to occur in the future is a certainty; however, the level of activity is uncertain (BLM 2005c). The U.S. Geological Survey (USGS) estimated that the mean undiscovered non-coal bed hydrocarbon resource in the PRB of both Montana and Wyoming is 1.8 billion barrels of oil equivalent (USGS 2002). Whether this resource base is exploited is dependent upon a number of factors, such as the currently favorable economics to develop the shallow, easier exploitable CBNG resource.

One existing natural gas sales line runs through the northern portion of Big Horn County and the Crow Indian Reservation. No plans for the construction and operation of any oil and gas pipelines in the vicinity of the Absaloka Mine have been identified.

There are no existing petroleum refineries in the Montana PRB study area, and no plans for the construction and operation of any petroleum refineries in this area have been identified. The nearest oil refineries to the Absaloka Mine are located more than 60 miles away in Billings and Laurel, Montana.

4.1.2.2 CBNG Development

The future of CBNG development is highly sensitive to the price of natural gas (BLM 2005c). During the late 1990s, CBNG production increased dramatically nationwide. The PRB contains significant coal deposits with methane gas at relatively shallow depths that would allow for economic recovery of the resource. The majority of the Montana PRB has the potential to see significant increases in CBNG development in the near future. There are currently more than 200 commercially producing CBNG wells in the State of Montana, all of which are located near Decker about 50 miles south of the Absaloka Mine. CBNG development in the Montana PRB is in part a result of successful development in the Wyoming PRB where CBNG activity started as early as 1993 (Flores et al. 2001). The PRB is estimated to contain approximately 39 trillion cubic feet (TCF) of total gas in place (Hill et al. 2000). Of those in-place reserves, 14.3 TCF is estimated to be recoverable, and the USGS estimates 5.0 TCF in the Montana portion of the PRB (BLM 2006a).

The PRB Coal Review does not address the past, present, and reasonably foreseeable development of CBNG resources in the Montana PRB area in detail. However, the *Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* (BLM 2003) and the Draft Supplement of that study (BLM 2006a) contain Reasonably Foreseeable Development and Reasonably Foreseeable Future Action scenarios for the development of CBNG in the Montana PRB. The BLM's "expanded development" scenario predicted the number of potential wells, based on known coal deposits in the Montana portion of the PRB, that would be drilled during the next 20 to 23 years, regardless of mineral ownership. The number of wells per county and Native American Reservation (Crow and Northern Cheyenne) that overlie the known coal occurrences was predicted. The estimate for expanded development ranges from 10,000 to 26,000 wells drilled, the upper limit includes the reasonably foreseeable future activity estimates of 4,000 wells each for the Crow and Northern Cheyenne reservations and 200 wells for the Custer National Forest.

Given current oil and gas stipulations and geographical distribution of the natural gas, it is unlikely that the maximum density of wells (one well per producing coal seam per 80 acres) would be achieved. Therefore, the Powder River Resource Management Area of Montana could host as many as 7,500 to

14,000 producing CBNG wells by 2026 (BLM 2006a). BLM's Preferred Alternative (Alternative H) in the Draft Supplement to the Statewide Oil and Gas EIS is for phased development, which would limit the number of approved federal Applications for Permit to Drill (APDs) by year and by geographic area.

The BLM's expanded development scenario in Draft Supplement to the Statewide Oil and Gas EIS predicts the level of disturbance associated with various development scenarios, implementation of BMPs, general assumptions for the numbers of various support facilities (e.g., compressors, access roads, utility lines), well spacing, and water discharge rates (BLM 2006a).

4.1.3 Other Development Activity

Sand, gravel and clinker (scoria) have been and are being mined in the Montana PRB study area. Aggregate, which is sand, gravel and stone, is used for construction purposes, typically for road base. Scoria or clinker (which is formed when coal beds burn and the adjacent rocks become baked) is used as aggregate when other sources, such as alluvial terrace sand and gravel deposits, are not available. Clinker deposits cover approximately 1,050 square miles within the Fort Union Formation in the northern PRB and commonly cap ridges and form topographic benches. Scoria accounts for over 90 percent of the aggregate mined within the Montana PRB study area and is mined in most counties within the Montana PRB (Mahrt 2007).

Increased sand, gravel, and scoria production and associated surface disturbance are anticipated in the Montana PRB study area in the future because aggregate would be required for road maintenance and new construction activities as other primary resources, such as coal and oil and gas, continue to be developed. New operations and increased production from existing operations can be expected. These operations would vary in size based on the immediate need from the primary industries, but there is no specific information about these projected operations.

Currently, the Tongue River Reservoir is the only key water storage reservoir in the Montana PRB Coal Review study area. The total surface area associated with this key water storage reservoir is approximately 3,600 acres. There are no known long range projections for development of additional reservoirs in the Montana PRB study area; therefore, the reasonably foreseeable development of additional reservoirs is not addressed in the BLM's PRB Coal Review or the Statewide Oil and Gas FEIS.

4.2 Cumulative Environmental Consequences

BLM's PRB Coal Review estimates the disturbance and reclamation acreages associated with all existing and projected coal mine development, under both upper and lower production scenarios, in the Montana PRB area for the years 2003, 2010, 2015, and 2020. Those disturbance and reclamation acreages under the lower and upper production scenarios are given in Tables 4-2 and 4-

3, respectively, for both PRB Subregions 4 and 5. It is projected that active mines in the Montana PRB would disturb about 58,387 acres through 2020 under the lower production scenario and 62,689 acres under the upper production scenario. Approximately 28,390 acres would be permanently reclaimed by 2020 under both development scenarios. The existing and projected coal mine-associated disturbance and reclamation acreages that are shown in Tables 4-2 and 4-3 include the Absaloka Mine during the baseline year (2003) and for 2010, 2015, and 2020. The Proposed Action is therefore consistent with and within the scenarios and ranges projected by this regional analysis.

Alternative H (the preferred development scenario) in BLM's *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* estimates that during the next 20 to 23 years, all regional projects related to CBNG, conventional oil and gas, and coal mining activities would cumulatively disturb about 117,000 acres of land surface during the development phase. These disturbances would be reduced to approximately 88,000 acres during the production phase. After production ends and lands used for oil and gas production and mining are abandoned, most land can be returned to premining land use (excluding permanent roads and facilities) (BLM 2006a).

The type, magnitude, and duration of cumulative environmental impacts that would likely result from implementing the Proposed Action, Alternative 1, or the No Action alternative, in addition to the reasonably foreseeable development in the Montana PRB, are briefly summarized in Table 2-4.

4.2.1 Topography and Physiography

The disturbances associated with the majority of the past, present, and projected activities have resulted in or would result in the alteration of the surface topography. Surface coal mining, which is projected to continue in the area of the existing coal mines shown in Figure 4-2, permanently alters the topography by removing the overburden and coal and then replacing the overburden. Recontouring during reclamation to match approximate original contour, as required by regulation, reduces the long-term impact to topography. After mined-out areas are reclaimed, the restored land surfaces are typically gentler, with more uniform slopes and restored basic drainage networks.

Oil and gas exploration and development has occurred and is projected to continue throughout portions of the Montana PRB study area. It also results in the temporary alteration of topography to accommodate facilities (e.g., well pads, compressor stations, access roads, utility corridors, etc.) but the disturbance tends to be shallow and it occurs in smaller, more discrete areas than coal mining. Oil and gas development-related disturbances are also spread out over a much greater surface area than mining-related disturbances.

The topography in the general vicinity of the surface mines in the Montana PRB is relatively diverse, ranging from the relatively flat, rolling terrain found in the lower reaches of the stream valleys to the relatively rugged terrain with steeply sloping coulees found in the uplands. After reclamation, the topography outside of the valley bottoms would be less rugged, more homogeneous, and gentler. In general, premining features that were more topographically unique (e.g., steeper hills and ravines and rock outcrops) would be permanently smoothed with more uniform slopes. The reshaped land surface, being more uniform and subdued, could be less visually attractive to some observers. Mine sites at the Sarpy Creek, Colstrip, and Decker areas are separated by relatively great distances and by relatively rugged, undisturbed topography.

4.2.2 Geology, Mineral Resources and Paleontology

The Fort Union Formation exists over 22,000 square miles in the PRB of Montana and Wyoming. The Wyodak-Anderson and Rosebud coal zones within the Tongue River Member of the Fort Union Formation are mined where the coal is strippable along the basin margin. The USGS (1999) estimates that the entire PRB contains a total of approximately 550 billion tons of in-place Wyodak-Anderson coal reserves, the Montana portion of which (Big Horn, Rosebud, and Powder River counties) contains a total of approximately 42.8 billion tons of in-place Wyodak-Anderson coal reserves. The Wyodak-Anderson coal zone with overburden thickness of 200 feet or less in these three counties of Montana contains approximately 20.4 billion tons of in-place reserves. 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.

Montana PRB coal production in 2006 was approximately 41.1 million tons. The PRB mines located in Big Horn and Rosebud counties produce around 99 percent of the coal produced in Montana each year (Montana Coal Council 2007).

In the coal mine areas, the overburden and coal would be removed and the overburden replaced, resulting in a permanent change in the geology of the area and a permanent reduction of coal resources.

In 2005, annual natural gas production within Montana was up 51.9 percent from 2000, reaching a total of 108.6 billion cubic feet (bcf) (MBOGC 2006). This increase in gas production is attributed partially to an increase in CBNG production in the PRB. CBNG production in 2005 accounted for 10.7 percent of the state's total gas production. The Montana Board of Oil and Gas Conservation (MBOGC) issued 575 permits to drill for CBNG in 2005, which is 462 permits more than the number issued in 2000 (MBOGC 2006).

Natural gas production has been increasing in Big Horn County, where the majority of the CBNG production in the state is taking place. CBNG production in Big Horn County increased to 11.6 bcf in 2005 from 3.6 bcf in

2000, an increase of approximately 322 percent (MBOGC 2006). According to Fidelity Exploration and Petroleum Company, Montana CBNG production is lagging behind Wyoming production due to differences in the resource, available infrastructure, regulatory issues, and pending litigation related to impacts from groundwater that is extracted to facilitate the production of methane from the coal seams (Fidelity 2006).

Oil and gas and related development accounts for most of the projected mineral resource development-related disturbances outside of the coal mining areas. It generally would result in moderate, long-term to permanent surficial disturbance and reclamation at discrete areas, as discussed above.

Alternative H (the preferred development scenario) in BLM's *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* estimates that during the next 20 to 23 years, development of CBNG on the Crow and Northern Cheyenne reservations would disturb an initial 24,200 acres, or 12,100 acres per reservation. Following the initial development phase, these disturbances would be reduced by a total of nearly 10,000 acres during the production phase. Each reservation would then have about 7,000 acres disturbed around the well pads, access roads, utility corridors, and water management facilities throughout the production phase (BLM 2006a). After production ends, most land can be returned to premining land use (excluding permanent roads and facilities).

According to the BLM's PRB Coal Review (BLM 2005c), no significant or unique paleontological localities have been recorded on federal lands in the PRB. However, lack of finds in the PRB does not mean that no scientifically significant fossils are present, as much of the area has not been adequately explored for paleontological resources. Mineral resource development activities in the Montana PRB therefore have the potential to adversely affect scientifically significant fossils if they are present. As only a relatively small portion of the PRB has been evaluated for the occurrence of paleontological resources, and the discrete locations for future development cannot be predicted at this time, no accurate estimate can be made of the number of sites that may be affected by cumulative development activities.

Impacts to paleontological resources as a result of the already-approved cumulative energy development occurring in the PRB consist of permanent 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 potential 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 processes involved in mineral extraction.

4.2.3 Air Quality

The Task 1A report for the PRB Coal Review (BLM 2005a) documents the modeled PRB air quality impacts of operations during a baseline year (2002) using actual emissions and operations for that year. Emissions from permitted minor sources were estimated, due to unavailability of actual emissions data. The baseline year analysis evaluated impacts both within the PRB itself and at selected sensitive areas surrounding the region. The analysis specifically looked at impacts of coal mines, power plants, CBNG development, and other development activities for the PRB at the individual receptor areas for both Montana and Wyoming. The Task 2 report for the PRB Coal Review (BLM 2005c) identified reasonably foreseeable development activities for the years 2010, 2015, and 2020. The Task 3A report for the PRB Coal Review (BLM 2006b) evaluates the impacts on air quality and air quality-related values that are projected to occur for the year 2010 using the development levels projected for 2010 and the same model and meteorological data that were used for the baseline year study in the Task 1A report. Impacts for 2015 and 2020 were projected qualitatively based on evaluation of anticipated changes in emissions and on modeled impacts for the 2010 lower and upper production scenarios.

Existing and projected emissions sources for the baseline year (2002) and 2010 analyses were identified within a study area comprised of Rosebud, Custer, Powder River, Big Horn, and Treasure counties.

The state-of-the-art guideline dispersion model used to evaluate impacts of the existing and projected source emissions on several source groups is explained in detail in the Task 1A and 3A reports of the PRB Coal Review (BLM 2005a and 2006b). The modeling approach for the Task 3A report used actual emissions from existing sources representative of 2002 operations and adjusted those emissions for the expected level of development in 2010. No specific emissions data were available for the projected levels of development. The baseline year emissions data were gathered from a variety of sources, but mainly relied on data gathered by the Wyoming Department of Environmental Quality (WDEQ) and the Montana Department of Environmental Quality (MDEQ).

The existing regional air quality conditions generally were very good in the PRB Coal Review Task 1A and 3A study area. There are limited air pollution emissions sources (few industrial facilities, including the surface coal mines, and few residential emissions in relatively small communities and isolated ranches) and good atmospheric dispersion conditions. The available data show that the region is in compliance with the ambient air quality standards for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) and there have been no monitored exceedances of the annual or 24-hour PM_{10} ambient air standard at the Absaloka Mine.

The baseline year (2002) modeling indicated some impacts of PM_{10} emissions within the near-field receptors of Montana. The modeling also showed some substantial baseline year impacts on visibility at the nearby Class I areas.

Predicted impacts from baseline year (2002) and projected 2010 emissions were modeled for three air quality criteria pollutants (NO_2, SO_2, and PM_{10}), along with changes in air quality-related values at Class I areas and at identified sensitive Class II areas. For regulatory purposes, the Class I Prevention of Significant Deterioration (PSD) evaluations are not directly comparable to the air quality permitting requirements because the modeling effort does not identify or separately evaluate increment-consuming sources that would need to be evaluated under the PSD program. The cumulative impact analysis focuses on changes in cumulative impacts instead of on a comparison to the PSD-related evaluations, which would apply to specific sources. Changes in impacts for three air quality criteria pollutants (NO_2, SO_2, and PM_{10}) were evaluated, along with changes in air quality-related values at Class I areas and at identified Class II sensitive areas.

Table 4-4 presents the modeled impacts on ambient air quality at the near-field receptors in Montana. The projected maximum impacts for the three pollutants are provided for the baseline year (2002) analysis and for both development scenarios for 2010. The baseline year impacts on ambient air quality were well below the ambient air quality standards, with the exception of PM_{10} emissions on some near-field receptors.

For the Montana near-field receptors, the maximum modeled 24-hour PM_{10} levels are above the National Ambient Air Quality Standards (NAAQS) and Montana AAQS for the baseline year as well as for both coal development scenarios for 2010. The upper development scenario shows an increase in the impact of more than 40 percent above the baseline year for this parameter. Impacts at all other receptors show compliance with the NAAQS and the Montana AAQS. Impacts of NO_2 and SO_2 emissions are predicted to be below the NAAQS and Montana AAQS at all Montana near-field receptors. Large percentage increases in annual SO_2 impacts are projected, but the impacts themselves are well below the NAAQS. A large portion of the impacts for all scenarios would be associated with coal-related sources, although non-coal sources would contribute a notable portion of the impact (BLM 2006b).

Table 4-5 lists the three Class I areas and two Class II areas where the modeled impacts are the greatest. Table 4-5 includes a comparison to ambient air quality standards and PSD increments; however, it must be noted that this modeling analysis did not separate PSD increment-consuming sources from those that do not consume increment. The PSD-increment comparison is provided for informational purposes only and cannot be directly related to a regulatory interpretation of PSD increment consumption. For the Class I Northern Cheyenne Indian Reservation, modeled impacts for the baseline year (2002) and the two production scenarios for 2010 are less than the annual SO_2 PSD Class I increment, slightly above the PSD Class I increment levels for

Table 4-4. Projected Maximum Potential Near-field Impacts (µg/m³).

Pollutant	Averaging Time	Base Year (2002) Impacts	2010 Lower Development Scenario Impacts	2010 Upper Development Scenario Impacts	NAAQS	Montana AAQS	PSD Class II Increments
Montana Near-field							
NO_2	Annual	8.85	11.3	11.8	100	100	25
	1-hour	365.8	415.9	519.5	---	564	---
SO_2	Annual	1.3	2.3	2.7	80	80	20
	24-hour	18.9	19.5	20.4	365	365	91
	3-hour	74.7	76.4	79.8	1,300	1,300	512
	1-hour	240.7	246.4	257.3	---	1,300	---
PM_{10}	Annual	19.6	22.5	27.7	50	50	17
	24-hour	**175.8**	**200.0**	**247.7**	150	150	30

[1] No standard or increment.
Bold values indicate exceedance of AAQS.
Source: PRB Coal Review Task 3A Report (BLM 2006b)

annual PM_{10}, 24-hour SO_2, and 3-hour SO_2, and well above the Class I increments for 24-hour PM_{10}. Also for the Class I Northern Cheyenne Reservation, modeled impacts for the upper coal production scenario for 2010 are above the PSD Class I increment level for annual NO_2. In the other two Class I areas (Washakie Wilderness Area and Wild Cave National Park), only the 24-hour PM_{10} are higher than the PSD Class I increment levels for the baseline year and both coal production scenarios for 2010. In the sensitive Class II areas (Crow Indian Reservation and Cloud Peak Wilderness Area), all modeled impacts are well below the Class II PSD increments, except that the 24-hour PM_{10} impacts are greater than the Class II 24-hour PM_{10} increments at the Crow Indian Reservation.

It should be noted in Table 4-5 that the modeled impacts for both the annual and 24-hour PM_{10} are considerably higher for the Northern Cheyenne Indian Reservation than for the Crow Indian Reservation, for both the baseline year and the two production scenarios for 2010. This could be interpreted to indicate that the Northern Cheyenne Indian Reservation is presently, and would continue to be, in closer proximity to more and/or greater sources of particulate emissions than the Crow Indian Reservation.

The projected modeled visibility impacts for the baseline year (2002) and for the lower and upper coal production scenarios for 2010 for all analyzed Class I and sensitive Class II areas are listed in Table 4-6. For the baseline year, the maximum visibility impacts at Class I areas were determined to be at the Northern Cheyenne Indian Reservation and at Wind Cave and Badlands National Parks in South Dakota. For these locations, modeling showed more than 200 days of impacts with a change of 10 percent or more in extinction. A 10 percent change in extinction corresponds to 1.0 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.

To provide a basis for discussing the modeled visibility impacts resulting from the projected increased production under the lower and upper coal production scenarios for 2010, the modeled visibility impacts for 2002 were subtracted from the model results for 2010. Table 4-6 shows the number of additional days that the projected impacts were greater than 10 percent for each site for the upper and lower coal production scenarios. Using the Northern Cheyenne Indian Reservation as an example, the modeling projects 305 days with impacts greater than 10 percent (1.0 dv) in 2002. Under the 2010 lower coal production scenario, the modeling projects an additional five days with impacts greater than 1.0 dv, or a total of 310 days with impacts greater than 10 percent. The modeled visibility impacts for the baseline year and the two production scenarios for 2010 were projected to be greater for the Northern Cheyenne Indian Reservation than for the Crow Indian Reservation.

For acid deposition, all predicted impacts are below the deposition threshold values for both nitrogen and sulfur compounds. There are substantial

Table 4-5. Maximum Predicted PSD Class I and Sensitive Class II Area Impacts (μg/m³)[1].

Location	Pollutant	Averaging Period	Base Year (2002) Impacts	2010 Lower Development Scenario	2010 Upper Development Scenario	PSD Class I/II Increments
Class I Areas						
Northern Cheyenne Indian Reservation	NO_2	Annual	2.0	2.3	**2.7**	2.5
	SO_2	Annual	0.6	0.8	0.9	2
		24-hour	**6.1**	**6.5**	**6.9**	5
		3-hour	**26.8**	**27.9**	**29.3**	25
	PM_{10}	Annual	**5.0**	**5.8**	**7.0**	4
		24-hour	**42.0**	**47.8**	**59.4**	8
Washakie Wilderness Area	NO_2	Annual	0.1	0.1	0.1	2.5
	SO_2	Annual	0.0	0.1	0.1	2
		24-hour	1.0	3.0	3.3	5
		3-hour	2.0	5.1	5.6	25
	PM_{10}	Annual	0.3	0.4	0.4	4
		24-hour	**14.5**	**16.5**	**16.9**	8
Wind Cave National Park	NO_2	Annual	1.2	1.5	1.7	2.5
	SO_2	Annual	0.2	0.4	0.5	2
		24-hour	1.2	3.5	3.8	5
		3-hour	3.5	9.9	10.3	25
	PM_{10}	Annual	1.3	1.7	1.9	4
		24-hour	**10.7**	**14.0**	**15.7**	8
Sensitive Class II Areas						
Crow Indian Reservation	NO_2	Annual	5.7	6.2	6.7	25
	SO_2	Annual	0.8	0.9	0.9	20
		24-hour	4.7	5.1	5.3	91
		3-hour	14.7	15.1	15.7	512
	PM_{10}	Annual	3.0	3.7	4.0	17
		24-hour	**30.5**	**35.1**	**36.7**	30
Cloud Peak Wilderness Area	NO_2	Annual	0.5	0.7	0.7	25
	SO_2	Annual	0.1	0.2	0.3	20
		24-hour	1.4	3.3	3.7	91
		3-hour	3.6	6.5	7.9	512
	PM_{10}	Annual	0.8	1.1	1.2	17
		24-hour	13.3	17.1	17.9	30

[1] The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increments consumption analysis.
Bold values indicate exceedance of PSD Class I or II standards.
Source: PRB Coal Review Task 3A Report (BLM 2006b)

Table 4-6. Modeled Change in Visibility Impacts at Class I and Sensitive Class II Areas.

Location	2002 No. of Days >10%	2010 Lower Development Scenario Change in No. of Days > 10%	2010 Upper Development Scenario Change in No. of Days > 10%
Federally and Tribally Designated Class I Areas			
Badlands National Park	238	19	26
Bob Marshall WA	12	2	4
Bridger WA	47	4	7
Fitzpatrick WA	42	3	5
Fort Peck Indian Reservation	69	8	9
Gates of the Mountain WA	14	6	7
Grand Teton National Park	26	2	5
North Absaroka WA	47	6	6
Northern Cheyenne Indian Reservation	305	5	10
Red Rock Lakes	16	3	5
Scapegoat WA	14	4	4
Teton WA	40	4	5
Theodore Roosevelt National Park	98	15	22
UL Bend WA	49	4	5
Washakie WA	53	2	3
Wind Cave National Park	261	11	15
Yellowstone National Park	42	7	8
Sensitive Class II Areas			
Absaroka Beartooth WA	53	3	5
Agate Fossil Beds National Monument	199	26	30
Big Horn Canyon National Rec. Area	108	7	8
Black Elk WA	263	16	22
Cloud Peak WA	137	8	8
Crow Indian Reservation	284	10	15
Devils Tower National Monument	279	15	21
Fort Belknap Indian Reservation	46	3	4
Fort Laramie National Historic Site	153	27	30
Jedediah Smith WA	23	1	2
Jewel Cave National Monument	267	14	18
Lee Metcalf WA	25	2	4
Mount Naomi WA	8	6	8
Mount Rushmore National Monument	248	19	25
Popo Agie WA	47	7	8
Soldier Creek WA	223	23	29
Wellsville Mountain WA	6	5	7
Wind River Indian Reservation	66	12	15

Source: PRB Coal Review Task 3A Report (BLM 2006b)

percentage increases in deposition under the lower and upper coal development scenarios for 2010; however, impacts remain well below the threshold values. The acid neutralizing capacity (ANC) of sensitive lakes also was analyzed, and results are summarized in Table 4-7. The baseline year study indicated that none of the lakes had predicted significant impacts; however, the lower and upper development scenarios for 2010 show an increased impact at Florence Lake, leading to an impact that is above the 10 percent ANC threshold. Impacts also are predicted to be above the threshold for Upper Frozen Lake.

For 2015 and 2020, the PRB Coal Review Task 3A report includes a qualitative analysis of potential air quality impacts and the impacts from individual source groups, based on the projected changes from 2002 to 2010 for the respective production scenarios. The production from conventional oil and gas and CBNG activities is projected to peak at 2010, with slight declines predicted over the following decade. Therefore, from these sources, expected impacts would decrease slightly from 2010 to 2015 and 2020. The coal mining sources would be the major contributors to PM_{10} impacts in the near-field, and these impacts would result from the proximity of the receptors to the coal mining operations. If coal mines expand or relocate, those impacts likely would follow that development; however, the specific impacts would need to be addressed with a more refined modeling effort, specifically including accurate source parameters. Power plants currently are the major contributors to all SO_2 impacts in the near-field in Montana. However, the impacts are well below any ambient standard or PSD increment, and continued expansion should not jeopardize the attainment of those standards. Impacts on NO_2 concentrations are the result of emissions from all the source groups. No one-source group dominates the NO_2 impacts in the near-field (BLM 2006b).

A pattern that is similar to the near-field receptors also holds true for the Class I and sensitive Class II receptor groups. Essentially, the mine operations would continue to dominate the PM_{10} impacts, the power plants would continue to dominate the SO_2 impacts (although they would continue to be below the standards), and the overall source groups would continue to contribute to NO_2 impacts, but impacts should remain below the NO_2 standard (BLM 2006b).

Based on modeling results, none of the acid deposition thresholds were exceeded at Class I areas for either the baseline year or for the lower or upper development scenarios for 2010. In general, the projected increases in coal development (and power plants) are not expected to raise the deposition levels above the threshold, extended into 2020. The only concern relates to the acid deposition into sensitive lakes. The model results showed that the increased deposition, largely from SO_2 emissions from power plants, exceeded the thresholds of significance for the ANC at two sensitive (high alpine) lakes. The results indicate that with increased growth in power plant operations, the reduced ANC of the sensitive lakes would become significant and would need to

Table 4-7. Predicted Total Cumulative Change in Acid Neutralizing Capacity of Sensitive Lakes.

Location	Lake	Background ANC (μeq/L)	Area (hectares)	Base Year 2002 Change (percent)	2010 Lower Development Scenario Change (percent)	2010 Upper Development Scenario Change (percent)	Thresholds (percent)
Bridger Wilderness Area	Black Joe	67.0	890	1.3	1.88	1.97	10
	Deep	60.0	205	1.4	2.08	2.18	10
	Hobbs	70.0	293	0.9	1.37	1.43	10
	Upper Frozen	5.0	65	0.7[1]	0.99[1]	**1.04**[1]	1[1]
Cloud Peak Wilderness Area	Emerald	55.3	293	5.3	6.59	6.89	10
	Florence	32.7	417	8.9	**11.52**	**12.03**	10
Fitzpatrick Wilderness Area	Ross	53.5	4,455	0.9	1.37	1.43	10
Popo Agie Wilderness Area	Lower Saddlebag	55.5	155	1.9	2.58	2.70	10

1 Data for Upper Frozen Lake presented in changes in μeq/L rather than percent change. (For lakes with less than 25 μeq/L background ANC.)
Bold values indicate exceedance of threshold values.
Source: PRB Coal Review Task 3A Report (BLM 2006b)

be addressed carefully for each proposed major development project (BLM 2006b).

The study also modeled impacts of selected hazardous air pollutant emissions (benzene, ethyl benzene, formaldehyde, n-hexane, toluene, and xylene) on the near-field receptors in Montana and Wyoming. Model results for the 2010 upper development scenario show that impacts were predicted to be above the acute Reference Exposure Level for formaldehyde [94 micrograms per cubic meter ($\mu g/m^3$)] at only two receptors in Wyoming but are below all Reference Exposure and Reference Concentrations for Chronic Inhalation levels in Montana and for other compounds in Wyoming. Essentially, the modeled impacts for 2010 showed a continuation of the patterns exhibited for the baseline year analysis.

As discussed in Section 3.4 of this EIS, the South Extension development area would be mined as an integral part of the Absaloka Mine. Therefore, the cumulative air quality impacts from the Proposed Action would be a continuation of the current conditions and would not be significantly different from those of the existing mine. Air quality modeling indicates that the projected mine activities at the Absaloka Mine would be in compliance with PM_{10} ambient air standards for the life of the mine at the permitted mining rate of 11 million tons per year. WRI proposes to continue mining at a rate of 6.5 to 7.0 million tons per year during time that the South Extension development area would be mined.

4.2.4 Water Resources

Surface and groundwater are used extensively throughout the PRB for agricultural water supply, municipal water supply, and both domestic and industrial water supply. Surface water use is limited to major perennial drainages and agricultural areas within the basin are found mainly along these drainages. Municipal water supply comes from a combination of surface and groundwater. Domestic and industrial water supply primarily is from groundwater.

The PRB Coal Review Task 3B (Cumulative Water Effects) report is currently in preparation. This report, which will describe projected effects on ground and surface water as a result of projected development in the PRB, will be incorporated into future EIS analyses when it is complete.

4.2.4.1 Groundwater

There are many aquifers in the Montana portion of the PRB that represent different hydrologic flow regimes, including unconfined as well as confined aquifers, bedrock aquifers and unconsolidated alluvial aquifers. Aquifers range from the shallow Quaternary age alluvium in the stream courses to the Mississippian age Madison Formation at nearly 10,000 feet below the surface. The following list of significant aquifer systems in the Montana portion of the

PRB that can be used for water supply gives the approximate depth from land surface that each is generally expected to occur:

- Quaternary Alluvial Aquifer System, surface to 90 feet;
- Fort Union Aquifer System, 100 to 400 feet;
- Hell Creek/Fox Hills Aquifer System, 100 to 500 feet;
- Judith River Aquifer System, 2,500 feet;
- Eagle Aquifer System, 2,700 to 5,700 feet;
- Dakota/Lakota Aquifer System, 5,600 to 8,600 feet;
- Madison Aquifer System, 10,000 feet

The Fort Union Aquifer System includes the coal and overburden aquifers that are directly affected by surface coal mining. It is a major source of local water supply for domestic and stock water use, and it is also the aquifer where the major pumpage from CBNG wells occurs. Coal beds of the Tongue River Member of the Fort Union Formation are the most-used aquifers in the Montana PRB where they are largely used for stock watering (Arthur et al. 2007). Surface coal mining and the development of CBNG resources have the potential to produce cumulative impacts to groundwater resources, particularly the Fort Union coal beds, when compared to the existing environment. Dewatering and the resulting drawdown of coal seam aquifer water levels are the unavoidable impacts of mining and CBNG development.

Watersheds are important to predicting these groundwater impacts, and the areas of highest potential for CBNG development are within the northern portion of the Upper Tongue River watershed, the southern section of the Lower Tongue River watershed, the western section of the Middle Powder River watershed, and the eastern section of the Rosebud watershed (Arthur et al. 2007). Currently, all of the commercially producing CBNG wells in the State of Montana are located near Decker in the Upper Tongue River watershed, at the southern edge of the Montana portion of the PRB. The Absaloka Mine and proposed South Extension development area are located within the Sarpy Creek watershed, which is part of the Lower Yellowstone-Sunday watershed. Table 4-8 shows the estimated total groundwater volumes, per watershed, that exist in the Fort Union coal seams of the Montana PRB. These estimates utilize the area of each watershed having known coal occurrences that could be developed for CBNG production multiplied by an average coal seam thickness of 70 feet (from USGS 1999b). This volume is then multiplied by a porosity estimate of 2.0 percent to derive the total in-place groundwater volume in the Fort Union coal seams for each watershed. It should be noted that this total does not include the volume of all coal seams in the Montana portion of the PRB, but only those coals in the CBNG potential development areas. Nor do these totals include the non-coal aquifers (Arthur et al. 2007).

As discussed in Section 4.1.2.2, BLM's expanded development scenario in the *Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings Resource Management Plans* predicted the number of potential CBNG wells that could be drilled in the Montana PRB during the next 20 years

Table 4-8. Total Groundwater Resources in the Fort Union Coal Seams of the Montana PRB.

Watershed	Total Watershed Area (acres)	Recoverable Groundwater per Watershed (acre-feet)
Little Bighorn	87,000	114,784
Little Powder River	29,500	45,914
Lower Bighorn	121,500	172,176
Lower Tongue	1,374,000	1,928,375
Lower Yellowstone-Sunday	687,500	964,187
Middle Powder	368,500	516,529
Mizpah	24,000	34,435
Rosebud	81,400	1,136,363
Upper Tongue	589,000	780,533
TOTAL	**4,095,000**	**5,693,296**

Source: Arthur et al. 2007

to range from 10,000 to 26,000. Using the maximum potential well development scenario, Arthur et al. (2007) estimated the potential water production for each PRB watershed per year. Table 4-9 illustrates that the watersheds with the greatest water production are those with the most wells (i.e., Upper Tongue River, Lower Tongue River, and Rosebud watersheds). The maximum total water production for all CBNG wells in the Montana PRB watersheds under the maximum development scenario is approximately 100,000 acre-feet per year, or approximately 1.75 percent of the water in the coal seams within the CBNG potential development areas. Tables 4-8 and 4-9 also illustrate that the total water production predicted for all CBNG wells in the Lower Yellowstone-Sunday watershed would be 10,354 acre-feet per year, or approximately 1.1 percent of the 964,187 acre-feet of water in the coal seams of that watershed.

As discussed in Chapter 3, Section 3.5.1.2.1, maximum groundwater losses from all affected aquifers due to mining the South Extension development area are predicted to be approximately 94 gallons per minute, or 152 acre-feet per year. The mining-related groundwater losses in the Lower Yellowstone-Sunday watershed would therefore be about 1.5 percent of the maximum total water production predicted for CBNG development in that watershed.

Each surface coal mine must assess the probable hydrologic consequences of mining as part of the mine permitting process. The MDEQ must evaluate the cumulative hydrologic impacts associated with each proposed mining operation before approving the mining and reclamation plan for each mine, and it must

Table 4-9. Maximum Potential Produced CBNG Water by Montana PRB Watershed.

Watershed	Effective Area (acres)	Maximum Producing CBNG Wells	Average Production Rate Per Well (gpm)	Maximum Potential CBNG Water per Year (acre-feet)
Little Bighorn	87,179	1,050	2.5	4,224
Little Powder River	29,605	278	2.5	1,125
Lower Bighorn	121,538	1,200	2.5	4,843
Lower Tongue	1,374,159	5,183	2.5	20,890
Lower Yellowstone-Sunday	687,303	2,568	2.5	10,354
Middle Powder	368,349	3,167	2.5	12,764
Mizpah	23,941	224	2.5	895
Rosebud	81,395	5,397	2.5	21,763
Upper Tongue	589,009	5,806	2.5	23,416
TOTAL	**4,095,034**	**24,873**	**2.5**	**100,274**

Source: Arthur et al. 2007

find that the cumulative hydrologic impacts of all anticipated mining would not cause material damage to the hydrologic balance outside of the permit area for each mine. As a result of these requirements, each existing approved mining permit includes an analysis of the hydrologic impacts of the surface coal mining proposed at that mine. If revisions to mining and reclamation permits are proposed, then the potential cumulative impacts of the revisions must also be evaluated.

A source of data on the impacts of surface coal mining on groundwater is the monitoring that is required by MDEQ and administered by the mining operators. Each mine is required to monitor groundwater levels and quality in the coal and in the shallower aquifers in the area surrounding its operations. Monitoring wells are also required to record water levels and water quality in the backfilled areas. Annual hydrology reports are submitted to the regulatory agencies by each mine.

The major groundwater issues related to surface coal mining that have been identified are:

- 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;

- the effects to aquifers used for water supply that are stratigraphically deeper than the mine pits and are not disturbed by mining;

- changes in water quality as a result of mining; and

- potential overlapping drawdown due to proximity of coal mining and CBNG development.

The impacts of surface coal mining on a cumulative basis for each of these issues are discussed in the following paragraphs.

The effect of replacing the coal and overburden with backfilled overburden material is the first major groundwater concern. The following discussion of recharge, movement, and discharge of water in the backfill aquifer is excerpted from the 1988 U.S. Geological Survey Water-Resources Investigation Report entitled "*Cumulative Potential Hydrologic Impacts of Surface Coal Mining in the Eastern Powder River Structural Basin, Northeastern Wyoming*", also known as the "USGS CHIA" (Martin et al. 1988):

> Postmining recharge, movement, and discharge of groundwater in the Wasatch aquifer and Wyodak coal aquifer will probably not be substantially different from premining conditions. Recharge rates and mechanisms will not change substantially. Hydraulic conductivity of the spoil aquifer will be approximately the same as in the Wyodak coal aquifer allowing groundwater to move from recharge areas through the spoil aquifer to the undisturbed Wasatch aquifer and Wyodak coal aquifer to the west.

Data from backfill monitoring wells at the Absaloka Mine demonstrate that recharge to the backfill occurs readily in the Montana PRB as well. The cumulative size of the backfilled areas in the Montana PRB would be increased by approximately 1,770 acres and the duration of mining activity would be increased by mining the proposed South Extension development area. Since the mined-out areas are being backfilled and the monitoring data demonstrate that recharge of the backfill is occurring, substantial additional impacts are not anticipated as a result of the Proposed Action or Alternative 1. There are no other active or proposed surface coal mines in the Sarpy Creek drainage basin, and because no other mines share an interconnected groundwater system, there would be no cumulative effects from mining to the post-mining groundwater regimes in the Sarpy Creek watershed.

The second major groundwater issue is the assessment of cumulative groundwater level drawdown impacts. There are no other active or proposed surface coal mines in the Sarpy Creek drainage basin. The closest mine in proximity is the Rosebud Mine, which is located about 20 miles to the east (Figure 4-2) and these two mines do not share an interconnected groundwater system. Figures 3-10 and 3-11 depict the predicted drawdown in the overburden and Rosebud-McKay coal aquifers, respectively, attributed to pit dewatering over the life of mining the proposed South Extension development area. These drawdown prediction figures illustrate that the areal extent of drawdown in both the overburden and coal aquifers due to pit dewatering would be limited to a maximum distance of no more than ½ mile from the pits. These figures and the discussion in Section 3.5.1.2.1 illustrate and explain that drawdowns would not extend beyond the boundary faults or into those areas where the aquifers are not saturated.

Groundwater level drawdowns that would occur due to mining the South Extension development area, in both the overburden and coal seam aquifers, will occur in the immediate vicinity of the mine pits and are not projected to extend much beyond the boundary of the proposed mine development area (Nicklin 2006). There is no clear correlation between the historical water level drawdowns in the overburden and coal aquifers and distances from the Absaloka Mine pits. Historical water level changes resulting from mining have been variable, and in some cases, difficult to distinguish from normal water level fluctuations. As discussed in Section 3.5.1.1.3, the coal seam aquifers have been mined north of the proposed South Extension development area since the mid-1970s, and the dewatering effects from the mining operation have not extended into the proposed development area.

Therefore, no overlapping, or cumulative, groundwater level drawdown impacts from surface coal mining, including that of the current Absaloka mining operation, to the groundwater regimes in the Sarpy Creek watershed are anticipated.

The third major groundwater issue is the potential cumulative effects to aquifers used for water supply that are stratigraphically deeper than the mine pits and are not disturbed by mining. Both the Absaloka Mine and the Rosebud Mine utilize wells completed in the Madison Formation as a source of industrial water supply. Absaloka Mine's industrial water supply is from a 7,977-foot-deep well, and the Rosebud Mine's industrial water supply is from a 9,336-foot-deep well. The distance separating these two mine supply wells (approximately 20 miles) is too great for there to be interference between them, so no cumulative effects to the Madison Formation would be expected to occur during mine life.

The fourth major groundwater issue is the effect of mining on groundwater quality. In a regional study of the cumulative impacts of coal mining in the Wyoming PRB, the median concentrations of dissolved solids and sulfates were found to be higher in water from backfill aquifers than in water from either the Wasatch Formation overburden or the Wyodak coal aquifer (Martin et al. 1988). This is expected because blasting and movement of the overburden materials exposes more surface area to water, increasing dissolution of soluble materials, particularly from the overburden materials that were situated above the saturated zone in the premining environment.

One pore volume of water is the volume of water that would be required to saturate the backfill following reclamation. The time required for one pore volume of water to pass through the backfill aquifer is greater than the time required for the postmining groundwater system to reestablish equilibrium. According to the USGS CHIA, estimates of the time required to reestablish equilibrium range from tens to hundreds of years (Martin et al. 1988).

The major current use of water from the aquifers being replaced by the backfill is for livestock because these aquifers are typically too high in dissolved solids for domestic use and well yields are typically too low for irrigation (Martin et al. 1988). Backfill groundwater quality data collected since the preparation of the USGS CHIA support the conclusion that water from the backfill will generally be acceptable for its current use, which is livestock watering, even before equilibrium is established. The incremental effect on groundwater quality due to leasing and mining the South Extension development area would be to increase the total volume of backfill and, thus, the time for equilibrium to reestablish.

The fifth major groundwater issue of concern is the potential for cumulative groundwater drawdown due to the proximity of coal mining and CBNG development. As previously stated, all of the commercially producing CBNG wells in the State of Montana are located approximately 50 miles south of the Absaloka Mine in the Upper Tongue River watershed, although the majority of the Montana PRB has the potential to see significant increases in CBNG development in the near future.

As addressed in Section 3.5.1.2.1, mining-related drawdown in the Rosebud-McKay coal aquifer in the vicinity of Absaloka Mine's proposed South Extension development area would be restricted by the northeast-trending structural fault planes that bound the northern and southern sides of the proposed mine area. Truncation of the coal seams by the structural faults serves as a barrier to groundwater flow; therefore, potentiometric declines during active mining would be strongly controlled by these faults. Furthermore, the seams that would be mined are not continuous to the west due to erosion and/or burning, so drawdowns can extend only to the northeast at any appreciable distance from the mine. Drawdown attributed to any other activity must therefore be present within the same fault block and be located northeast of the South Extension development area in order for a cumulative drawdown effect to occur.

There are no overlapping groundwater impacts from the Absaloka Mine and CBNG development in the Montana PRB at this time; however, should CBNG production in the same Rosebud-McKay coal seam be developed in the general area to the northeast of the Absaloka Mine sometime in the next 11 to 12 years, dewatering-associated drawdown would be expected to occur. Groundwater impacts from CBNG development and surface coal mining would be additive in nature and that addition of CBNG development would extend the area experiencing drawdown to the east of the mining area. There may then be potential for conflicts to occur over who (coal mining or CBNG operators) is responsible for replacing or repairing private wells that are adversely affected by the drawdowns. State law (82-11-175, MCA) requires CBNG operators to offer a reasonable mitigation agreement to each person who holds an appropriation right or a permit to appropriate groundwater and for which the point of diversion is within one mile of a CBNG well; or one-half mile of a well that is adversely affected by a CBNG well. These mitigation agreements must address the reduction or loss of water resources and must provide for prompt supplementation or replacement of water from any natural spring or water well adversely affected by the CBNG well.

After CBNG development and coal mining projects are completed, it will take longer for groundwater levels to recover due to the overlapping drawdown impacts caused by the dewatering and de-pressuring of the coal aquifer by both operations.

4.2.4.2 Surface Water

Streamflows may be reduced during surface coal mining because federal and state regulations require capture and treatment of all runoff from mined lands in sedimentation ponds to meet effluent standards before it is allowed to flow off the mine permit areas. Also, the surface coal mine pits are large and these pits, together with ponds and diversions to keep water out of the pits can intercept the runoff from significant drainage areas. Coal mines in the PRB fall under EPA's Western Alkaline Coal Mine Subcategory regulation (40 CFR Part 434) to control runoff and sediment from reclamation areas. This regulation requires coal mine operators in the arid and semiarid west to implement Best Management Practices (BMPs) where mined land is reclaimed to maintain the average annual sediment yield at or below premining conditions. Therefore, reestablishment of streamflows may be expedited after mining if sedimentation ponds are not used to meet premining sediment yields.

The proposed South Extension development area would be an extension of the existing Absaloka Mine and is entirely within the Sarpy Creek watershed. The closest active surface mining disturbance to the Absaloka Mine is approximately 20 miles to the east at the Rosebud Mine. Due to the distance between these operations and the fact that they are in two different watersheds, there would not be overlapping surface water impacts. No other reasonably foreseeable surface mining developments within the Sarpy Creek watershed have been forecasted.

The entire disturbance area of the Absaloka Mine, including the proposed South Extension development area (7,472 acres) represents about 2.6 percent of the Sarpy Creek watershed at its confluence with the Yellowstone River and about 1.1 percent of the Lower Yellowstone-Sunday watershed. These 7,472 acres would not all be disturbed at any one time.

Currently, there is no CBNG production in the Sarpy Creek drainage basin. The surface water resources in the basin consist primarily of intermittent and ephemeral streams and scattered stock ponds. The projected CBNG development would cause direct surface disturbance of these surface water features. Discrete locations for development disturbance and reclamation areas cannot be determined based on existing information. However, the projected disturbance would primarily involve the construction of linear facilities such as product gathering lines and road systems.

The development of CBNG resources in the Sarpy Creek watershed could potentially increase surface flow and affect surface water quality in the drainage. BLM's Alternative F development scenario (the high range for phased development) in the *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* (BLM 2006a) predicts a total potential of 1,700 CBNG wells could be drilled within the entire Lower Yellowstone-Sunday watershed, which Sarpy Creek is within, over a 20-year development period. Under BLM's Preferred Alternative (Alternative H), CBNG development is expected in approximately the same total numbers predicted for Alternative F, although the rate of development would differ slightly. Under Alternative H, water produced from CBNG wells would be managed to emphasize beneficial use while assuring Montana Pollutant Discharge Elimination System (MPDES) water quality requirements are met. If CBNG discharges cause surface water quality standards to be exceeded, no additional CBNG discharges would be allowed from federal wells upstream. BLM would require that the operator submit a Water Management Plan and that it address both site-specific and cumulative effects of proposed water management methods prior to approval of any APDs. BLM's Preferred Alternative management option would maintain the beneficial uses of existing surface water resources in the Montana portion of the PRB (BLM 2006a).

The key water quality parameters for potential effects of CBNG development are sodicity (as sodium adsorption ratio, or SAR) and salinity (as electrical conductivity, or EC). The MDEQ believes irrigated agriculture is the most sensitive use for surface water, so protection of water quality for irrigation use will be sufficient to protect all other beneficial uses.

The water quality standards for SAR and EC were adopted in 2003 by the Montana Board of Environmental Review to protect the beneficial use of the streams and rivers in the Montana PRB, i.e., irrigated agriculture. The standards, which have been approved by the EPA, establish the maximum levels of EC and SAR that may be discharged without harming plants and soils. As such, all discharge permits issued in Montana must contain provisions that limit EC and SAR. In March 2006, the Montana Board of Environmental Review amended its regulation implementing Montana's nondegradation policy in terms of EC and SAR. The Board adopted the portion of the proposed rule that designated EC and SAR as "harmful" parameters. The amended regulations became effective under state law on May 19, 2006, but they will not be enforced until approved by the EPA.

Under Montana's nondegradation law, any change in the existing quality of "high quality" waters (which means the ambient quality of the water body is better than the water quality standards established for EC and SAR) is prohibited unless an authorization to degrade is obtained from MDEQ, or the change is deemed "nonsignificant". Under the newly amended regulation, any change in the existing quality of a high quality stream is deemed "significant" when the ambient quality of the stream is 40 percent of the standard or above. If implemented, the effect of this rule would be that CBNG discharges to surface waters in Montana will need to be treated to ambient water quality standards.

Arthur et al. (2007) predicted a maximum potential CBNG water discharge to the Lower Yellowstone-Sunday watershed to be 10,364 acre-feet per year. As discussed in Section 3.5.2.2.1, changes to the overall surface runoff and water quality characteristics of Middle Fork Sarpy Creek and Sarpy Creek are expected to be negligible during and after mining of the South Extension development area. Streams that drain the South Extension development area are ephemeral under natural conditions and are dry throughout most of the year. Once mining is completed, the pits would be backfilled and drainage patterns would be reestablished to premine conditions. Therefore, surface mining and potential CBNG development would have negligible cumulative impacts to surface water resources in the Sarpy Creek and Lower Yellowstone-Sunday drainage basins.

4.2.5 Alluvial Valley Floors

Regulatory determinations of alluvial valley floor (AVF) occurrence and location are completed as part of the permitting process for coal mining operations because their presence can restrict mining activities under federal and state laws. The MDEQ administers the AVF regulations for coal mining activities in Montana. Coal mine-related impacts to AVFs generally are not permitted if the AVF is determined to be significant to agriculture. AVFs that are not significant to agriculture can be disturbed during mining, but the essential hydrologic functions must be restored as part of the reclamation process.

As a result of past permitting efforts at Absaloka Mine, the East Fork of Sarpy Creek was designated an AVF significant to farming. The lower portion of a tributary to East Fork Sarpy Creek (East Coulee) was designated an AVF non-significant to farming. Both the East Fork Sarpy Creek and East Coulee AVFs are considered adjacent to Absaloka Mine and neither has been disturbed by mining. The Middle Fork Sarpy Creek within Absaloka Mine's current permit area has been determined by MDEQ to not meet AVF criteria. Sarpy Creek has not been assessed for the presence of AVFs because the existing and proposed mine operations are sufficiently distant that adjacency is not an issue.

The formal AVF designation and related regulatory programs are specific to coal mining operations; however, other development-related activities in the Sarpy Creek drainage basin would potentially impact AVF resources. No cumulative impacts to AVFs are expected to occur as a result of mining the South Extension development area however, because no designated AVFs would be disturbed and disruptions to the overall streamflow of Middle Fork Sarpy Creek and Sarpy Creek that might supply downstream AVFs during mining are expected to be negligible.

4.2.6 Soils

The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining for the lower and upper production scenarios in PRB Subregions 4 and 5 (BLM 2005c) are shown in Tables 4-2 and 4-3, respectively. Tables 4-2 and 4-3 include existing and projected disturbance and reclamation at the Absaloka Mine. BLM's PRB Coal Review does not address the cumulative effects to soils from all reasonably foreseeable development projects in the Montana PRB. BLM's Draft Supplement to the Montana Statewide Oil and Gas FEIS (BLM 2006a) does however project the ranges of total surface areas and impacts on soils that would occur from various potential development activities, and the rates that those disturbances would occur under both expanded (or full-scale) and phased development scenarios.

Of the types of development projects in the Montana PRB, coal mining activities would create the most concentrated cumulative impacts to soils. This is due to the large acreages involved and the tendency of mining operations to occur in contiguous blocks. These factors may encourage widespread accelerated wind and water erosion. In addition, extensive soil handling may reduce soil quality through compaction and corresponding loss of permeability; declining microbial populations; reduced fertility and organic matter; potential mixing of saline and/or alkaline soil zones into seedbeds; and the limited availability of suitable soil resources for reclamation uses in some areas. However, for surface coal mining operations there are measures that are either routinely required or can be specifically required as necessary to reduce impacts to soil resources and to identify overburden material that may be unsuitable for use in reestablishing vegetation, as discussed in Sections 3.3.1.3 and 3.8.3. Disturbed areas would also be progressively reclaimed over time by planting appropriate vegetation species to restore soil productivity and prevent soil erosion. Cumulative impacts to soils resulting from the Absaloka Mine South Extension development plan would be a function of disturbance and reclamation of additional land to sustain current production over an extended time rather than new or increased coal production.

Development activities related to oil and gas (particularly CBNG development), such as increased vehicle traffic, vegetation removal, soil salvage and redistribution, discharge of CBNG-produced groundwater, and construction and maintenance of project-specific components (e.g., roads and rights-of-way, well pads, industrial sites, and associated ancillary facilities) would result in cumulative impacts to soils in portions of the Montana PRB. In general, soil disturbance and handling from these activities would generate both long-term and short-term impacts to soil resources through accelerated wind or water erosion, compaction, other declining soil quality factors, or the essentially permanent removal of soil resources at industrial sites. Potential impacts to soils would be minimized by BMPs and restrictions on activities as defined through project-specific NEPA assessments. There would also be permitting requirements from state and federal agencies that include provisions for minimizing impacts to soils.

Under BLM's Preferred Alternative (Alternative H) development scenario in the *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans*, over a 23-year timeframe the cumulative disturbances from all regional projects would result in the disruption of about 117,000 acres during the development phase. These disturbances would be reduced to about 88,000 acres during the production phase of CBNG, conventional oil and gas, and coal mining. After production ceases and lands used for production and mining are abandoned, most land can be returned to pre-disturbance land uses (excluding permanent roads and facilities). During construction activities, there would be a temporary increase in soil erosion, runoff and sedimentation, but there would be minimal unavoidable, irreversible and irretrievable impacts to soils. CBNG-produced water would be managed per a site-specific Water Management Plan with first priority being beneficial use of the produced water; impoundments designed to minimize or mitigate impacts to soil, water, and vegetation; an option for injection of CBNG water; and no degradation of a watershed. All of these factors would reduce the detrimental impacts caused by application of high-SAR water to soils (BLM 2006a).

Development of CBNG on the Crow and Northern Cheyenne reservations under Alternative H would disturb an initial 24,200 acres, or 12,100 acres per reservation. Following the initial development phase, these disturbances would be reduced by a total of nearly 10,000 acres. Each reservation would then have about 7,000 acres of disturbed soils around well pads, access roads, utility corridors, and water management facilities throughout the production phase (BLM 2006a).

4.2.7 Vegetation, Wetlands and Riparian Areas

Development/disturbance activities similar to those described above in Section 4.2.6 would result in cumulative impacts to vegetation, wetlands and riparian areas in portions of the Montana PRB. The baseline year (2003) area of disturbance and reclamation and the projected cumulative areas of disturbance and reclamation for 2010, 2015, and 2020 related to surface coal mining for the lower and upper production scenarios in PRB Subregions 4 and 5 (BLM 2005c) are shown in Tables 4-2 and 4-3. Tables 4-2 and 4-3 include existing and projected disturbance and reclamation at the Absaloka Mine. Cumulative impacts to vegetation, wetlands and riparian areas resulting from the Absaloka Mine South Extension development plan would be a function of disturbance and reclamation of additional land to sustain current production over an extended time rather than new or increased coal production.

The study area for vegetation (including wetlands and riparian areas) did not include the Montana portion of the PRB in BLM's PRB Coal Review. The Draft Supplement to the Statewide Oil and Gas FEIS (BLM 2006a) did however project the acreages potentially impacted in each habitat type for each of the reasonably foreseeable development scenarios, for both the Powder River and Billings RMP areas.

4.2.7.1 Vegetation

The PRB is characterized as a mosaic of general vegetation types, which include prairie grasslands, shrublands, forested areas, and riparian areas. These broad categories often represent several vegetation types that are similar in terms of dominant species and ecological importance. Fourteen vegetation types were identified within the Wyoming portion of the PRB Coal Review study area, of which 10 primarily consist of native vegetation and are collectively classified as rangeland. These vegetation types include short-grass prairie, mixed-grass prairie, sagebrush shrubland, other shrubland, coniferous forest, aspen, forested riparian, shrubby riparian, herbaceous riparian, and wet meadow. The remaining vegetation types support limited or non-native vegetation and include cropland, urban/disturbed, barren, and open water. These are the same predominant vegetation types within the Montana portion of the PRB.

In general, impacts to vegetation can be classified as short term and long term. Potential short-term impacts arise from the removal and disturbance of herbaceous species during a project's development and operation that would cease upon project completion and successful reclamation in a given area. Potential long-term impacts would also include an extended loss of vegetation and vegetative productivity on areas that would not be reclaimed in the near term (e.g., power plant sites). Species composition on the reclaimed lands may be different than on the surrounding undisturbed lands. The removal of woody species would be considered a long-term impact since these species could take 25 years or longer to attain a plant size comparable to woody species in undisturbed areas.

Impacts to vegetation related to disturbance from CBNG development would be added to the impact of surface coal mining. Generally, disturbances related to mining are intense but concentrated in a discrete area. Active mine areas are progressively reclaimed and reseeded to reestablish vegetation that will generally result in an increase in grasslands with less plant diversity than was present under natural conditions. Disturbances related to CBNG development are scattered and spread over large areas. Construction of CBNG-related facilities and roads would cause the primary effects on vegetation. For a developed well, about 40 percent of the original drill site would remain disturbed for the life of the well (20 years); however, unsuccessful exploratory sites would be reclaimed. Wildlife habitat and livestock production capabilities may be diminished or lost over the long term through direct loss of vegetation. Indirect impacts may include the dispersal of noxious and invasive weeds within and beyond surface disturbance boundaries, which would result in the displacement of native species and a reduction in plant diversity. In addition, the discharge of CBNG-produced water with a sodium adsorption ratio (SAR) that exceeds that recommended for agricultural uses could impact existing vegetation, as discussed in the PRB Coal Review, Task 1D Report (BLM 2005c).

Under BLM's Preferred Alternative development scenario (Alternative H) in the *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans*, Plans of Development (PODs) that include mitigation measures would be required for development of CBNG resources on BLM-administered lands. The PODs would be developed in consultation with the Indian tribes, surface owners, and other involved permitting agencies. Each POD would include a site-specific Reclamation Plan, Wildlife Monitoring and Protection Plan, Surface Use Plan, Noxious Weed Management Plan, and Water Management Plan. BLM would limit the amount of disturbed crucial sagebrush habitat on BLM surface or on private surface overlying federal minerals to avoid or minimize effects to species of special concern from habitat fragmentation related impacts.

4.2.7.2 Special Status Plant Species

Special status plant species are those species for which federal and state agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the Endangered Species Act, BLM Sensitive Species, and Montana Natural Heritage Program (MTNHP) plant species of concern. Appendix C contains lists of plant species of concern and effects determinations for the Proposed Action. The U.S. Fish and Wildlife Service (USFWS) list of threatened, endangered, and candidate species (animal and plant) and BLM's designated sensitive vascular plant species that are currently known to occur in Big Horn, Rosebud, and Treasure counties, Montana, are included in Appendix C, Tables C-1 and C-2, respectively. Table C-3 in Appendix C lists the MTNHP vascular plant species of concern for the entire state of Montana.

One federally listed plant species (Ute ladies'-tresses orchid) could potentially occur, but has not been documented, within the Montana PRB. The USFWS has reviewed the South Extension development area and has acknowledged that the Proposed Action will have no effect on listed species in the area (Appendix D). Twelve BLM sensitive plant species are known to occur in Big Horn, Rosebud, and Treasure counties (MTNHP 2007); however, none of these plants were identified in the South Extension development area during the

2005 vegetation baseline study (WESTECH 2006b). None of the MTNHP-listed vascular plant species of concern have been observed in the Absaloka Mine area (WESTECH 2006b).

Potential direct impacts to special status plant species could include the incremental loss or alteration of potential or known habitat associated with past and reasonably foreseeable development in the Montana PRB. Direct impacts also could include the direct loss of individual plants, depending on their location in relation to development activities. Indirect impacts could occur due to increased dispersal and establishment of noxious weeds, which may result in the displacement of special status plant species in the long term. Cumulative impacts to special status plant species, as a result of the Proposed Action, would be negligible because none of the listed species are known to occur in the South Extension development area.

4.2.7.3 Noxious and Invasive Weed Species

Once established, invasive and non-native plant species can out-compete and eventually replace native species, thereby reducing forage productivity and the overall vigor of existing native plant communities. Table 4-10 lists the 30 plant species that the State of Montana has designated as noxious weeds. Three of these plant species (Canada thistle, field bindweed, and houndstongue) were identified in the South Extension development area during the 2005 vegetation baseline study (WESTECH 2006b).

Development-related construction and operation activities would potentially result in the dispersal of noxious and invasive weed species within and beyond the surface disturbance boundaries, which would result in the displacement of native species and changes in species composition in the long term. The potential for these impacts would be higher in relation to the development of linear facilities (e.g., pipeline ROWs and oil- and gas-related road systems) than for site facilities (e.g., coal mines and power plants) due to the potential for dispersal of noxious weeds over a larger area.

The reclamation plans for surface coal mines in Montana must include steps to control invasion by weedy plant species. According to ARM 17.24.726(4), surface coal mines must address weed control on reclaimed areas as follows:

> The reestablished vegetation must meet the requirements of the Noxious Weed Management Act (7-22-2101 through 7-22-2153, MCA, as amended).

According to ARM 17.24.711, prior to phase III bond release the revegetated area must be:

- diverse, effective and permanent;

Table 4-10. State of Montana Noxious Weeds.

Common Name	**Scientific Name**	**Category**
Hoary cress or White top	*Cardaria draba*	1
Diffuse knapweed	*Centaurea diffusa*	1
Spotted knapweed	*Centaurea maculosa*	1
Russian knapweed	*Centaurea repens*	1
Yellow starthistle	*Centaurea solstitialis*	3
Rush skeletonweed	*Chondrilla juncea*	3
Oxeye daisy	*Chrysanthemum leucanthemum*	1
Canada thistle	*Cirsium arvense*	1
Field bindweed	*Convolvulus arvensis*	1
Common crupina	*Crupina vulgaris*	3
Houndstongue	*Cynoglossum officinale*	1
Leafy spurge	*Euphorbia esula*	1
Orange hawkweed	*Hieracium aurantiacum*	2
Yellow-devil hawkweed	*Hieracium floribundum*	2
Kingdevil hawkweed	*Hieracium piloselloides*	2
Meadow hawkweed	*Hieracium pratense*	2
Common St. Johnswort	*Hypericum perforatum*	1
Yellowflag iris	*Iris pseudacorus*	3
Dyer's woad	*Isatis tinctoria*	2
Perennial pepperweed	*Lepidium latifolium*	2
Dalmatian toadflax	*Linaria dalmatica*	1
Yellow toadflax	*Linaria vulgaris*	1
Purple loosestrife	*Lythrum salicaria*	2
Wandlike loosestrife	*Lythrum virgatum*	2
Eurasian watermilfoil	*Myriophyllum spicatum*	3
Sulfur cinquefoil	*Potentilla recta*	1
Tall buttercup	*Ranunculus acris*	2
Tansy ragwort	*Senecio jacobaea*	2
Tamarisk (Saltcedar)	*Tamarix spp.*	2
Common tansy	*Tanacetum vulgare*	1

1 = Currently established and generally widespread in many counties.
2 = Recently introduced and rapidly spreading.
3 = Not detected in the state or found only in small, scattered, localized infestations.
Source: University of Montana (2004)

- composed of species native to the area or of introduced species when desirable and necessary to achieve the post-mining land use and when approved by MDEQ;
- at least equal in extent of cover to the natural vegetation of the area; and
- capable of stabilizing the soil surface in order to control erosion to the extent appropriate for the post-mining land use.

Preventing the spread of noxious weeds is easier, more successful and less costly than reclamation or mitigation. Stipulations for current oil and gas exploration authorizations within the Billings and Powder River RMP areas cover weed management and riparian/wetland management (BLM 1992). Under these stipulations, all categories of noxious weeds must be managed. The BLM has developed an action plan for weed containment and eradication practices that would be implemented for all alternatives of the *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans* (BLM 1996). Operators would be required to include weed management plans in their PODs to prevent the spread of noxious weeds (BLM 2006a).

The Montana Department of Agriculture, along with other agencies and associations, created the Montana Weed Management Plan with the purpose of strengthening, supporting, and coordinating private, county, state, and federal weed management efforts in the state, and promote implementation of ecologically based integrated weed management programs (Montana Department of Agriculture 2005).

4.2.7.4 Wetland and Riparian Species

Reasonably foreseeable development activities in the Montana PRB would result in the removal or disturbance of wetland and riparian vegetation that is located within the projected disturbance areas. As the discrete locations of future oil and gas-related facilities and actual disturbance areas of future coal mines are not currently known, the potential impacts cannot be projected. In the case of coal mining, wetlands that meet the regulatory criteria must be identified and special permitting procedures are required to assure that after mining there will be no net loss of wetlands. Wetlands that are not under the U.S. Army Corps of Engineers jurisdiction are restored as required by MDEQ, by the surface managing agency (on public land), or by the private landowner. For other types of development, such as oil and gas, disturbance of wetlands is avoided where possible. Where avoidance is not possible, mitigation measures for impacts to wetlands is evaluated on a site-specific basis.

Operations associated with development activities in the Montana PRB would result in the use of groundwater. The discharge of produced water could result in the creation of wetlands in containment ponds, landscape depressions, and riparian areas along segments of drainages that previously supported upland vegetation. Existing wetlands and riparian areas that would receive additional water would become more extensive and potentially support a greater diversity of wetland species. However, the discharge of produced water with a sodium adsorption ratio that exceeds that recommended for agricultural uses could impact existing vegetation. In the long term, after water discharges have peaked and subsequently decrease, the extent of wetlands and riparian areas and species diversity would decrease accordingly. After the complete cessation of water discharges, artificially created wetland and riparian areas once again would support upland species and previously existing wetland and riparian areas would decrease in areal extent.

4.2.8 Wildlife

In general, impacts to wildlife can be classified as short term and long term. Potential short-term impacts arise from habitat disturbance associated with a project's development and operation that would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of permanent changes to habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects, such as power plant facilities and rail lines. The cumulative impacts on wildlife resulting from the reasonably foreseeable development activities in the Montana PRB include the direct loss of wildlife populations from vehicular collisions, habitat loss, alteration or fragmentation of habitat, or animal displacement by greater human access into previously untraveled areas. Indirect impacts could include disturbance and displacement, noise, stress from human presence, noxious weed invasion, changes in hydrologic or water quality conditions, and increased poaching. Cumulative impacts to most wildlife would increase as additional habitat is disturbed. These impacts would moderate as land is reclaimed.

Habitat fragmentation from activities such as surface coal mining, roads, well pads, pipelines, and electrical power lines can result in the direct loss of potential wildlife habitat. Other habitat fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. These effects result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and changes in species composition. However, the extent and duration of these effects on wildlife would depend on many factors, such as the level of development, sensitivity of the animal species, seasonal use, type and timing of project activities, as well as an area's physical parameters such as topography, hydrology, type and quantity of vegetation removed, and climate. Sensitive wildlife species, such as raptors, sage-grouse, and other bird species dependent on sagebrush habitats would be disturbed over large areas near development activities and local population declines may occur.

Numerous grazing management projects (fencing, reservoir development, spring development, well construction, vegetative treatments) have also impacted wildlife habitat in the area. The consequences of these developments have proven beneficial to some species and detrimental to others. Water developments are used by wildlife; however, without proper livestock management, many of these 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, sage grouse, and other shrub-dependent species.

The existing and proposed mines in the Sheridan/Decker and Ashland/Colstrip areas (Subregions 4 and 5, respectively) (Figure 4-1) would cause a reduction in habitat for most wildlife species. Many species are highly mobile, have access to adjacent habitats, and possess a high reproductive potential. The existing surface mines in the northern PRB are not contiguous, and habitats adjacent to and between existing and proposed mines include shrublands, upland grasslands, bottomland grasslands, improved pastures, haylands, wetlands, riparian areas, and ponderosa pine woodlands. As a result, the species occupying these adjacent areas should respond quickly to reclamation and invade suitable reclaimed lands. The overall reduction in topographic diversity in the mine permit areas may lower the carrying capacity for big game in the reclaimed areas; however, big game ranges are generally very large, mining activities are, in general, not located in habitats defined as crucial, and mining operations in this area are spread out rather than contiguous.

While the types of impacts described above would occur under all development scenarios, the magnitude of the impact would be roughly proportional to the extent of CBNG development under each alternative described in BLM's *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resources Management Plans* (BLM 2006c). However, under Alternatives E, F, G, and H, BLM would require CBNG operators to submit plans that demonstrate how their project design minimizes or mitigates impacts to wildlife before exploration and approval of the APD. Under those alternatives, all CBNG development would follow the programmatic guidance to address wildlife concerns, and each project plan would include a site-specific Wildlife Monitoring and Protection Plan.

Detailed discussions of cumulative impacts to wildlife from reasonably foreseeable development activities the Montana PRB are included in BLM's RMPs, the Final Statewide Oil and Gas EIS, and the Draft Supplement to the Statewide Oil and Gas FEIS, and are incorporated into this EIS by reference (BLM 1984, 1992, 2003, and 2006a).

4.2.8.1 Game Species

Potential direct impacts to big game species would include the incremental loss or alteration of potential forage and ground cover associated with construction and operation of reasonably foreseeable development activities. Development associated with coal mining, drilling for CBNG, ancillary facilities, agricultural operations, urban areas, and transportation and utility corridors result in vegetation removal. Indirect impacts to big game would include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious weeds, and dust from unpaved road traffic.

Assuming that adjacent habitats would be at or near carrying capacity and considering the variables associated with drought conditions and human activities in the study area, displacement of game species as a result of reasonably foreseeable development activities would create some un-quantifiable reduction in populations.

Long-term monitoring at the surface mines in the Montana PRB has established that no severe mine-caused mortalities have occurred and no long-lasting impacts on big game have been noted on existing mine sites. No crucial big game habitat or migration corridors have been identified by Montana Fish, Wildlife and Parks for the South Extension development area, and aside from the existing Absaloka Mine, there are no other mining operations in this area.

Direct and indirect impacts to small game species (i.e., upland game birds, waterfowl, small game mammals) as a result of reasonably foreseeable development activities would be the same as discussed above for big game species. Impacts would result from the incremental surface disturbance of potential habitat, increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved roads.

Operations associated with reasonably foreseeable development activities in the Montana PRB would result in the use of groundwater. Most, if not all, of the coal mine-produced water would be consumed during operation. There is no crucial habitat for waterfowl on the Montana PRB mine sites, so mining would not substantially contribute to impacts to those species. Cumulative impacts to waterfowl from already-approved mining, as well as new mine developments, 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 discharge of CBNG-produced water could result in the expansion of wetlands, stock ponds and reservoirs, potentially increasing waterfowl habitats. As discussed in the Task 1D Report of the PRB Coal Review (BLM 2005b), the median sodium concentration of CBNG-produced water from the Fort Union Formation is 270 milligrams per liter (mg/L). If sodium concentrations are maintained below 17,000 mg/L, potential adverse effects to waterfowl would be minimal.

Impacts to sage-dependent upland game birds could occur due to regional habitat fragmentation and the disturbance to breeding grounds. There is no crucial habitat for small game mammals on the mine sites, so mining would not substantially contribute to impacts to those species. Section 4.2.8.4 includes a more detailed discussion of cumulative impacts to sage-grouse.

4.2.8.2 Nongame Species

Potential direct impacts to nongame species (e.g., migratory birds, raptors, small mammals, amphibians, and reptiles) would include the incremental loss or alteration of potential foraging and breeding habitats from construction and operation of reasonably foreseeable development activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). Impacts also could result in mortalities of less mobile species (small mammals, reptiles, amphibians, and invertebrates), nest or burrow abandonment, and loss of eggs or young as a result of crushing from vehicles and equipment. Indirect impacts would include increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved road traffic.

A number of migratory bird species have been documented within the PRB. In the event that development activities were to occur during the breeding season (April 1 through July 31), these activities could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. Loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of the Migratory Bird Treaty Act and potentially could affect populations of important migratory bird species that may occur in the PRB.

A variety of breeding raptor species occur within the Montana PRB, including the bald eagle, golden eagle, red-tailed hawk, Swainson's hawk, American kestrel, prairie falcon, northern harrier, short-eared owl, and great horned owl. Potential direct impacts to raptors would result from the surface disturbance of nesting and foraging habitat in the PRB. Development activities that occur during the breeding season (February 1 through July 31) could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. As discussed above, such losses would not comply with the intent of several laws, including the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

New power line segments in the Montana PRB would incrementally increase the collision potential for migrating and foraging bird species, such as raptors and waterfowl. However, collision potential typically is dependent on variables such as the location in relation to high-use areas, line orientation to flight patterns and movement corridors, species composition, visibility, and design. In addition, new power lines could pose an electrocution hazard for raptor species attempting to perch on the structure. Configurations less than 1 kilovolt or greater than 69 kilovolts typically do not present an electrocution potential, based on conductor placement and orientation (APLIC 2006). It is assumed that future permitting for power lines would require the use of appropriate raptor-deterring designs, thereby minimizing potential impacts. For example, the Surface Mining Control and Reclamation Act (SMCRA) requires that surface coal mine operators use the best technology currently available to ensure that electric power lines are designed and constructed to minimize electrocution hazards to raptors. In addition, many of the power lines for CBNG development currently are being constructed underground.

Erection of nesting structures and planting of trees on land reclaimed by surface coal mines would gradually replace raptor nesting and perching sites that are affected by development in areas affected by mining. Prey species (small- and medium-sized animals) would move back into the areas once reclamation is completed. A research project on habitat reclamation on mined lands within the Montana PRB concluded that the small mammal species richness and abundance on reclaimed areas in the northern PRB was usually higher than on adjacent undisturbed areas (Clayton et al. 2006).

4.2.8.3 Fisheries

Potential cumulative effects on fisheries as a result of reasonably foreseeable development activities in the Montana PRB would be closely related to impacts on ground and surface water resources. In general, development activities could affect fish species in the following ways: 1) alteration or loss of habitat as a result of surface disturbance; 2) changes in water quality as a result of surface disturbance or introduction of contaminants into drainages; and 3) changes in available habitat as a result of water withdrawals or discharge. The potential effects of development activities on aquatic communities are discussed below for these impact topics.

Game and nongame fish species are present in the perennial stream segments and scattered ponds and reservoirs. In general, perennial stream habitat in the Montana portion of the PRB is limited to Rosebud Creek; Tongue River and its tributaries Squirrel, Hanging Woman, Otter, and Pumpkin creeks; and Powder River and its tributaries Little Powder River and Mizpah Creek. Perennial streams are not normally directly impacted by surface disturbance since a buffer protection zone typically is required for development activities near these types of streams. BLM's PRB Coal Review assumes that surface disturbance activities would not be allowed in perennial stream segments or reservoirs on public land that contain game fish species.

The predominant type of potentially affected aquatic habitat in the northern PRB consists of intermittent and ephemeral streams and scattered ponds and reservoirs. Due to a lack of water on a consistent basis in most of these aquatic habitats, existing aquatic communities are mainly limited to invertebrates and algae that can persist in intermittent stream habitats. The removal of stock ponds during mining eliminates habitat for invertebrates and possibly fish species. This loss would be temporary if the stock ponds are replaced during reclamation.

Projected development that could result in the loss of aquatic habitat as a result of direct surface disturbance would primarily involve the construction of additional linear facilities, product gathering lines and road systems associated with conventional oil and gas and CBNG activities and additional disturbance associated with extending coal mining operations onto lands adjacent to the existing mines. Discrete locations for development disturbance and reclamation areas, such as stream crossings, cannot be determined based on existing information. However, the potential impacts would include direct removal of habitat, habitat degradation from sedimentation, altered spawning and migration due to stream obstructions, direct mortality from accidental spills of harmful substances, increased fish harvesting due to increased human presence, and reduced streamflow due to water removal for drilling activity.

Surface disturbing activities can result in sediment input to water bodies, which affects water quality parameters such as turbidity and bottom substrate composition. Contaminants also can be introduced into water bodies through chemical characteristics of the sediment. Potential related effects on aquatic biota could include physiological stress, movement to avoid the affected area, or alteration of spawning or rearing areas (Waters 1995). Studies have shown that total dissolved solids (TDS) levels in streams near reclaimed coal mine areas have increased from one percent to seven percent (Martin et al. 1988). Typically, sedimentation effects are short term and localized in terms of the affected area. Total suspended solids (TSS) concentrations would stabilize and return to typical background concentrations after construction or development activities have been completed. It is anticipated that sediment input associated with development disturbance areas would be minimized by implementation of appropriate erosion control measures, as would be determined during future permitting.

CBNG and coal mining are the primary types of development activities that use or manage water as part of their operations. Based on current trends, it is assumed that most, if not all, of the coal mine-produced water would be consumed during operation. As discussed in Section 3.5.2.2, changes in surface runoff characteristics and sediment discharges would occur during surface coal mining as a result of the destruction and reconstruction of drainage channels as mining progresses and the use of sediment control structures to manage discharges of surface water from the mine permit area. State and federal regulations require treatment of surface runoff from mined lands to meet effluent standards. The Montana Board of Environmental Review adopted nondegradation rules in 2003 (amended in 2006) that essentially prohibit any discharge of CBNG-produced water that would degrade the quality of rivers and streams in the Montana PRB (refer to Section 4.2.4.2). Conditions of Water Management Plans and MPDES Permits would provide enforceable assurances that water quality, aquatic resources, and the beneficial uses of receiving waters would not be degraded by production water discharges.

4.2.8.4 Special Status Animal Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species (species that are protected under the Endangered Species Act), BLM Sensitive Species, U.S.

Forest Service Sensitive Species, and MTNHP animal species of concern. Appendix C contains lists of animal species of concern and effects determinations for the Proposed Action.

The USFWS list of threatened, endangered, and candidate species (plant and animal) that are currently known to occur in Big Horn, Rosebud, and Treasure counties, Montana, is included in Appendix C, Table C-1. The USFWS has reviewed the South Extension development area and has acknowledged that the Proposed Action would have no effect on listed species in the area. USFWS does not anticipate impacts to any threatened, endangered, or proposed species or critical habitat and that no further review under Section 7 of the Endangered Species Act is necessary (Appendix D).

BLM's designated sensitive animal species that are currently known to occur in Montana and the Dakotas are listed in Appendix C, Table C-2. As the table indicates, 17 bird species, eight mammal species, eight reptile and amphibian species, and six fish species in BLM's sensitive species list are known to occur in Big Horn, Rosebud, and Treasure counties, Montana. During the 2004-2005 wildlife survey of the South Extension development area, suitable habitat for nine of the bird species, six of the mammal species, and none of the fish species was found to be present. Of these, only two bird species (Brewer's sparrow and red-headed woodpecker) were recorded (WESTECH 2006d). Specialized habitat requirements make occupation for other sensitive species unlikely.

Table C-4 in Appendix C lists the MTNHP animal species of concern that could potentially occur or that have been recorded in the general Absaloka Mine area, including the South Extension development area (WESTECH 2006d). The table lists 24 bird species, four mammal species, six reptile species and three amphibian species, and of these, habitat for 15 birds, four mammals, four reptiles, and one amphibian is available in the South Extension development area. Of these 24 species, only four (red-headed woodpecker, Brewer's sparrow, lark bunting, and grasshopper sparrow) were recorded during the 2004-2005 wildlife survey of the proposed South Extension development area. Since several more species of concern have been recorded in areas adjacent to the mine's proposed development area, it is likely that more of these species could occur at least occasionally in the area (WESTECH 2006d).

Potential impacts to special status terrestrial species within the Montana PRB due to the reasonably foreseeable development activities would be similar to those discussed above for nongame wildlife (e.g., small mammals, birds, amphibians, and reptiles). Direct impacts to federally protected species are prohibited by law, but those species of concern that are not federally protected may be impacted. Potential direct impacts would include the incremental loss or alteration of potential habitat (native vegetation and previously disturbed vegetation) from construction and operation of development activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). Impacts also could result in mortalities of less mobile species (e.g., small mammals, reptiles, and amphibians), nest or burrow abandonment, and loss of eggs or young as a result of crushing from vehicles and equipment. Indirect impacts would include increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved road traffic.

In general, direct and indirect impacts to special status species would result in a reduction in habitat suitability and overall carrying capacity. Development within potential habitat for special status species likely would decrease its overall suitability and potentially would reduce or preclude use of a species habitat due to increased activity and noise. Future use of habitat by a special status species would be strongly influenced by habitat quality and the degree of impact would depend on a number of variables including the location of the nest or den site, the species' relative sensitivity, and possible topographic shielding.

Any development activities (oil and gas and related development, coal mining and related development, or other development) that occur during the special status bird species breeding season (April 1 through July 31) could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. As discussed previously, loss of an active nest site, incubating adults, eggs, or young as a result of any of these development activities would not comply with the intent of the Migratory Bird Treaty Act and potentially could affect populations of important migratory bird species that may occur in the PRB.

A number of raptor species have been documented in the PRB and are on two or more of the special status species lists, including bald eagle, ferruginous hawk, northern goshawk, merlin, peregrine falcon, western burrowing owl, and short-eared owl. Potential direct impacts to raptors would result from the surface disturbance of breeding and foraging habitat. Breeding raptors in or adjacent to development activities could abandon breeding territories, nest sites, or lose eggs or young. As discussed previously, loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of several laws, including the Endangered Species Act, the Bald Eagle Protection Act and the Migratory Bird Treaty Act, and potentially could affect populations of important migratory bird species that may occur within the PRB. New power line segments incrementally would increase the collision potential for migrating and foraging bird species such as raptors. Power line poles are used as hunting perches by raptors; therefore, new power line segments may have an adverse affect on sage-grouse and other prey species by increasing predation pressure.

The assumption is made that existing stipulations would provide some protection to sage-grouse habitat, including lek areas, nesting habitat, and winter range, although it is recognized that these actions would not completely protect this species. Mitigation measures within the Wildlife Monitoring and Protection Plans would help reduce, but cannot avoid all, impacts to all species of wildlife including sagebrush-obligate birds. For BLM's Alternatives A thru E in the *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans*, sage-grouse habitat would be managed in accordance with the current BLM policy for management of BLM sensitive species; specifically, development activities cannot impact these species in a way that may cause further declines in the species population status. For Alternative F and G, additional sage-grouse population management prescriptions could be implemented, with the goal of maintaining the current sage-grouse populations. Alternative H (BLM's Preferred Alternative) would see the broad application of BMPs within crucial sage-grouse habitat, coupled with monitoring to determine the success of these BMPs. Further restrictions could be implemented if monitoring shows management actions are not effective in maintaining sage-grouse populations in development areas. Wildlife Monitoring and Protection Plans would also help to reduce the impacts of CBNG development for most sensitive species (BLM 2006a).

No sage-grouse or sage-grouse leks have been documented in the vicinity of the Absaloka Mine area, including the proposed South Extension development area. Disturbance from already-approved surface mining, as well that proposed in the South Extension development area, should not affect regional sage-grouse populations. The existing and proposed surface mines in the Montana PRB would cumulatively cause a reduction in potential sage-grouse habitat. These mine areas are not contiguous, and habitat adjacent to and between the mines include suitable sage-grouse habitat. Because these species are highly mobile and have access to adjacent, favorable habitats, these species should respond quickly and invade suitable lands, including suitable reclaimed lands as reclamation proceeds.

Potential impacts to special status fish species as a result of development activities would be similar to effects discussed previously for fisheries. The same state and federal regulations requiring erosion control measures, Water Management Plans, and MPDES permit would be implemented for each project. These measures would help minimize increased sediment input to stream segments that may contain one of more of the special status fish species. Therefore, it is anticipated that the cumulative impacts to special status fish species would be low.

4.2.9 Land Use and Recreation

BLM's PRB Coal Review estimates the disturbance and reclamation acreages associated with all existing and projected coal mine development, under both upper and lower production scenarios, in the Montana PRB area for the years 2003, 2010, 2015, and 2020. Those disturbance and reclamation acreages under the lower and upper production scenarios are given in Tables 4-2 and 4-3, respectively, for both PRB Subregions 4 and 5 (Figure 4-1). It is projected that active mines in the Montana PRB would disturb about 58,387 acres through 2020 under the lower production scenario and 62,689 acres under the upper production scenario. Approximately 28,390 acres would be permanently reclaimed by 2020 under both development scenarios.

Alternative H (the preferred development scenario) in BLM's *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* estimates that during the next 20 to 23 years, all regional projects related to CBNG, conventional oil and gas, and coal mining activities would cumulatively disturb about 117,000 acres of land surface during the development phase. These disturbances would be reduced to approximately 88,000 acres during the production phase.

The Final Statewide Oil and Gas EIS discusses the potential cumulative impacts to land use and recreation as a result of the projected development activities in the Powder River and Billings Planning Area. Land ownership of the entire planning area, which totals approximately 19,372,000 acres, is approximately 69 percent private, 15 percent federal, 10 percent tribal, and 5 percent state. The majority of the private land is agriculturally based (grazing and crops). The federal lands are used for grazing, timber production, mineral production (excluding Custer National Forest), water storage, wildlife refuges, and year-round recreation. Northern Cheyenne Reservation lands are used for cattle production, mining, logging and lumber production, residential, and recreation. Major land uses on the Crow Reservation include agriculture, mining, and recreation. State lands are used for grazing, mining, timber production, oil and gas production, state parks, and recreation (BLM 2006a).

The PRB is a predominantly rural, open landscape. With little rainfall and limited alternative sources of water, the primary land use is grazing. Nevertheless, there is a range of other land uses. With nearly 80 percent of the area being privately owned or tribal, public lands provide important open space and recreation resources including both developed recreation facilities and areas to pursue dispersed recreation activities. The private sector contributes the elements of commercial recreation opportunities and tourism services such as motels and restaurants. Some private landowners also allow hunting with specific permission, sometimes for a fee.

4.2.9.1 Grazing and Agriculture

It is assumed that a substantial majority of the directly affected land use would be grazing land, with agricultural land disturbance following as a distant second. It is expected that this would apply to both coal and coal-related cumulative disturbance and oil and gas and oil and gas-related cumulative disturbance.

Potential impacts to grazing in the Montana PRB as a result of development activities can be classified as short term and long term. For example, the effects of a coal mine would be considered short term because the land use would change from rangeland or agriculture to a mine, but would then be reclaimed after the economically recoverable coal reserve has been removed, and the land use would be returned to rangeland or agriculture. In contrast, a power plant, railroad, or an urban community development would be considered long term as the change in land use may be virtually permanent. Short-term effects would be those with a definite end date, and even though the development may last for many years, requirements and standards for reclamation would return the land to its original use. Long-term effects would be those with a long and indeterminate life expectancy with no expectation of reclamation.

Potential short-term impacts to grazing and agriculture during development and operational phases of the projects arise from:

- temporary loss of forage as a result of vegetation removal/disturbance;
- temporary loss of crop production;
- temporary loss of animal unit months (AUMs);
- temporary loss of water-related range improvements, such as improved springs, water pipelines, and stock ponds;
- temporary restriction of livestock movement within a grazing allotment; and
- temporary loss of other range improvements, such as fences and cattle guards.

The discharge of CBNG-produced water could increase the availability of water to livestock, which may offset the temporary loss of AUMs and water-related range improvements. Also, there may be opportunities for surface owners upon CBNG well abandonment, to take ownership of the well and power source for livestock watering purposes.

Potential long-term impacts consist of permanent loss of rangeland forage and agricultural land in areas, such as at power plants, roads, and railroad corridors, that would not be reclaimed in the near term. Indirect impacts may include dispersal of noxious and invasive weed species within and beyond the surface disturbance boundaries, which decreases the amount of desirable forage available for livestock grazing in the long term.

4.2.9.2 Recreation

Accessible public lands provide diverse recreational opportunities, including hunting, fishing, off-road vehicle use, hiking, sightseeing, and wildlife observation. However, most of the recreation resources in the Montana PRB are dispersed activities, such as hunting and fishing, and are not developed recreation sites. Activities that involve the use of heavy equipment (well drilling, well pad construction, road construction, mining, utility line installation, etc.) would result in changes to the natural landscape, which would cause the greatest direct impact on recreation areas. Increased travel and human presence could produce indirect impacts to recreation areas such as fires, hazardous waste spills and cleanups, and changes in wildlife habitats and migration patterns. As formerly remote areas become more accessible, competition for limited recreational resources escalates. Installation of oil and gas production facilities in areas used for hunting, hiking, and other dispersed recreational activities would infringe on the solitude and rural characteristics of the area. The oil and gas-related infrastructure and activities would reduce the number of game animals in the area by forcing them to leave, thus reducing or eliminating certain hunting activities. Hunters may also be concerned about shooting near facilities and equipment (BLM 2006a).

Few, if any, of the developed recreation sites in the Montana PRB would be affected by development related disturbance. As most of the projected disturbance area would occur on privately and tribally owned surface land, the extent of effects on dispersed recreation activities would largely depend on whether the disturbance areas had been open to public or private lease hunting. It is projected that cumulative development activities, especially the dispersed development of CBNG, would tend to exacerbate the trend toward a reduction in private land available for public hunting. Many of the adverse effects on dispersed recreation activities would be reduced after the coal- and oil and gas-related development activities have been completed and the disturbed areas have been reclaimed.

Alternative H (the preferred development scenario) in BLM's *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* predicts the greatest effects to recreation activities in the Montana PRB due to federal CBNG development would occur in the Lower and Upper Tongue River, Middle Powder River, and Rosebud watersheds. Recreation impacts under Alternative H could be less than the other alternatives because each development proposal would be subject to review against four resource screens (air, water, wildlife, and Native American concerns) and planning and mitigation requirements (e.g., Water Management Plans and Wildlife Monitoring and Mitigation Plans). That review process would balance CBNG development with protection of the natural environment and help maintain wildlife habitat (BLM 2006a).

No direct effects on wilderness or roadless areas would be expected from the projected development activities. There are no designated wilderness areas in the Montana PRB. There would be no effects on Wild and Scenic Rivers as there are no river segments identified as "eligible" in the Montana PRB (NWSRS 2007).

4.2.10 Cultural Resources

Cultural resources would be impacted by surface and subsurface disturbing activities. As stated previously, BLM's preferred development scenario (Alternative H) in the *Draft Supplement to the Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* estimates that during the next 20 to

23 years, all regional projects related to CBNG, conventional oil and gas, and coal mining activities would cumulatively disturb about 117,000 acres of land surface in the Planning Area during the development phase. Other activities, such as increased travel and vandalism resulting from access improvements and increased erosion resulting from surface disturbances, would also impact cultural resources (BLM 2006a).

Cultural sites occur throughout the Montana PRB. The BLM estimates that disturbances from all cumulative effect analysis project activities could identify 5,398 to 5,585 cultural resource sites in the Planning Area over the next 20 to 23 years (BLM 2006a).

Cultural sites fall into two categories: prehistoric and historic. Artifact scatters dominate prehistoric sites. When there is adequate information to evaluate these types of sites, most are not eligible for the National Register of Historic Places (NRHP). However, complex sites and sites with buried and dateable material are often field evaluated as eligible. In most cases, treatment of cultural sites that are eligible for the NRHP is confined to those that would be directly impacted by development, while those that may be indirectly impacted receive little or no consideration unless a direct effect can be established. Historic site categories documented for the Montana PRB are based on broad historic themes. The site categories are rural, urban, mining, transportation, military, exploration, and communication. Evaluation of the importance of historic sites, districts, and landscapes must consider aspects of both theme and period in assessing the historic character and contributing attributes of the resources.

Any activity, noise, traffic, emissions, and smells can affect the quality and continued use of Traditional Cultural Properties (TCPs). TCPs important to the Crow and Northern Cheyenne and their perceptions of mitigation are presented in the Crow Indian Reservation (Crow Tribe of Indians 2002), the Northern Cheyenne Tribe and its Reservation: 2002 (Northern Cheyenne Tribe 2002), and An Ethnographic Overview of Southeast Montana (Peterson and Deaver 2002).

General ethnographies of the tribes that may have had traditional ties to this region do not provide information on specific resources in the area that are likely to be traditional cultural concerns because these resources are considered confidential by the tribes. Within this region, there are prominent and identifiable places such as the Medicine Wheel to the southwest in the Bighorn Mountains and Devils Tower to the southeast in the Black Hills area. These known sites offer some indication of the types of places valued by the Plains horse cultures in the historic period. Any identification of sacred or traditional localities must be verified in consultation with authorized tribal representatives. Native American groups can request additional information and can tour the proposed development area upon request.

Beneficial results or impacts can also occur from development activities. Valuable data are collected during cultural resource surveys. Data that would otherwise not be collected until some time in the future, or lost in the interim, are made available for study. Mitigation also results in the collection and preservation of data that would otherwise be lost. The data that have been and will be collected provide opportunities for regional and local archeological research projects.

4.2.10.1 Site Protection

At the time an individual project is permitted, the development activities would be subject to the following regulations relative to cultural resources. Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, its implementing regulations, including but not limited to 36 CFR 800, 36 CFR 61, Executive Order 11593, and NEPA and its implementing regulations, including 40 CFR 1500 - 1508, provide the legal environment for documentation, evaluation, and protection of historic properties (i.e., cultural resources eligible for inclusion on the NRHP) that may be affected by development activities. In cases of split estate (where surface ownership and mineral ownership differ), surface resources, such as cultural sites, belong to the surface owner. The surface owner must be consulted about investigation, mitigation, or monitoring.

Federal regulations require cultural resources inventory, recordation, and evaluation of resources as part of a project's permit approval process. Archaeological clearance is required by the Section 106 process prior to disturbance from all federal undertakings, including projects on federally controlled surface, projects recovering federal minerals, and all projects requiring federal funding or permits. All areas of proposed ground-disturbing activity must be inventoried for cultural resources. Any discovered resources must be documented and evaluated for eligibility for the NRHP. On the Crow Indian Reservation, all cultural resource inventories, resource evaluations, and mitigation planning will be conducted in consultation with the Crow Tribal Cultural Department and the Tribal Historic Preservation Officer. In most cases and with proper planning, effects to eligible properties can be minimized.

4.2.11 Transportation and Utilities

Generally, existing transportation systems in the Montana PRB would not likely be directly affected by the disturbance associated with projected development. Site-specific disturbances may require that segments of certain transportation corridors (e.g., roads, pipelines, transmission lines) be moved to accommodate a project's development. In such cases, the agencies authorized to regulate such actions would have to approve any proposal to move any segments of any transportation systems and construction of alternative routing would be required prior to closing existing links so that any disruptive effects on transportation systems would be minimized.

Potential effects of development activities on transportation and utilities may be either short or long term in nature, varying with the type of development. A power plant or an urban community development would be considered long term, and the demand for transmission line capacity would be virtually permanent, lasting for the economic life of the activity. The effects of coal production and the related demand for rail capacity would vary with market changes. In recent years, coal production has been increasing and the PRB Coal Review projects that the trend would continue, as shown in Tables 4-2 and 4-3. Section 4.1.1.2.1 discusses the existing rail lines and reasonably foreseeable railroad development and coal transportation capacity as it relates to projected coal production from the Montana PRB. Similarly, the demand for pipeline capacity would vary with market conditions as well as with the rate of depletion of the oil or gas resources. It is assumed that new gas pipeline capacity out of the Montana PRB would be needed and additional pipelines could be built. However, no specific projects have been identified so that the location(s), capacities, and effects cannot be determined at this time.

Potential direct effects of projected development on existing roads and highways would include extended/increased vehicular traffic and risk of traffic accidents in the Montana PRB from daily travel by workers and their families. Indirect effects would include extended/increased wear and tear on existing roads, additional air emissions from vehicles, additional fugitive dust from roads, noise, increased potential access to remote areas, and an extended/increased risk of vehicle collisions with livestock and wildlife. Additional road and highway maintenance and improvements would almost certainly be required over a period of years as the population gradually increased. Direct effects on railroads, pipelines, and transmission lines primarily would include extended/increased demand for capacity to move coal, oil and gas, and electricity from production locations to markets outside the area.

Section 4.1.1.2.2 discusses the existing power plants in the Montana PRB and the possibility of additional power production capacity as it relates to projected coal production from the area. It is assumed that additional power production would require additional transmission line capacity. New power transmission lines would therefore be constructed to connect new power plants to the grid, but no specific projects have been identified so that the location(s), capacities, and effects cannot be determined at this time.

4.2.12 Socioeconomics

During the 1970s and early 1980s, the PRB emerged as a major coal producing region. The surface coal mines that were developed during that time are now mature operations that provide a stable economic and social foundation for the region. While coal development has historically produced periodic surges in population, followed occasionally by population loss in some communities, the growth in domestic energy consumption, coupled with the PRB's vast energy resource base, has resulted in over 30 years of growth in the region without the economic busts that have characterized some other western U.S. resource booms. This period of extended energy development has been accompanied by substantial social and economic benefits, including employment opportunity, tax revenue growth, and infrastructure development for local governments. Conversely, periods of rapid growth have stressed local communities including housing resources, public infrastructure, and service systems. The emergence of the coal and other energy resource development industries in the PRB has had a long-term cumulative influence on social conditions in the region. The mature, regional coal industry provides a measure of insulation from dramatic economic and social stresses.

Cumulative future energy development in the PRB has the potential to generate both beneficial and adverse effects on community social conditions. Beneficial social effects would be associated with an expanding economy and employment opportunities associated with energy development and resulting improvements in living standards for those employed in energy-related industries. Adverse social effects could occur as a result of conflicts over land use and environmental values. Negative social effects also could occur if the pace of growth exceeds the abilities of affected communities to accommodate energy-related employees and their families with housing and community services.

Montana's economy has been structured around the basic industries of extractive minerals, agriculture, tourism, timber, and manufacturing. Each of these basic industries is important, and the extractive mineral industry has long been a vital part of Montana's economy. Various Montana communities depend on the mineral industry for much of their economic well being. The minerals industry is a significant contributor to the economy of Montana. State and local tax income (severance and ad valorem taxes) from natural resource production totaled over $274 million in 2006. State and local tax revenue from coal production alone in 2006 was approximately $47.5 million (Montana Department of Revenue 2006).

From 1987 through 2005, coal production in Montana increased by over 18 percent; an average of approximately one percent per year. The PRB Coal Review (BLM 2005c) projects coal production in Montana to increase by about eight percent per year from 2003 through 2020 under the upper coal production scenario, or about three percent per year from 2003 to 2020 under the lower coal production scenario (Tables 4-2 and 4-3). Increased coal development in the Montana PRB would likely mean a proportionally equal increase in mining-related jobs. The increase in employment is expected to increase income to individuals and government agencies in the area, but would also stimulate migration to the area, resulting in shortages in housing and community services. Effects to communities would depend on how well they can absorb the increase in population.

In 2005, total Montana PRB coal production was approximately 32.6 million tons, which was about 3.5 percent of the coal mined in the United States that year. Total coal production in 2006 from the Absaloka, Rosebud, Spring Creek, and Decker Coal mines was 41.1 million tons. These four surface mines employed a total of 887 people and the estimated payroll was $62,746,000 in 2006 (Montana Coal Council 2007).

The Absaloka Mine is unique among Montana surface coal mines in that coal reserves being mined are almost entirely held in trust for the Crow Tribe. As a result, all royalties and production taxes from this in-trust coal within the current mine area are paid directly to the tribe. The cumulative royalty payment from the Absaloka Mine to the Crow Tribe through December 2006 was $71,141,795 (Montana Coal Council 2007). Royalty and tax revenues from coal mined from the South Extension tract would also go directly to the tribe. As described in Chapter 2 of this EIS, the Proposed Action would extend the life of the Absaloka Mine approximately 12 years, to 2021 at the current annual mining rate of 6.5 to 7.0 million tons per year. Under Alternative 1, at the current annual coal production rate, mine life would be extended by approximately two years, to 2011. Under the No Action Alternative (Alternative 2), Absaloka Mine would mine its remaining reserves by the end of 2009 at the current annual production rate. Customers currently receiving coal from Absaloka Mine would be forced to contract with other producers in the region, so regional production and related socioeconomic conditions would remain relatively stable. However, the local impacts on employment, personal income, and government revenues and services would be significant, particularly with respect to the Crow Tribe.

Neither the BLM's PRB Coal Review Report or the *Draft Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans* address the cumulative socioeconomic impacts of all the projected development activities within the Montana PRB. The Draft Supplement to the Statewide Oil and Gas FEIS does however provide an analysis of the social and economic impacts that would result from the development of CBNG resources in the Montana portion of the PRB under various scenarios. The key social and economic conditions that would occur as a result of the BLM's preferred alternative (Alternative H) are described in that document, and are briefly summarized below.

4.2.12.1 Employment

The CBNG operators currently working in the Montana PRB have indicated that it is likely workers from Sheridan and Gillette, Wyoming, would fill most of the new jobs generated from the CBNG industry in Montana (Langhus 2006). The CBNG industry is the PRB is currently based primarily out of those two Wyoming cities and there are no major CBNG operators or contractors based in Montana. CBNG workers would most likely commute on a daily basis from their homes in Wyoming. The early years of development activity would most likely be near the Wyoming border in Big Horn County, north of Sheridan. Development would likely move east into Powder River County, north of Gillette. The latter years of development would likely move north, primarily into Rosebud County. If current CBNG industry employees in Wyoming fill the jobs created by the proposed CBNG development in Montana, the economic benefits of the wages earned would mainly go to Wyoming. This would limit both the employment opportunities and the adverse effects of population change on local housing, schools, and services (BLM 2006a).

Over the 23-year development period, there would be an annual average of 774 jobs created by the CBNG industry in Montana, and the total number of jobs created during the phased development period under Alternative H would be 14,707; however, Wyoming CBNG workers would fill most of those jobs (BLM 2006a).

4.2.12.2 Personal Income

Under BLM's preferred alternative, the estimated total wages over the 23-year, phased development period would be approximately $629 million. Annual wages are estimated to be around $27 million, but would range from about $6.6 million in year one to $38.2 million in year 21. Changes in personal income resulting from new employment of CBNG workers and purchases of services from vendors are more likely to occur in Wyoming than in Montana. Most of this money would likely be spent in Wyoming, where workers are expected to reside. Purchases made with CBNG income would produce additional indirect income in Montana as earnings circulate through the economy (BLM 2006a).

4.2.12.3 Population

Employees working in the CBNG industry in the Montana portion of the PRB would most likely commute from Wyoming, where they currently reside. CBNG development activities in the Montana PRB would probably not stimulate migration to the area, which would result in very little impact to the housing market and community services (BLM 2006a).

4.2.12.4 Housing

Most of the CBNG industry employees would commute from Wyoming, thus there would be little additional demand for housing in the Montana PRB communities (BLM 2006a).

4.2.12.5 Facilities and Services

The CBNG industry would have little effect on public facilities and services since most of the workers would be living in Wyoming rather than the communities in the Montana portion of the PRB. The additional employees needed to develop the CBNG resources in the Montana portion of the PRB would most likely affect the communities of Sheridan, Gillette, and Buffalo, Wyoming (BLM 2006a).

4.2.12.6 Government Revenues

Income taxes generated from CBNG development in the Montana PRB would likely be paid in Wyoming, since most workers are expected to come from that state.

Property taxes would accrue to counties roughly in proportion to the number of new wells. Big Horn, Powder River, and Rosebud counties would have the vast majority of new wells; therefore, they would likely experience the greatest assessed values and the greatest increase in new county property tax revenues. These new revenues would help improve schools, roads, community services, and other county assets, after accounting for any new costs associated with CBNG (BLM 2006a).

Local and state economies would also benefit from sales of goods and services by local businesses to oil and gas operators. Local sales of goods and services would not however generate increases in tax revenues because there is no state sales tax. In addition, most of the purchases associated with CBNG development would likely be made in Wyoming (BLM 2006a).

The products of natural resource extraction in Montana, including natural gas, are subject to state natural resource taxes, including local government severance taxes. Severance taxes are distributed to a variety of state and local funds and would contribute positively to the state and local economies (BLM 2006a).

Annual federal royalty income (12.5 percent of the annual gross income earned on production) under BLM's preferred CBNG development alternative (Alternative H) would range from approximately $12 million (year 1) to $343 million (year 20). About 50 percent of royalties paid to the federal government are generally returned to the state from which they originate. Rents on state and federal lands leased for oil and gas development are bid competitively, with the lowest bid being $1.50 per acre.

4.2.12.7 Social Conditions

Impacts on social conditions in the Montana PRB would include changes in the services provided by governments due to increased funds from CBNG development; the effects of drilling and related activities on the rural lifestyles in the area; and changes in levels of traffic, noise, visual resource impacts, and psychological stress levels. Native Americans have predicted numerous social and cultural impacts as a result of CBNG development on adjacent fee, state, and federal minerals (BLM 2006a).

4.2.12.8 Attitudes, Beliefs, Lifestyles, and Values

The majority of individuals in the Montana PRB are understood to have traditional rural lifestyles in which relatively quiet and natural surroundings are important values. They could find CBNG development inconsistent with their traditional rural and agricultural lifestyles. According to scoping comments and press reports, this would be particularly true for Big Horn, Rosebud, and Powder River counties, where most of the CBNG development would take place. Some residents in the area who are more interested in the potential economic benefits of CBNG development would likely perceive or experience fewer impacts with respect to lifestyles and values (BLM 2006a).

CBNG development is likely to conflict to some degree with traditional Native American values, which emphasize the preservation of cultural heritage and a reverence for the natural environment. Increases in noise, visual resource impacts, and impacts to plant populations, especially if these resources are used for spiritual or religious purposes, could affect Native Americans. It is assumed that no CBNG wells would be developed on the Crow or Northern Cheyenne Indian reservations initially, and therefore impacts would more likely affect those individuals living off the reservations. It is likely that a smaller number of Native Americans who are interested in the potential economic benefits of CBNG development would perceive or experience fewer impacts with respect to their values. It is unlikely that tribal members would fill the jobs created unless they are already employed in the CBNG industry out of Wyoming (BLM 2006a).

Under Alternative H, the Crow and Northern Cheyenne reservations would be protected from dewatering and drawdown of coal seam aquifers and drainages of tribal CBNG and groundwater resources by establishment of a five-mile buffer zone around the borders of the reservations. All Indian Trust Assets (ITAs) within this five-mile radius would be protected, and if analysis showed the ITAs would be adversely affected, then the BLM would consult with the tribe and determine appropriate mitigation measures. The cumulative reduction in federal royalties due to the five-mile buffer drilling restriction around Indian reservations would result in a $1.2 billion loss to the federal government at current natural gas prices (BLM 2006a).

5.0 CONSULTATION AND COORDINATION

In February 2004, Westmoreland Resources, Inc. (WRI[1]) entered into an Exploration and Option to Lease Agreement with the Crow Tribe under the Indian Mineral Development Act (IMDA) for a coal reserve area on the Crow Indian Reservation south of and adjacent to the Absaloka Mine's existing Tract III Coal Lease. WRI exercised its lease option on June 1, 2006, and subsequently entered into a Cooperative Agreement with the Bureau of Indian Affairs (BIA) for the preparation of this Environmental Impact Statement (EIS). In addition to this EIS, other factors and consultations are considered and play a major role in determining the outcome of WRI's proposed South Extension development plan. These include the following.

Interagency Consultation

Approval and eventual implementation of the WRI South Extension development plan for the Absaloka Mine would require a number of actions by multiple federal and state agencies under various regulatory authorities and requirements. These are summarized as follows:

Federal Agencies

BIA: In its trust responsibility to the Crow Tribe, BIA has approval authority over agreements under IMDA pursuant to 25 CFR Part 225. The IMDA agreement between WRI and the Crow Tribe has been conditionally approved by BIA. The South Extension includes allotted trust lands; therefore, BIA must also approve surface use agreements between the allottee surface owners and WRI.

OSM: The Surface Mining Control and Reclamation Act (SMCRA) gives the Office of Surface Mining Reclamation and Enforcement (OSM) primary responsibility to administer programs that regulate surface coal mining operations and surface effects of underground coal mining operations. As noted above, OSM is the regulatory authority for surface mining on the Crow Indian Reservation. If the BIA approves the IMDA lease for the South Extension and the surface use agreements, OSM will then have the responsibility for a permit decision on WRI's South Extension mining permit application pursuant to 30 CFR Part 750 under SMCRA. OSM must also concur with the MDEQ permit decision on WRI's Tract III Revision application in order to revise the existing federal mine permit accordingly.

BLM: By reference in 25 CFR Part 225, 43 CFR Part 3480 is applicable to IMDA coal agreements. Pursuant to 43 CFR Part 3480, the Bureau of Land Management (BLM) has review and approval responsibility for mining plans to assure maximum economic recovery of coal for the benefit of the Crow Tribe. BLM

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

is also delegated this authority and responsibility under 30 CFR Part 750. This BLM function is a part of the permit review and approval process by OSM.

EPA: EPA directly implements the federal environmental laws and regulations in Indian country, as defined at 18 USC 1151, including on the Crow Indian Reservation. With regard to the proposed project, EPA is the permitting and regulatory agency for activities on the Crow Indian Reservation that invoke the Clean Air Act, Clean Water Act, Safe Drinking Water Act, and Resource Conservation and Recovery Act, among other laws.

State Agencies

MDEQ, Industrial and Energy Minerals Bureau: The Montana Department of Environmental Quality (MDEQ) has attained primacy for regulation of coal mine operations in Montana under 30 CFR Part 926. A Memorandum of Understanding (MOU) between MDEQ and OSM provides for cooperative regulation of surface coal mining operations in the ceded strip; therefore, operations on Tract III are regulated by MDEQ as the primary regulatory authority with concurrence on permit decisions by OSM. MDEQ has responsibility for the permit decision on the Tract III Revision application under the Montana Strip and Underground Mine Reclamation Act (MSUMRA), which, along with the implementing rules of ARM 17.24, constitutes Montana's approved program under SMCRA.

MDEQ, Water Protection Bureau: Under the Montana Water Quality Act, MDEQ is responsible for permitting discharges to the waters of Montana, which includes all water discharge points from coal mine operations outside of Indian Reservations. Discharges on the Tract III Coal Lease are regulated by MDEQ as the primary regulatory authority within the ceded strip.

Other Interests

The Crow Tribe: Under the IMDA, and subject to the approval of the Secretary of Interior and any limitations or provisions contained in its constitution, the Crow Tribe may enter into a lease (with WRI in this case) for coal in which the Tribe owns a beneficial or restricted interest.

Public Notice of Federal and State Agency Actions

The BIA published a Notice of Intent (NOI) to prepare an EIS and Notice of Scoping in the *Federal Register* for the proposed expansion of the Absaloka Mine onto the Crow Indian Reservation on November 28, 2006. The publication announced the time and location of a public scoping meeting and requested public comment on BIA's proposed approval of the IMDA lease agreement for a coal reserve area on the Crow Indian Reservation and the associated mine permitting process.

Public scoping meetings were held on November 16 and December 14, 2006 in Hardin, Montana. At the public meetings, WRI orally presented information about its mine and its need for additional coal. The presentation was followed by a question and answer period, during which four oral comments were made. The scoping period extended from November 28, through December 26, 2006, during which time BIA and MDEQ received written comments from three entities.

The EPA will publish a Notice of Availability in the *Federal Register* for the Draft EIS (DEIS). A 60-day comment period on the DEIS will commence with publication of the EPA's Notice of Availability. The BIA will also post a Notice of Availability in the Big Horn County News (Hardin, Montana) and Billings Gazette (Billings, Montana) newspapers. The BIA notice will announce the date and location of a formal public hearing that will be held during the 60-day comment period to solicit public comments on the DEIS. Following the comment period on the DEIS, the Final EIS (FEIS) will be prepared. All substantive comments received from the public and state and federal review agencies on the DEIS will be included, with agency responses, in the FEIS.

Parties on the distribution list will be sent copies of the FEIS when it is completed. The EPA will publish a Notice of Availability for the FEIS in the *Federal Register* and the BIA will post a Notice of Availability in the Big Horn County News (Hardin, Montana) and Billings Gazette (Billings, Montana) newspapers.

After a 30-day availability period for the FEIS, BIA will make a separate decision to approve or not approve the IMDA lease for the in-trust coal and the surface use agreements and a Record of Decision (ROD) will be signed. Copies of BIA's ROD will be mailed to parties on the mailing list and others who commented on this EIS during the National Environmental Policy Act (NEPA) process. The BIA's decisions must be appealed within 30 days from the date the Notice of Availability for the ROD is published in the *Federal Register*. The decisions can be implemented at that time if no appeal is received.

After a 15-day availability period for the FEIS, MDEQ will make a decision to either approve or disapprove WRI's Tract III Revision application and publish its ROD, which contains MDEQ's written findings. Copies of MDEQ's ROD will be mailed to parties on the mailing list and others who commented on this EIS. Members of the public and other potentially affected parties may appeal the decision to the Board of Environmental Review within 30 days after the ROD is issued. The Tract III Revision permit decision remains in effect during any subsequent appeal periods.

After a 30-day availability period for the FEIS, and the MDEQ has either approved or disapproved WRI's Tract III Revision application, OSM must either concur or not concur with MDEQ's permitting decision. Members of the public and other potentially affected parties may file an appeal of OSM's decision within 30 days of the pronouncement. OSM's decision remains in effect during any subsequent appeal periods.

After a 30-day availability period for the FEIS, and the BIA has either approved or disapproved the IMDA lease for the South Extension and the accompanying surface use agreements, OSM can make its decision on WRI's proposed federal mine permit application to extend the existing Absaloka Mine area to the south onto the IMDA lease area. Members of the public and other potentially affected parties may file an appeal of OSM's decision within 30 days of the pronouncement. OSM's decision remains in effect during any subsequent appeal periods.

Other Consultations

Other federal, state, and local governmental agencies and Indian tribes that were consulted in preparation of this EIS are listed in Table 5-1.

List of Preparers

The BIA and MDEQ are joint lead agencies responsible for the preparation of this EIS under their respective authorities of NEPA and the Montana Environmental Policy Act (MEPA). OSM, BLM, EPA, and the Crow Tribe are cooperating agencies as entities with a permit decision function and/or with special expertise or interest in the proposed project. WWC Engineering, a third-party contractor, under the direction of the BIA and MDEQ, prepared this EIS. Representatives from cooperating agencies reviewed and contributed to the EIS. Tables 5-2 and 5-3 provide listings of the BIA, MDEQ, OSM, EPA, BLM, and the Crow Tribe interdisciplinary team and the third-party consultant personnel who prepared and reviewed this EIS.

Distribution List

This EIS was distributed to federal agencies, state officials and agencies, local governments, interest groups, industry representatives, and individuals for their review and comment (Table 5-4).

Table 5-1. Federal, State, Tribal, and Local Governmental Agencies Consulted During the EIS Process.

Agency or Organization	Individual	Position
United States Department of the Interior - Fish and Wildlife Service	R. Mark Wilson	Field Supervisor
Montana Fish, Wildlife & Parks		
Montana Department of Environmental Quality/		
Industrial and Energy Minerals Bureau	Angela McDannel Tom Golnar	Groundwater Hydrologist Surface Water Hydrologist
Air Resources Management Bureau	Diane Lorenzen	Air Quality Specialist
Websites of the Montana State Government Agencies Consulted for Current Information		
Montana Department of Labor and Industry	http://dli.mt.gov/	
Montana Department of Environmental Quality	http://www.deq.mt.gov/	
Montana Office of Economic Opportunity	http://www.business.mt.gov/	
Montana Fish, Wildlife & Parks	http://fwp.mt.gov/	
Montana Natural Heritage Program	http://mtnhp.org/	
Montana Board of Oil and Gas Conservation	http://bogc.dnrc.mt.gov/	
Montana Climate Office	http://climate.ntsg.umt.edu/	
Montana Bureau of Mines and Geology	http://www.mbmg.mtech.edu/	
Tribal Governments		
Crow		
Northern Cheyenne		
Arapaho-Shoshone		
Blackfeet		
Gros Ventre-Assiniboine		
Chippewa Cree		
Assiniboine-Sioux		

Table 5-2. List of Contributors and Reviewers.

Name	Project Responsibility
BIA Rocky Mountain Regional Office	
Rick Stefanic	Project Leader
Gene Onacko	Environmental Engineering
Marv Keller	Cultural Resources
Joe Randolph	Cultural Resources
Jerry Kaiser	Biology
Larry Beneker	Soils
Allan Hanley	Land Use
Montana Department of Environmental Quality	
Greg Hallsten – Director's Office, EIS Coordinator	Project Leader
Angela McDannel – Permitting and Compliance, IEMB, Coal and Uranium Section	Groundwater Resources
Tom Golnar – Permitting and Compliance, IEMB, Coal and Uranium Section	Surface Water Resources
Diane Lorenzen – ARMB, Analytical Services Section	Air Quality
EPA Region 8 Montana Office	
Stephen Potts	NEPA Coordinator/Cooperating Agency Representative
John Wardell	Director, Montana Office
BLM Montana State Office	
Becky Spurgin	Cooperating Agency Representative
Office of Surface Mining Reclamation and Enforcement Western Regional Coordinating Center	
Rick Williamson	EIS Project Coordinator/Cooperating Agency Representative
Crow Tribe	
William Watt	Office of Legal Council, Crow Nation Executive Branch/Cooperating Agency Representative

Table 5-3. List of Preparers.

Name	Education/Experience	Responsibility
	BIA Rocky Mountain Regional Office	
Rick Stefanic	M.S., B.A. Geology/Biology, 29 years professional experience	EIS Project Leader/ Editor
	Montana Department of Environmental Quality	
Greg Hallsten	M.S., B.S. Range Management, B.S. Wildlife Biology 30 years professional experience	EIS Project Leader/ Editor
	WWC Engineering Third-Party Contractor	
Ken Collier	B.S. Geology, 30 years professional experience (Licensed Wyoming Geologist)	Project Management Report Preparation
John Berry	B.S. Wildlife Biology, 30 years professional experience	Report Preparation
Heidi Robinson	15 years professional experience	Document Production
Mal McGill	6 years professional experience	CADD

Table 5-4. BIA Distribution List.

Federal Agencies
BLM, Billings, MT
BLM, Miles City, MT
BIA, Billings, MT
BIA, Crow Agency, MT
EPA Region 8, MT Office
OSM Western Region, Denver, CO
OSM, Casper, WY
U.S. Fish & Wildlife Service, Helena, MT

State Officials
Governor of Montana Brian Schweitzer

State Agencies
Montana Office of the Governor
Montana Dept. of Environmental Quality
Montana Board of Oil and Gas Conservation
Montana Environmental Quality Council

Local Agencies and Government
Big Horn County, Montana Planning Board
Rosebud County, Montana Commission

Tribal Organizations and Individuals
Chairman, Crow Tribe Executive Branch
Northern Cheyenne Tribal Council

Educational Institutions/Organizations
Little Bighorn College, Crow Agency, MT
Big Horn County Library, Hardin, MT

Companies/Businesses
Burlington Northern Santa Fe Railroad Co.
Consol, Inc., Exploration & Land Dept.
Decker Coal Company
P&M Coal Mining Company
Spring Creek Coal Company
Western Energy Company
Westmoreland Coal Company
Westmoreland Resources, Inc.
WWC Engineering

Press
Big Horn County News
Billings Gazette

Individuals
Ron Crum
Leslie Best
Cecil Noyes
Ellis Millar

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7.0 GLOSSARY

acidic – The pH of a substance is less than 7.

acre-foot – A term used in measuring the volume of fluid. An acre-foot is the amount of fluid required to cover 1 acre to a depth of 1 foot, or 43,560 cubic feet (325,829 gallons).

adverse impact - An apparent direct or indirect detrimental effect.

alkalinity - The degree to which the pH of a substance is greater than 7.

alluvial deposit - Deposits of clay, silt, sand, gravel, and/or other materials carried by moving surface water, such as streams, and deposited at points of weak water flow; alluvium.

alluvial valley floor (AVF) - An area of unconsolidated stream-laid deposits holding streams with water availability sufficient for subirrigation or flood irrigation agricultural activities (see 30 CFR 701.5).

alluvium - Sorted or semi-sorted sediment consisting of clay, silt, sand, gravel, or other unconsolidated rock material deposited in comparatively recent geologic time by a stream or other body of running water in the bed of that stream or on its flood plain or delta.

alternative - In terms of the National Environmental Policy Act, one of several substitute or alternate proposals that a federal agency is considering in an environmental analysis.

ambient - Surrounding conditions (or environment) in a given place and time.

animal unit – A standardized unit of measurement for range livestock or wildlife. Generally, one mature cow, one horse, five sheep, 9.6 antelope, 5.8 deer, or 1.9 elk, based on an average forage consumption of 26 pounds of dry matter per day.

annual precipitation - The quantity of water that falls yearly in the form of rain, hail, sleet, and snow.

approximate original contour - Post-mining surface configuration achieved by backfilling and grading of mined-out areas so that the reclaimed land surface resembles the general surface configuration of the land prior to mining (see 30 CFR 701.5).

aquatic - Living or growing in or on the water.

aquifer - A layer of permeable rock, sand, or gravel that stores and transmits water in sufficient quantities for a specific use.

aquitard - A confining bed that retards but does not totally prevent the flow of water to or from an adjacent aquifer; a leaky confining bed.

area of critical environmental concern – An area that needs special management attention to preserve historic, cultural, or scenic values; to protect fish and wildlife resources or other natural systems or processes; or to protect life and provide safety from natural hazards.

arithmetic mean - The sum of the values of n numbers divided by n. It is usually referred to as simply the "mean" or "average".

ash - The residual non-combustible matter in coal that comes from included silt, clay, silica, or other substances. The lower the ash content, the better the quality of the coal.

avian - Of, relating to, or derived from birds.

backfill - The operation of refilling an excavation. Also, the material placed in an excavation when it is refilled.

baseline - Conditions, including trends, existing in the human environment before a proposed action is begun; a benchmark state from which the environmental consequences of an action are forecast; the no-action alternative.

best available control technology (BACT) - The best available air pollution control technology for a given emission source, considering environmental benefits, economic and energy costs, as defined by the applicable air quality regulatory authority.

beneficial impact - An apparent direct or indirect advantageous effect.

bentonite - A clay formed by the decomposition of volcanic ash which has the ability to absorb large amounts of water and to expand to several times its normal volume; used in adhesives, cements and ceramic fillers.

buffer zone - An area between two different land uses that is intended to resist, absorb, or otherwise preclude development or intrusion between the two use areas.

bypass coal - An isolated part of a coal deposit that is not leased and that can only be economically mined in an environmentally sound manner as a part of continued mining by an existing adjacent operation [see 43 CFR 3400.0.5(d)].

clinker (scoria) - Baked and fused rock resulting from in-place burning of coal deposits.

coal bed natural gas (CBNG) - Natural gas (methane) that is generated during the coal-forming process.

colluvium - Rock fragments, sand, or soil material that accumulates at the base of slopes; slope wash.

confluence - The point at which two or more streams meet.

conglomerate - A rock that contains rounded rock fragments or pebbles cemented together by another mineral substance.

contiguous - Lands or legal subdivisions having a common boundary, lands having only a common corner are not contiguous.

cooperating agency - An agency which has jurisdiction by law in an action being analyzed in an environmental document and who is requested to participate in the NEPA process by the agency that is responsible for preparing the environmental document [see 40 CFR 1501.6 and 1508.5].

criteria pollutant – U.S. EPA has established national air quality standards for carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide.

crucial wildlife habitat - Parts of the habitat necessary to sustain a wildlife population during periods of their life cycle. It may be a limiting factor on the population, such as nesting habitat or winter habitat.

cultural resources - The remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that reveal the nature of historic and prehistoric human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred, and (3) the environment immediately surrounding the resource.

cumulative impact - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

decibel - A unit of sound measurement. In general, a sound doubles in loudness for every increase of 10 decibels.

deciview (dv) - A general measure of view impairment (13 deciview equals a view of approximately 60 miles) caused by pollution. A 10 percent change in extinction corresponds to 1.0 dv.

dip - The angle at which a rock layer is inclined from the horizontal.

direct (or primary) impact - An impact caused by an action that occurs at the same time and place as the action (see 40 CFR 1508.8).

discharge - Any of the ways that ground water comes out of the surface, including through springs, creeks, or being pumped from a well.

dissected upland - An upland or high area in which a large part of the original surface has been deeply cut into by streams.

dragline - A type of excavating crane that casts a rope- or cable-hung bucket a considerable distance, collects the dug material by pulling the bucket toward itself on the ground with a second rope or cable, elevates the bucket, and dumps the material on a backfill bank or pile.

electrical conductivity - A measure of the salt content of water.

emission - Air pollution discharge into the atmosphere, usually specified by mass per unit time.

eolian deposit - Sediment carried, formed, or deposited by the wind, as sand dunes.

ephemeral stream - A stream that flows occasionally because of surface runoff, and is not influenced by permanent ground water.

erosion - The wearing away of the land surface by running water, wind, ice or other geologic agents.

evapotranspiration - The sum total of water lost from the land by evaporation and plant transpiration.

excavation (archeological) - The scientifically controlled recovery of subsurface materials and information from a cultural site. Recovery techniques are relevant to research problems and are designed to produce maximum knowledge about the site's use, its relation to other sites and the natural environment, and its significance in the maintenance of the cultural system.

fault - A fracture surface in rocks along which movement of rock on one side has occurred relative to rock on the other side.

fixed carbon - In coal, the solid combustible material remaining after removal of moisture, ash, and volatile matter. It is expressed as a percentage.

floodplain - The relatively flat area or lowland adjoining a body of flowing water, such as a river or stream, that is covered with water when the river or stream overflows its banks.

forage - Vegetation used for food by wildlife, particularly big game wildlife, and domestic livestock.

formation (geologic) - A rock body distinguishable from other rock bodies and useful for mapping or description. Formations may be combined into groups or subdivided into members.

fossil - The remains or traces of an organism or assemblage of organisms that have been preserved by natural processes in the earth's crust. Many minerals that may be of biologic origin are not considered to be fossils (e.g. oil, gas, asphalt, limestone).

fugitive dust - Airborne particles emitted from any source other than through a controllable stack or vent.

geometric mean - The nth root of the product of the values of n positive numbers.

groundwater - Subsurface water that fills available openings in rock or soil materials to the extent that they are considered water saturated.

habitat - A place where a plant or animal naturally or normally lives and grows.

habituation - The process of becoming accustomed to, or used to, something; acclimation.

hazardous materials - Substance which, because of its potential for corrosivity, toxicity, ignitability, chemical reactivity, or explosiveness, may cause injury to persons or damage to property.

hazardous waste - Those materials defined in Section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, and listed in 40 CFR § 261.

heterogenous - Made up of dissimilar constituents.

human environment - The natural and physical environment and the relationship of people with that environment (see 30 CFR 1508.14).

hydraulic conductivity - The capacity of a medium to transmit water; permeability coefficient. Expressed as the volume of water at the prevailing temperature that will move in unit time under a unit hydraulic gradient through a unit area. Units include gallons per day per square foot, centimeters per second.

hydric soil - A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic (water-loving) vegetation. Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.

hydrocarbon - Any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen.

hydrogeology - The science that deals with subsurface waters and with related geologic aspects of surface waters.

hydrology - The science dealing with the behavior of water as it occurs in the atmosphere, on the surface of the ground, and underground.

hydrophytic vegetation - The plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. When hydrophytic vegetation comprises a community where indicators of hydric soils and wetland hydrology also occur, the area has wetland vegetation.

impermeable - Not capable of transmitting fluids or gasses in appreciable quantities.

incised - Having a margin that is deeply and sharply notched.

Indian Mineral Development Act (IMDA) – (25 USC Secs 2101-2108). Authorizes any Indian tribe, subject to the approval of the Secretary and any limitation or provision contained in its constitution or charter, may enter into any joint venture, operating, production sharing, service, managerial, lease or other agreement (referred to as a “minerals agreement”) providing for the exploration for, or extraction, processing, or other development of oil, gas, uranium, coal, geothermal, or other energy or nonenergy mineral resources in which such Indian tribe owns a beneficial or restricted interest, or providing for the sale or other disposition of the production of products of such mineral resources.

indirect (or secondary) impact - A reasonably foreseeable impact resulting from an action but occurring later in time than or removed in distance from that action (see 40 CFR 1508.8).

infiltration - The flow of a fluid into a solid substance through pores or small openings; specifically, the movement of water into soil or porous rock.

in-place coal reserves - The estimated volume of all of the coal reserves in a lease without considering economic or technological factors that might restrict mining.

interbedded - Layers of one type of rock, typically thin, that are laid between or that alternate with layers of another type of rock.

interburden - A layer of sedimentary rock that separates two mineable coal beds.

interdisciplinary - Characterized by participation or cooperation among two or more disciplines or fields of study.

intermittent stream - A stream that does not flow year-round but has some association with ground water for surface or subsurface flow.

laminated - Consolidated or unconsolidated sediment that is characterized by thin (less than 1 cm thick) layers.

land and resource management plan (LRMP) - A land use plan that directs the use and allocation of U.S. Forest Service lands and resources.

lead agency - The agency or agencies preparing or having taken primary responsibility for preparing an environmental document (see 40 CFR 1508.16).

lease (mineral) - A legal document executed between a mineral owner or lessor and another party or lessee which grants the lessee the right to extract minerals from the tract of land for which the lease has been obtained [see 43 CFR 3400.0-5(r)].

lek - A traditional breeding area for grouse species where territorial males display and establish dominance.

lenticular - Term describing a body of rock or earth that thins out in all directions from the center like a double convex optical lens.

limb (geologic) - One side of a fold (syncline or anticline).

limestone - A sedimentary rock consisting chiefly of calcium carbonate.

lineament - A linear topographic feature of regional extent that is believed to reflect crustal structure.

lithic scatter - The waste material, chips, and flakes resulting from stone tool manufacture.

loadout facilities - The mine facilities used to load the mined coal for transport out of the mine.

loam - A rich, permeable soil composed of a mixture of clay, silt, sand, and organic matter.

maintenance tract - A federal coal tract that would continue or extend the life of an existing coal mine.

major federal action - An action with effects that may be major and which is potentially subject to federal control and responsibility (see 40 CFR 1508.18).

major sources – Those sources that emit more than 100 tons per year of any single criteria air pollutant, 25 tons per year of all combined hazardous air pollutants (HAPs), or 10 tons per year of an individual HAP. The determination of "major" is based on all sources of HAPs at the site, and not just the equipment affected by the MACT standard.

maximum economic recovery (MER) - The requirement that, based on standard industry operating practices, all profitable portions of a leased federal coal deposit must be mined. MER determinations will consider existing proven technology; commercially available and economically feasible equipment; coal quality, quantity, and marketability; safety, exploration, operating, processing, and transportation costs; and compliance with applicable laws and regulations [see 43 CFR 3480.0-5(a)(24)].

MEPA process – Montana state policy requiring state agencies to consider the environmental, cultural, social, and economic impacts of major proposals like mines, power plants, timber sales, and subdivisions before the project is approved.

meteorological - Related to the science dealing with the atmosphere and its phenomena, especially as relating to weather.

methane - A colorless, odorless, and inflammable gas; the simplest hydrocarbon; chemical formula = CH_4. It is the principal constituent of natural gas and is also found associated with crude oil and coal.

mineable coal - Coal that can be economically mined using present day mining technology.

mineral rights - The rights of one who owns the mineral estate (subsurface).

mining permit - A permit to conduct surface coal mining and reclamation operations issued by the state regulatory authority pursuant to a state program or by the Secretary pursuant to a federal program (see 30 CFR 701.5).

mitigation - An action to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

mudstone - A hardened sedimentary rock consisting of clay. It is similar to shale but lacks distinct layers.

National Register of Historic Places (NRHP) - A list of districts, sites, buildings, structures and objects significant in American history, architecture, archeology and culture maintained by the Secretary of the Interior. Expanded as authorized by Section 2(b) of the Historic Sites Act of 1935 (16 U.S.C. 462) and Section 101(a)(1) (A) of the National Historic Preservation Act.

natural gas - Combustible gases (such as hydrocarbons) or mixtures of combustible gases and non-combustible gases (such as helium) that are in a gaseous phase at atmospheric conditions of temperature and pressure.

NEPA process - All measures necessary for compliance with the National Environmental Policy Act of 1969 (see 40 CFR 1508.21).

No Action Alternative - An alternative where no activity would occur. The development of a no action alternative is required by regulations implementing NEPA and MEPA. The No Action Alternative provides a baseline for estimating the effects of other alternatives.

outcrop - A rock formation that appears at or near the surface; the intersection of a rock formation with the surface.

overburden - Material of any nature, consolidated or unconsolidated, that overlies a coal or other useful mineral deposit, excluding topsoil.

paleontological resource - A site containing evidence of plant or non-human animal life of past geological periods, usually in the form of fossil remains.

particulate matter - A particle of soil or liquid matter (e.g., soot, dust, aerosols, fumes and mist).

peak discharge or flow - The highest discharge of water recorded over a specified period of time at a given stream location; also called maximum flow. Often thought of in terms of spring snowmelt, summer, fall or winter rainy season flows.

perennial species (vegetation) - Vegetation that lives over from season to season.

perennial stream - A stream or part of a stream that flows continuously during the calendar year as a result of groundwater discharge or surface runoff.

permeability - The ability of rock or soil to transmit a fluid.

permit application package - A proposal to conduct surface coal mining and reclamation operations on federal lands, including an application for a permit, permit revision, or permit renewal and all the information required by SMCRA, the applicable state program, any applicable cooperative agreement, and all other applicable laws and regulations including, with respect to federal leased coal, the Mineral Leasing Act and its implementing regulations.

permit area - The area of land, indicated on the approved map submitted by the operator with his or her application, required to be covered by the operator’s performance bond under the regulations at 30 CFR Part 800 and which shall include the area of land upon which the operator proposes to conduct surface coal mining and reclamation operations under the permit, including all disturbed areas (see 30 CFR 701.5).

pH - A measure of acidity or alkalinity. A solution with a pH of 7 is neutral, pH greater than 7 (to 14) is alkaline, and a pH less than 7 (to 0) is acidic.

physiography - Physical geography.

piezometer - A well, generally of small diameter, that is used to measure the elevation of the water table.

playa - The sandy, salty, or mud-caked flat floor of a basin with interior drainage, usually occupied by a shallow ephemeral lake during or after rain or snow storms.

point source (pollution) - A point at which pollution is added to a system, either instantaneously or continuously. An example is a smokestack.

pore volume - The amount of fluid necessary to fill the void space in an unsaturated porus medium (i.e., mine backfill).

porosity - The percentage of the bulk volume of rock, sediment or soil that is not occupied by sediment or soil particles; the void space in rock or sediment. It may be isolated or connected.

postmining topography - The relief and contour of the land that remains after mining has been completed.

potentiometric surface - The surface that coincides with the static level of water in an aquifer. The surface is represented by the levels to which water from a given aquifer will rise under its full hydraulic head.

predator - An animal that obtains food by killing and consuming other animals.

prime or unique farmland - Those lands which are defined by the Secretary of Agriculture in 7 CFR part 657 (*Federal Register* Vol. 4 No. 21) and which have historically been used for cropland (see 30 CFR 701.5).

Proposed Action - In terms of NEPA and MEPA, the project, activity, or action that the federal and state agencies propose to implement or undertake and which is the subject of an environmental analysis.

proposed development plan (or proposed South Extension development plan)- With respect to this EIS, the proposed mine and reclamation plans for the Tract III Revision area and the South Extension coal lease area.

raptor - Bird of prey, such as an eagle, falcon, hawk, owl, or vulture.

recharge - The processes by which groundwater is absorbed into a zone of saturation.

reclamation - Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves regrading, replacement of topsoil, revegetation and other work necessary to restore the disturbed area for post-mining use.

record of decision (ROD) - A document separate from, but associated with, an environmental impact statement that publicly and officially discloses the responsible official's decision on the proposed action (see 40 CFR 1505.2).

recoverable coal - The amount of coal that can actually be recovered for sale from the demonstrated coal reserve base.

resource management plan (RMP) - A land use plan, as prescribed by FLPMA, that directs the use and allocation of public lands and resources managed by BLM. Prior to selection of the RMP, different alternative management plans are compared and evaluated in an EIS to determine which plan will best direct the management of the public lands and resources.

revegetation - The reestablishment and development of self-sustaining plant cover following land disturbance. This may occur through natural processes, or the natural processes may be enhanced by human assistance through seedbed preparation, reseeding, and mulching.

right of way (ROW) - The right to pass over property owned by another. The strip of land over which facilities such as roadways, railroads, or power lines are built.

riparian - The area adjacent to rivers and streams that lies between the stream channel and upland terrain and that supports specific vegetation influenced by perennial and/or intermittent water.

royalty (mineral) - A share of production that is free of the expense of production. It is generally paid by a lessee to a lessor of a mineral lease as part of the terms of the lease.

runoff - That portion of rainfall that is not absorbed; it may be used by vegetation, lost by evaporation, or it may find its way into streams as surface flow.

salinity - Refers to the solids, such as sodium chloride (table salt) and alkali metals, that are dissolved in water. Often in non-saltwater areas, total dissolved solids is used as an equivalent term.

sandstone - A common sedimentary rock primarily composed of sand grains, mainly quartz, that are cemented together by other mineral material.

scoping - A public informational process required by the National Environmental Policy Act to determine private and public concerns, scope of issues, and/or questions regarding a proposed action to be evaluated in an environmental impact analysis.

scoria (clinker) - Baked and fused rock resulting from in-place burning of coal deposits.

sediment - Soil, rock particles and organic or other debris carried from one place to another by wind, water, gravity, ice, or other geologic agent.

sedimentary rock - A layered rock resulting from the consolidation of sediment, such as shale, sandstone, and limestone.

sedimentation pond - An impoundment used to remove solids from water in order to meet water quality standards or effluent limitations before the water leaves the permit area (see 30 CFR 701.5).

semi-arid - A climate or region characterized by little yearly rainfall and by the growth of a number of short grasses and shrubs.

severance tax - A tax on the removal of minerals from the ground.

shale - A very fine-grained clastic rock or sediment consisting predominately of clay-sized particles that is laminated; lithified, layered mud.

shrub - A low, woody plant, usually with several stems; may provide food and/or cover for wildlife.

significant impact - A qualitative term used to describe the anticipated importance of impacts to the human environment as a result of an action.

siltstone - A fine-grained clastic rock consisting predominately of silt-sized particles.

socioeconomics - The social and economic situation that might be affected by a proposed action.

sodium adsorption ratio (SAR) - An expression of relative activity of sodium ions in exchange reactions with soil, indicating the sodium or alkali hazard to soil. It is a particularly important measure in waters used for irrigation purposes.

soil survey - The systematic examination, description, classification, and mapping of soils in an area, usually a county. Soil surveys are classified according to the level of detail of field examination. Order I is the most detailed and Order V is the least detailed.

solid waste - Any solid, semi-solid, liquid, or contained gaseous material that is intended for disposal.

South Extension - With respect to this EIS, the proposed Absaloka Mine Crow Reservation South Extension lease tract, which is located south of and adjacent to WRI's existing Tract III Coal Lease. The IMDA lease agreement with the Crow tribe is for this coal reserve area encompassing approximately 3,660 acres on the Crow Reservation.

spontaneous combustion - The heating and slow combustion of coal and coaly material initiated by the absorption of oxygen.

stipulations - Requirements that are part of the terms of a mineral lease. Some stipulations are standard on all Federal leases. Other stipulations may be applied to specific leases at the discretion of the surface management agency to protect valuable surface resources or uses existing on those leases.

storage coefficient - The volume of water that can be released from storage per unit surface area of a saturated confined aquifer, per unit decline in the component of hydraulic head normal to the surface. It is calculated by taking the product of the specific storage and the aquifer thickness.

stratigraphic - Of, relating to, or determined by stratigraphy, which is the branch of geology dealing with the study of the nature, distribution, and relations of layered rocks in the earth's crust.

stripping ratio - The unit amount of overburden that must be removed to gain access to a similar unit amount of coal.

subirrigation - In alluvial valley floors, the supplying of water to plants from underneath, or from a semi-saturated or saturated subsurface zone where water is available for use by vegetation (see 30 CFR 701.5).

subbituminous - A lower rank of coal (35-45 percent carbon) with a heating value between that of bituminous and lignite, usually 8,300-11,500 Btu per pound. Subbituminous coal contains a high percentage of volatile matter and moisture.

surface disturbance - Any disturbance by mechanical actions that alters the soil surface.

surface rights - Rights to the surface of the land, does not include rights to oil, gas, or other subsurface minerals or subsurface rights.

suspended solids - The very fine soil particles that remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

tectonic fracture - Fractures caused by deformation of the earth's crust.

threatened and endangered (T&E) species - These species of plants or animals classified as threatened or endangered pursuant to Section 4 of the Endangered Species Act. Any species which is in danger of extinction, or is likely to become so within the foreseeable future.

> ***Category 1*** - Substantial biological information on file to support the appropriateness of proposing to list as endangered or threatened.
>
> ***Category 2*** - Current information indicates that proposing to list as endangered or threatened is possibly appropriate, but substantial biological information is not on file to support an immediate ruling (U.S. Fish and Wildlife Service).

TMDL (Total Maximum Daily Load) - A TMDL is the total amount of a pollutant that a water body may receive from all sources without exceeding water quality standards. A TMDL can also be defined as a reduction in pollutant loading that results in meeting water quality standards.

topography - Physical shape of the ground surface; the configuration of land surface including its relief, elevation, and the position of its natural and manmade features.

topsoil - The surface layer of a soil.

total dissolved solids (TDS) - The total quantity in milligrams per liter of dissolved materials in water.

Tract III Revision – Absaloka Mine's Tract III South permit revision application, filed with MDEQ in November 2006 and OSM in February 2007, to revise its currently approved mine and reclamation plans to mine additional reserves within the Tract III Coal Lease that are not yet included within the mine's existing permits.

transmissivity - The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient. Equals the hydraulic conductivity multiplied by the aquifer thickness. Values are given in units of gallons per day per foot.

transpiration - The discharge of water vapor by plants.

truck & shovel - A mining method used to remove overburden and coal in a strip mining operation. Truck and shovel operations use large bucket-equipped digging and loading machines (shovels) and large dump trucks to remove overburden instead of using a dragline for overburden removal.

typic - Typical.

unconfined aquifer - An aquifer where the water table is exposed to the atmosphere through openings in the overlying materials.

unsuitability criteria - The 20 criteria described in 43 CFR 3461, the application of which results in an assessment of federal coal lands as suitable or unsuitable for surface coal mining.

uranium - A very hard, heavy, metallic element that is crucial to development of atomic energy.

vegetation type - A kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates an area.

vertebrate fossils - The remains of animals that possessed a backbone; examples are fish, amphibians, reptiles, dinosaurs, birds, and mammals.

vesicular - Rock containing many small cavities that were formed by the expansion of a bubble of gas or steam during the solidification of the rock.

visual resources - The physical features of a landscape that can be seen (e.g., land, water, vegetation, structures, and other features).

Visual Resource Management (VRM) - The systematic means to identify visual values, establish objectives which provide the standards for managing those values, and evaluate the visual impacts of proposed projects to ensure that objectives are met.

volatile matter - In coal, those substances, other than moisture, that are given off as gas or vapor during combustion.

waterfowl - A bird that frequents water, especially a swimming bird.

watershed - All lands which are enclosed by a continuous hydrologic drainage divide and lie upslope from a specified point on a stream.

wetlands - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands include marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs [see 33 CFR 328.3(a)(7)(b)].

wild and scenic river - Rivers or sections of rivers designated by Congressional actions under the 1968 Wild and Scenic Rivers Act as wild, scenic, or recreational by an act of the Legislature of the state or states through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

> **wild river areas -** Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
>
> **scenic river areas -** Rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
>
> **recreational river areas -** Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

wilderness - An area of undeveloped Federal land designated wilderness by Congress, retaining its primeval character and influence, without permanent improvements or human habitation, protected and managed to preserve its natural conditions and that (1) generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable, (2) has outstanding opportunities for solitude or primitive and unconfined recreation, (3) has at least 5,000 acres or is of sufficient size to make practical its preservation and use in an unimpaired condition, and (4) also may contain features that are of ecological, geological, scientific, educational, scenic, or historical value. These characteristics were identified by Congress in the Wilderness Act of 1964.

8.0 INDEX

APPENDIX A

FEDERAL AND STATE AGENCIES
AND PERMITTING REQUIREMENTS

APPENDIX A:
FEDERAL AND STATE AGENCIES & PERMITTING REQUIREMENTS

Agency	Lease/Permit/Action
FEDERAL	
Bureau of Indian Affairs	Approval of Coal Lease on Tribal Coal Approval of Surface Use Agreements
Office of Surface Mining Reclamation and Enforcement	Permit and License to Mine SMCRA Oversight
Environmental Protection Agency	Water Discharge Permit
Bureau of Land Management	Resource Recovery & Protection Plan Federal Coal Lease Exploration Drilling Permit on Federal Lands
Mine Safety and Health Administration	Safety Permit and Legal ID Ground Control Plan Major Impoundments Explosives Use and Storage Permit
Bureau of Alcohol, Tobacco, and Firearms	Explosives Use and Storage Permit
Federal Communication Commission	Radio Permit:/License: Mobile Relay System
Army Corps of Engineers	Authorization of Impacts to Wetlands and Other Waters of the U.S.
Department of Transportation	Hazardous Waste Shipment Notification
STATE	
Department of Environmental Quality -Industrial and Energy Minerals Bureau	Permit and License to Mine (outside of Indian Reservation)
Department of Environmental Quality -Air Resources Management Bureau	Air Quality Permit to Operate Air Quality Permit to Construct
Department of Environmental Quality -Water Protection Bureau -Public Water and Subdivisions Bureau	Montana Pollutant Discharge Elimination System Water Discharge Permit Authorization to Construct and Install Public Water Supply
Montana Department of Natural Resources and Conservation -Water Resources Division	Appropriation of Groundwater Permits Appropriation of Surface Water Permits

APPENDIX B

SUMMARY OF THE ENVIRONMENTAL IMPACTS OF
STORMWATER MANAGEMENT ALTERNATIVES

Alternative 1 – Preferred Alternative
(2-year, 24-hour detention with management practices)

Wetlands Impacts	Preventing an increase in the average annual sediment yield from the pre-mined, undisturbed conditions	Minimizing reductions in downstream runoff	Reducing unnecessary additional disturbance of surface acreage	Maintaining downstream hydrology
Removal of wetlands and loss of wetland function, which may be avoided or replaced in accordance with regulatory requirements. Establishment of wetlands occurring in concert with reclamation and revegetation due to rapid reestablishment of natural streamflows.	Sediment yield likely to exceed background during the active mining phase without contemporaneous reclamation and use of management practices. Return to natural conditions could be more rapid then with other alternatives.	Minimal disruption in downstream runoff during mining-phase and rapid re-establishment of downstream flows.	Additional surface disturbance would be minimal during mining.	Downstream hydrology likely to be maintained well post-mining. During active mining, sediment could impact hydrology. Management practices necessary to ensure erosion control to prevent downstream effects.

Alternative 2
(10-year, 24-hour detention from multiple outfalls)

Wetlands Impacts	Preventing an increase in the average annual sediment yield from the pre-mined, undisturbed conditions	Minimizing reductions in downstream runoff	Reducing unnecessary additional disturbance of surface acreage	Maintaining downstream hydrology
Removal of wetlands and loss of wetland function, which may be avoided or replaced in accordance with regulatory requirements. Establishment of wetlands significantly delayed due to re-directed and restricted flows from multiple subwatersheds to seven dams. Wetland reestablishment eliminated until removal of structures in dam footprints.	Sediment yield greatly reduced during mine operation, but significant increases above background likely during reclamation phase and post-reclamation.	Downstream runoff temporarily stopped or eliminated due to evaporation until post-reclamation removal of structures.	Significant loss of mineable surface area and additional disturbance required for larger sediment ponds extending beyond the mineable footprint for the project.	Seepage likely during active mining and during reclamation until removal of detention facilities. Diversions necessary to consolidate outfalls to seven detention facilities. OSM requirements to regrade to premining condition would disrupt established vegetation upon removal of structures post-reclamation. Significant alteration of downstream hydrology.

Alternative 3
(Use of a single instream detention facility in Middle Fork Sarpy Creek)

Wetlands Impacts	Preventing an increase in the average annual sediment yield from the pre-mined, undisturbed conditions	Minimizing reductions in downstream runoff	Reducing unnecessary additional disturbance of surface acreage	Maintaining downstream hydrology
Removal of wetlands and loss of wetland function, which may be avoided or replaced in accordance with regulatory requirements. Establishment of wetlands significantly delayed due to re-directed and altered flows from the dam. Significant dam footprint would eliminate re-establishment of wetlands until dam removal.	Sediment yield greatly reduced during active mining but compromised during reclamation and greatly enhanced post-reclamation as equilibrium is re-established after dam removal.	Downstream runoff eliminated or compromised directly in the primary receiving waterbody.	Additional surface disturbance minimal with the exception of the dam footprint.	Significant loss of streamflow if sediment removal efficiency is to be maintained. The large dam would not allow for natural patterns of infiltration and the quantity of runoff (as opposed to the rate of runoff) would be altered significantly. Significant alteration of downstream hydrology.

Alternative 4 – No Action Alternative

Wetlands Impacts	Preventing an increase in the average annual sediment yield from the pre-mined, undisturbed conditions	Minimizing reductions in downstream runoff	Reducing unnecessary additional disturbance of surface acreage	Maintaining downstream hydrology
Wetlands retained.	No increase from the pre-mining sediment yield.	No reduction in downstream water availability.	No additional disturbance of surface acreage.	No difference in downstream hydrology from pre-mining condition.

APPENDIX C

MONTANA SPECIES OF CONCERN AND
EFFECTS DETERMINATION SUMMARY TABLES

MONTANA SPECIES OF CONCERN

The term “Species of Concern” includes taxa that are at-risk due to rarity, restricted distribution, habitat loss and/or other factors. The term also encompasses species that have a special designation by organizations or land management agencies in Montana, including: U.S. Fish and Wildlife Service Threatened, Endangered and Candidate Species; Bureau of Land Management Designated Sensitive Species; and State of Montana Natural Heritage Program (MTNHP) Species Ranking.

CONTENTS

Table C-1. U.S. Fish and Wildlife Service Listed Threatened, Endangered, and Candidate Species for Montana.

Species (Common Name)	Status[1]	In Range (Yes/No)[2]	Habitat Present (Yes/No)[3]	Effects Determination
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		
White sturgeon	E	No		
Spalding's campion	T	No		
Ute ladies'-tresses	T	No		
Water howellia	T	No		
Linearleaf moonwort	C	No		
Arctic grayling	C	No		
Western yellow billed cuckoo	C	No		
Warm spring zaitzevian riffle beatle	C	No		

[1] T: Threatened, E: Endangered, C: Candidate
[2] Occurring in Big Horn, Rosebud, and Treasure counties, Montana, as determined from MTNHP records (MTNHP 2007). If project is not within the range of the species, no determination of habitat presence is needed.
[3] If out of species' range or habitat is not present, no Effects Determination is needed.

Table C-2. U.S. Bureau of Land Management (Montana and Dakotas) Designated Sensitive Species[1].

BIRDS			
Species (Common Name)	**In Range (Yes/No)[2]**	**Habitat Present (Yes/No)[3]**	**Effects Determination**
Baird's sparrow	Yes	No	
Black tern	No		
Black-backed woodpecker	No		
Blue-gray gnatcatcher	No		
Brewer's sparrow	Yes	Yes	See discussion in Section 3.10.6
Burrowing owl	Yes	No	
Chestnut-collared longspur	Yes	No	
Common loon	No		
Dickcissel	Yes	No	
Ferruginous hawk	Yes	Yes	See discussion in Section 3.10.4
Flammulated owl	No		
Franklin's gull	Yes	No	
Great gray owl	No		
Greater sage-grouse	Yes	Yes	See discussion in Sections 3.10.5
Golden eagle	Yes	Yes	See discussion in Section 3.10.4
Harlequin duck	Yes	No	
LeConte's sparrow	No		
Loggerhead shrike	Yes	Yes	See discussion in Section 3.10.6
Long billed curlew	Yes	Yes	See discussion in Section 3.10.6
Marbled godwit	No		
McCown's longspur	Yes	No	
Mountain Plover	Yes	No	
Nelson's sharp-tailed sparrow	No		
Northern goshawk	Yes	Yes	See discussion in Section 3.10.4
Peregrine falcon	Yes	No	
Red-headed woodpecker	Yes	Yes	See discussion in Section 3.10.6
Sage sparrow	No		
Sage thrasher	Yes	Yes	See discussion in Section 3.10.6
Sedge wren	No		
Sprague's pipit	No		
Swainson's hawk	Yes	Yes	See discussion in Section 3.10.4
Three-toed woodpecker	No		
Trumpeter swan	No		
White-faced ibis	No		
Willet	No		
Yellow rail	No		

Table C-2. U.S. Bureau of Land Management (Montana and Dakotas) Designated Sensitive Species[1] (Continued).

MAMMALS			
Species (Common Name)	**In Range (Yes/No)[2]**	**Habitat Present (Yes/No)[3]**	**Effects Determination**
Black-tailed prairie dog	Yes	No	
Fisher	No		
Fringed myotis	No		
Fringe-tailed myotis	No		
Great basin pocket mouse	No		
Long-legged myotis	Yes	Yes	See discussion in Section 3.10.3
Long-eared myotis	Yes	Yes	See discussion in Section 3.10.3
North American wolverine	No		
Northern myotis	No		
Pallid bat	Yes	Yes	See discussion in Section 3.10.3
Pygmy rabbit	No		
Spotted bat	Yes	Yes	See discussion in Section 3.10.3
Swift fox	Yes	No	
Townsend's big-eared bat	Yes	Yes	See discussion in Section 3.10.3
Western spotted skunk	Yes	Yes	See discussion in Section 3.10.3
White-tailed prairie dog	No		

REPTILES and AMPHIBIANS			
Species (Common Name)	**In Range (Yes/No)[2]**	**Habitat Present (Yes/No)[3]**	**Effects Determination**
Boreal/western toad	No		
Coeur d'Alene salamander	No		
Great Plains toad	Yes	No	
Greater short-horned lizard	Yes	Yes	See discussion in Section 3.10.7
Milk snake	Yes	Yes	See discussion in Section 3.10.7
Northern leopard frog	Yes	No	
Plains spadefoot	Yes	Yes	See discussion in Section 3.10.7
Snapping turtle	Yes	No	
Spiny softshell turtle	Yes	No	
Western hog-nosed snake	Yes	Yes	See discussion in Section 3.10.7

Table C-2. U.S. Bureau of Land Management (Montana and Dakotas) Designated Sensitive Species[1] (Continued).

FISH			
Species (Common Name)	**In Range (Yes/No)[2]**	**Habitat Present (Yes/No)[3]**	**Effects Determination**
Arctic grayling	No		
Blue sucker	Yes	No	
Northern redbelly X Finescale dace	No		
Paddlefish	Yes	No	
Pearl dace	No		
Sauger	Yes	No	
Shortnose gar	No		
Sicklefin chub	Yes	No	
Sturgeon chub	Yes	No	
Westslope cutthroat trout	No		
Yellowstone cutthroat trout	Yes	No	

VASCULAR PLANTS			
Species (Common Name)	**In Range (Yes/No)[2]**	**Habitat Present (Yes/No)[3]**	**Effects Determination**
Lead plant	Yes	No	
Narrowleaf milkweed	Yes	No	
Sweetwater milkvetch	Yes	No	
Barr's milkvetch	Yes	No	
Yellow bee plant	Yes	No	
Spiny hopsage	Yes	No	
Nuttall desert-parsley	Yes	No	
Bractless mentzelia	Yes	No	
Plains phlox	Yes	No	
Woolly twinpod	Yes	No	
Persistent-sepal yellow-cress	Yes	No	
Wyoming sullivantia	Yes	No	

1 BLM Sensitive Species List for Montana, South and North Dakota, approved February 22, 2004, provided by BLM Miles City Field Office, February 2, 2007.

2 Occurring in Big Horn, Rosebud, and Treasure counties, as determined from MTNHP records (MTNHP 2007) and/or from WESTECH (2006b and 2006d). No determination of habitat presence is needed if project is not within the range of the species.

3 If out of species' range or habitat is not present, no Effects Determination is needed.

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1].

Species (Scientific Name)	State Rank[2]	Observed at Absaloka Mine[3]	Effects Determination
Acorus americanus	SH		
Adoxa moschatellina	S2		
Agastache cusickii	S1		
Allium acuminatum	S1		
Allium columbianum	S1		
Allium parvum	S2S3		
Allium simillimum	S1		
Alnus rubra	S1		
Amerorchis rotundifolia	S2S3		
Ammannia robusta	SH		
Amorpha canescens	SH		
Antennaria densifolia	S1		
Aquilegia brevistyla	S2		
Aquilegia formosa	S1S2		
Arabis demissa	S1		
Arabis fecunda	S2		
Arabis kamchatica	SH		
Arctostaphylos patula	S1		
Asclepias incarnata	S1		
Asclepias ovalifolia	S1		
Asclepias stenophylla	S1		
Asplenium trichomanes	SH		
Aster frondosus	SH		
Aster ptarmicoides	S1		
Astragalus aretioides	S1		
Astragalus barrii	S3		
Astragalus ceramicus var. apus	S1		
Astragalus convallarius	S2		
Astragalus geyeri	S2		
Astragalus grayi	S1S2		
Astragalus lackschewitzii	S2		
Astragalus oreganus	S1		
Astragalus racemosus	S2		
Astragalus scaphoides	S2		
Astragalus terminalis	S2		
Athysanus pusillus	S1		
Atriplex truncata	S1		
Bacopa rotundifolia	S1		
Balsamorhiza hookeri	S1		
Balsamorhiza macrophylla	S2		
Bidens beckii	S2		
Boisduvalia densiflora	SH		
Botrychium ascendens	S1S2		
Botrychium campestre	S1		
Botrychium crenulatum	S2S3		
Botrychium hesperium	S2		
Botrychium lineare	S1		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	State Rank[2]	Observed at Absaloka Mine[3]	Effects Determination
Botrychium montanum	S3		
Botrychium pallidum	S1		
Botrychium paradoxum	S2		
Botrychium pedunculosum	S1		
Botrychium spathulatum	S1		
Brasenia schreberi	S1S2		
Braya humilis	S1		
Brickellia oblongifolia	S1		
Calamagrostis tweedyi	S3		
Calochortus bruneaunis	SH		
Camissonia andina	S1		
Camissonia parvula	S1		
Camissonia subacaulis	S2S3		
Cardamine oligosperma var. kamtschatica	S1		
Cardamine rupicola	S3		
Carex amplifolia	S1		
Carex chordorrhiza	S2		
Carex comosa	S1		
Carex crawei	S2		
Carex gravida	S1S2	X	See discussion in Section 3.9.3
Carex idahoa	S2S3		
Carex incurviformis	S1		
Carex lacustris	S1		
Carex lenticularis var. dolia	S1		
Carex multicostata	S1		
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		
Cercocarpus montanus var. glaber	S1S2		
Chenopodium subglabrum	S1		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	State Rank[2]	Observed at Absaloka Mine[3]	Effects Determination
Chrysothamnus parryi ssp. montanus	S1		
Cirsium brevistylum	S1S2		
Cirsium longistylum	S3		
Clarkia rhomboidea	S2		
Claytonia arenicola	S1		
Cleome lutea	S1		
Collomia debilis var. camporum	S2		
Collomia tinctoria	S1		
Corydalis sempervirens	S2		
Cryptantha fendleri	S2		
Cryptantha humilis	SH		
Cryptantha scoparia	S1		
Cyperus acuminatus	S1		
Cyperus erythrorhizos	SH		
Cyperus rivularis	S1		
Cyperus schweinitzii	S2		
Cypripedium fasciculatum	S2		
Cypripedium passerinum	S2		
Cystopteris montana	SH		
Dalea enneandra	S1		
Dalea villosa	S1		
Delphinium bicolor ssp. calcicola	S3		
Delphinium burkei	S2		
Dichanthelium oligosanthes var. scribnerianum	S1		
Downingia laeta	S1		
Draba crassa	S3		
Draba daviesiae	S3		
Draba densifolia	S2		
Draba fladnizensis	S1		
Draba globosa	S1		
Draba macounii	S1		
Draba porsildii	S1		
Draba ventosa	S1		
Drosera anglica	S2S3		
Drosera linearis	S1		
Dryas integrifolia	S1		
Dryopteris cristata	S2		
Eleocharis rostellata	S2		
Elodea longivaginata	S1		
Elymus flavescens	S1		
Elymus innovatus	S1		
Epipactis gigantea	S2		
Erigeron allocotus	S3		
Erigeron asperugineus	S1		
Erigeron eatonii ssp. eatonii	S1		
Erigeron evermannii	S1		
Erigeron flabellifolius	S3		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	**State Rank[2]**	**Observed at Absaloka Mine[3]**	**Effects Determination**
Erigeron formosissimus	S1		
Erigeron lackschewitzii	S2		
Erigeron leiomerus	S1		
Erigeron linearis	S1		
Erigeron parryi	S2		
Erigeron radicatus	S3		
Erigeron tener	S1		
Eriogonum brevicaule var. canum	S3		
Eriogonum caespitosum	S1		
Eriogonum capistratum var. muhlickii	S3		
Eriogonum salsuginosum	S1		
Eriogonum soliceps	S2		
Eriogonum visheri	S1		
Eriophorum callitrix	S1		
Eriophorum gracile	S2		
Eupatorium maculatum	S1S2		
Eupatorium occidentale	S2		
Euphrasia subarctica	S1		
Eustoma grandiflorum	S1		
Festuca vivipara	S1		
Gentiana glauca	S1		
Gentianopsis macounii	S1		
Gentianopsis simplex	S1		
Githopsis specularioides	S1		
Glossopetalon spinescens	S1		
Goodyera repens	S2S3		
Gratiola ebracteata	S1		
Grayia spinosa	S2		
Grindelia howellii	S2S3		
Gymnosteris parvula	SH		
Halimolobos perplexa	S1		
Haplopappus aberrans	S1		
Haplopappus carthamoides var. subsquarrosus	S1S2		
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		
Idahoa scapigera	S1		
Ipomoea leptophylla	S1S2		
Ipomopsis congesta ssp. crebrifolia	S1		
Ipomopsis minutiflora	S1		
Juncus acuminatus	S1		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	State Rank[2]	Observed at Absaloka Mine[3]	Effects Determination
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		
Kochia americana	S1		
Koenigia islandica	S1		
Lagophylla ramosissima	S1		
Lathyrus bijugatus	S1		
Leptodactylon caespitosum	S2		
Lesquerella carinata var. languida	S1		
Lesquerella douglasii	S1		
Lesquerella humilis	S1		
Lesquerella klausii	S3		
Lesquerella lesicii	S1		
Lesquerella paysonii	S1		
Lesquerella pulchella	S2		
Lewisia columbiana	S1		
Lewisia pygmaea var. nevadensis	S1		
Lilaea scilloides	SH		
Liparis loeselii	S1S2		
Listera borealis	S1S2		
Lobelia spicata	S1		
Lomatium attenuatum	S2		
Lomatium geyeri	S2		
Lomatium nuttallii	S1		
Lomatogonium rotatum	S1		
Lycopodium dendroideum	S1		
Lycopodium inundatum	S1		
Lycopodium lagopus	S1		
Maianthemum canadense	SH		
Malacothrix torreyi	S1		
Mentzelia montana	S1		
Mentzelia nuda	S1		
Mentzelia pumila	S2		
Mertensia bella	S1		
Mimulus breviflorus	S1S2		
Mimulus nanus	S1		
Mimulus patulus	S1		
Mimulus primuloides	S2		
Mimulus ringens	S1		
Najas guadalupensis	S1		
Nama densum	S1		
Nuttallanthus texanus	S1		
Nymphaea tetragona ssp. leibergii	S1		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	**State Rank[2]**	**Observed at Absaloka Mine[3]**	**Effects Determination**
Ophioglossum pusillum	S2		
Orogenia fusiformis	S2		
Oxytropis campestris var. columbiana	S1		
Oxytropis deflexa var. foliolosa	S1		
Oxytropis lagopus var. conjugens	S3		
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		
Penstemon angustifolius	S1S2		
Penstemon attenuatus var. militaris	SH		
Penstemon caryi	S3		
Penstemon flavescens	S3		
Penstemon globosus	S1		
Penstemon grandiflorus	S1		
Penstemon lemhiensis	S3		
Penstemon payettensis	S1		
Penstemon whippleanus	S1		
Petasites frigidus	S1		
Phacelia incana	S2		
Phacelia scopulina	SH		
Phacelia thermalis	S1		
Phippsia algida	S1		
Phlox andicola	S2		
Phlox kelseyi var. missoulensis	S2		
Physaria brassicoides	S2		
Physaria didymocarpa var. lanata	S1		
Physaria saximontana var. dentata	S3		
Plagiobothrys leptocladus	S1		
Poa curta	S1		
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		
Potentilla quinquefolia	S1		
Potentilla uniflora	S1		
Primula alcalina	S1		
Primula incana	S2		
Prunus pumila	S1		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	State Rank[2]	Observed at Absaloka Mine[3]	Effects Determination
Psilocarphus brevissimus	S1		
Psoralea hypogaea	S2S3	X	See discussion in Section 3.9.3
Puccinellia lemmonii	S1		
Quercus macrocarpa	S1		
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		
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		
Scheuchzeria palustris	S2		
Scirpus cespitosus	S2		
Scirpus heterochaetus	S1		
Scirpus hudsonianus	S1		
Scirpus pumilus ssp. rollandii	S1		
Scirpus subterminalis	S2		
Selaginella selaginoides	S2		
Senecio amplectens	S1		
Senecio eremophilus	S1S2		
Senecio spribillei	S1		
Shoshonea pulvinata	S1		
Sidalcea oregana	S1		
Silene spaldingii	S1		
Sisyrinchium septentrionale	S1		
Solidago sparsiflora	S1		
Sphaeralcea munroana	S1		
Sphaeromeria argentea	S2S3		
Sphaeromeria capitata	S3		
Sphenopholis intermedia	S1		
Spiranthes diluvialis	S1		
Sporobolus asper	SH		
Sporobolus neglectus	S1		

Table C-3. Montana Natural Heritage Program List of Vascular Plant Species of Concern[1] (Continued).

Species (Scientific Name)	State Rank[2]	Observed at Absaloka Mine[3]	Effects Determination
Stellaria crassifolia	S1		
Stellaria jamesiana	S1		
Stephanomeria spinosa	S1		
Stipa lettermanii	S1		
Suckleya suckleyana	S1		
Sullivantia hapemanii	S2		
Synthyris canbyi	S3		
Taraxacum eriophorum	S2		
Thalictrum alpinum	S2		
Thelypodium paniculatum	SH		
Thelypodium sagittatum	S2		
Thelypteris phegopteris	S2		
Thlaspi parviflorum	S2		
Tofieldia pusilla	S2		
Townsendia condensata	S1		
Townsendia florifera	S1		
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		
Viola selkirkii	S1		
Waldsteinia idahoensis	S1		
Wolffia columbiana	S2		
Zizia aurea	SH		

1 Source: Montana Natural Heritage Program List of Vascular Plant Species of Concern for the entire State of Montana (MTNHP 2007).

2 Natural Heritage Program state ranking codes

- S1: At high risk because of extremely limited and/or rapidly declining numbers, range, and/or habitat, making it highly vulnerable to global or extirpation in the state.
- S2: At risk because of extremely limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
- S3: Potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas.
- S4: Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern.
- S5: Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.
- SH: Possibly Extinct – Species known from only historical occurrences, but may nevertheless still be extant; further searching needed.

3 Source: WESTECH 2006b.

Table C-4. Animal Species of Concern Potentially Occurring or Recorded in the Habitats of the South Extension Inventory Area, 2004 – 2005[1].

Common Name (*Scientific Name*)	**MTNHP State Rank[2]**	**Habitat Present (Yes/No)**	**Recorded in Adjacent Area (1975-2005)**	**Recorded in South Extension Tract (2005)**
BIRDS				
Common loon (*Gavia immer*)	S2B	No	No	No
American white pelican (*Pelecanus erythrorhynchos*)	S3B	No	No	No
Bald eagle (*Haliaeetus leucocephalus*)	S3	No	Yes	No
Northern goshawk (*Accipiter gentilis*)	S3	Yes	Yes	No
Swainson's hawk (*Buteo swainsoni*)	S3B	Yes	Yes	No
Ferruginous hawk (*Buteo regalis*)	S2B	Yes	Yes	No
Peregrine falcon (*Falco peregrinus*)	S2B	No	Yes	No
Sage grouse (*Centrocercus urophasianus*)	S3	Yes	No	No
Mountain plover (*Charadrius montanus*)	S2B	No	No	No
Long-billed curlew (*Numenius americanus*)	S2B	Yes	Yes	No
Franklin's gull (*Larus pipixcan*)	S3B	No	No	No
Yellow-billed cuckoo (*Coccyzus americanus*)	S3B	Yes	No	No
Burrowing owl (*Speotyto cunicularia*)	S2B	Yes	Yes	No
Red-headed woodpecker (*Melanerpes erythrocephalus*)	S3B	Yes	Yes	Yes
Lewis' woodpecker (*Melanerpes lewis*)	S2B	Yes	Yes	No
Cassin's kingbird (*Tyrannus vociferans*)	S2B	Yes	Yes	No
Sage thrasher (*Oreoscoptes montanus*)	S3B	Yes	No	No
Loggerhead shrike (*Lanius ludovicianus*)	S3B	Yes	Yes	No
Dickcissel (*Spiza americana*)	S1S2B	No	No	No
Brewer's sparrow (*Spizella breweri*)	S2B	Yes	Yes	Yes
Lark bunting (*Calamospiza melanocorys*)	S3B	Yes	Yes	Yes
Grasshopper sparrow (*Ammodramus savannarum*)	S3B	Yes	Yes	Yes
Chestnut-collared longspur (*Calcarius ornatus*)	S3B	No	Yes	No
Grey-crowned rosy finch (*Leucosticte tephrocotis*)	S2B, S5N	Yes	Yes	No
MAMMALS				
Preble shrew (*Sorex preblei*)	S3	Yes	No	No
Merriam shrew (*Sorex merriami*)	S3	Yes	No	No
Townsend's big-eared bat (*Plecotus townsendii*)	S2	Yes	No	No
Black-tailed prairie dog (*Cynomys ludovicianus*)	S3	Yes	Yes	No

Table C-4. Animal Species of Concern Potentially Occurring or Recorded in the Habitats of the South Extension Inventory Area, 2004 – 2005[1] (Continued).

Common Name (*Scientific Name*)	**MTNHP State Rank[2]**	**Habitat Present (Yes/No)**	**Recorded in Adjacent Area (1975-2005)**	**Recorded in South Extension Tract (2005)**
REPTILES				
Snapping turtle (*Chelydra serpentine*)	S3	No	Yes	No
Spiny softshell (*Apalone spinifera*)	S3	No	No	No
Sagebrush lizard (*Sceloporus graciosus*)	S3	Yes	Yes	No
Greater short-horned lizard (*Phrynosoma hernandesi*)	S3	Yes	No	No
Western hog-nosed snake (*Heterodon nasicus*)	S2	Yes	Yes	No
Milk snake (*Lampropeltis triangulum*)	S2	Yes	No	No
AMPHIBIANS				
Plains spadefoot (*Spea bombifrons*)	S3	Yes	No	No
Great Plains toad (*Bufo cognatus*)	S2	No	No	No
Northern leopard frog (*Rana pipiens*)	S1S3	No	Yes	No
FISH				
None occurring	--	--	--	--

[1] Source: WESTECH 2006d

[2] MTNHP state ranking codes

- S1: At high risk because of extremely limited and/or rapidly declining numbers, range, and/or habitat, making it highly vulnerable to global or extirpation in the state.
- S2: At risk because of extremely limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
- S3: Potentially at risk because of limited and/or declining numbers, range, and/or habitat, even though it may be abundant in some areas.
- S4: Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern.
- S5: Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.
- B: Breeding – refers to the breeding population of the species in Montana.
- N: Nonbreeding – refers to the non-breeding population of the species in Montana.

APPENDIX D

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE'S LETTER TO THE
BUREAU OF INDIAN AFFAIRS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
MONTANA FIELD OFFICE
585 SHEPARD WAY
HELENA, MONTANA 59601
PHONE (406) 449-5225, FAX (406) 449-5339

File:M01 BIA (I)

February 8, 2007

Jerry Kaiser, Regional Biologist
Bureau of Indian Affairs
Rocky Mountain Regional Office
316 North 26th Street
Billings, Montana 59101

Dear Mr. Kaiser:

This is in response to your January 24, 2007 request for U.S. Fish and Wildlife Service (Service) review for federally listed threatened and endangered species regarding the effects of the proposed expansion of the Absaloka coal mine known as the South Extension. The project site is located on the Crow Indian Reservation, east of Hardin in Big Horn County, Montana.

The Service has reviewed your letter for the proposed project and acknowledges the determination that the proposed action will have no effect on listed species in the area. Considering the location of the project, the Service does not anticipate impacts to any threatened, endangered, candidate or proposed species or critical habitat. This concludes consultation and no further review under Section 7 of the Endangered Species Act is necessary.

We appreciate your efforts to ensure the conservation of threatened and endangered species under the Endangered Species Act, as amended. If you have questions or comments related to this issue, please contact Katrina Dixon at 406-449-5225, extension 222.

Sincerely,

R. Mark Wilson

R. Mark Wilson
Field Supervisor

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AGRICULTURE & WILDLIFE MANAGEMENT

APPENDIX E

SUMMARY OF ARCHAEOLOGICAL INVESTIGATIONS
COMPLETED AT THE ABSALOKA MINE

SUMMARY OF ARCHAEOLOGICAL INVESTIGATIONS COMPLETED AT THE ABSALOKA MINE	
Author(s) and Date	**Survey Title**
Ferguson, David 2004	A Class III Survey of 31 Drilling Locations for Westmoreland Resources' 2004 Coal Exploration Program. Report prepared by GCM Services, Inc., Butte, Montana for Westmoreland Resources, Inc., Hardin, Montana.
Fredlund, Lynn B. and Dale E. Fredlund 1974	1972 Archaeological Reconnaissance and Salvage Excavations on Westmoreland Resources Coal Lands, Big Horn County, Montana. Prepared for Westmoreland Resources, Hardin, Montana by University of Montana Statewide Archaeological Survey, Missoula, Montana.
Fredlund, Lynn B. and Dale E. Fredlund 1993	Ethnographic Overview of Five Tracts Proposed for Coal Development Near Colstrip and Decker, Montana. Prepared for Bureau of Land Management, Montana State Office, Billings, Montana by Ethnoscience, Billings, Montana.
Meyer, Garren 2002	A Cultural Resource Inventory of the Cookstove Logging Unit. Prepared for Bureau of Indian Affairs, Billings Area Office, Billings, Montana by GCM Services, Inc., Butte, Montana.
Meyer, Garren 2004	A Class III Cultural Resource Survey of Westmoreland Resources, Inc. Absaloka Mine Tract III South Addendum Area. Prepared for Absaloka Mine, Westmoreland Resources, Inc., Hardin, Montana by GCM Services, Inc., Butte, Montana.
Meyer, Garren 2006	NRPH Evaluations of Selected Sites on Absaloka Mine's Proposed Crow South Extension Area, Crow Indian Reservation. Prepared for Absaloka Mine, Westmoreland Resources, Inc., Hardin, Montana by GCM Services, Inc., Butte, Montana.
Meyer, Garren and David Ferguson 2005	A Class III Cultural Resource Survey of Westmoreland Resources, Inc. Absaloka Mine South Extension, Crow Indian Reservation. Prepared for Absaloka Mine, Westmoreland Resources, Inc., Hardin, Montana by GCM Services, Inc., Butte, Montana.
Meyer, Garren and Gene Munson 2004	A Class III Cultural Resource Survey of Westmoreland Resources, Inc. Absaloka Mine Tract III South. Prepared for Absaloka Mine, Westmoreland Resources, Inc., Hardin, Montana by GCM Services, Inc., Butte, Montana.

SUMMARY OF ARCHAEOLOGICAL INVESTIGATIONS COMPLETED AT THE ABSALOKA MINE	
Author(s) and Date	**Survey Title**
Munson, Gene 2003	Excavation of Hailstone 24BH1120 and Westside 24BH2635. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 1998	Archaeological Investigations at Janney Rockshelter 24BH1117. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 1998	Archaeological Investigations at Pillar Site 24BH2630. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 2000	Archaeological Investigations at Second Point Site 24BH1118. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 2000	Excavation of Dagan Site 24BH2622. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 2000	Archaeological Investigations at Merle Site 24BH2634. Prepared for Westmoreland, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 2001	Excavation of Minime Site 24BH2626. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene and David Ferguson 2002	A Class III Cultural Resource Inventory of the North Ashland Baseline Study Area, Rosebud County, Montana. Prepared for Peabody Energy, Gillette, Wyoming by GCM Services, Inc., Butte, Montana.
Munson, Gene, Dave Ferguson and Paul Anderson 1993	Westmoreland Class III Cultural Resource Inventory at the Absaloka Mine. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.
Munson, Gene, Dave Ferguson and Paul Anderson 1997	Appendix I to 1993 Westmoreland Class III Cultural Resource Inventory at the Absaloka Mine. Prepared for Westmoreland Resources, Inc. Absaloka Mine, Hardin Montana by GCM Services, Inc., Butte, Montana.

SUMMARY OF ARCHAEOLOGICAL INVESTIGATIONS COMPLETED AT THE ABSALOKA MINE	
Author(s) and Date	**Survey Title**
Wirth Associates 1975	Environmental Baseline Studies for Crow Indian Coal Leases Known as Tract II and Tract III, Sarpy Creek Basin, Big Horn County, Montana. Prepared for Westmoreland Resources, Hardin, Montana by Wirth Associates, Billings, Montana.