Environmental Assessment

Bentonite Performance Minerals A-6 Plan of Operations (*WYW-165911*) and Right-of-Way (*WYW-166012*); Amendment 6 to WDEQ Permit 246C for Bentonite Mining – "Big Block" Area, Northern Bighorn Basin, WY

Location: *6th P.M., T. 55 N., R. 92 W., Sections 31, 33*
6th P.M., T. 54 N., R. 92 W., Sections 5, 6

Applicant/Address: *Bentonite Performance Minerals, P.O. Box 547, Lovell, Wyoming 82431*

Wind River/Bighorn Basin District, Cody Field Office, Wyoming

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
NATIONAL SYSTEM OF PUBLIC LANDS

June 2012

The Bureau of Land Management is responsible for stewardship of our public lands. The BLM is committed to manage, protect and improve these lands in a manner to serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife habitat, wilderness, air and scenic quality, as well as scientific and cultural values.

BLM/WY/PL-12/025+1430

DOI-BLM-WY-020-2012-0074-EA

BENTONITE PERFORMANCE MINERALS A-6 PLAN OF OPERATIONS AND RIGHT-OF-WAY

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1.0 INTRODUCTION

1.1 BACKGROUND

The Bureau of Land Management has received a combined application for (1) a Plan of Operations and (2) a Right-of-Way for bentonite mining from Bentonite Performance Minerals, A Halliburton Company (BPM) seeking approval to expand their mining operations in an area known as the "Big Block" east of Lovell, WY. Most of the new disturbance falls under the regulations at 43 CFR 3809 (Surface Management), and the balance falls under the regulations at 43 CFR 2800 (Rights-of-way). The application is hereafter referred to as the "**A-6 Plan/ROW**", with essentially two Proposed Actions, herein analyzed as one. For clarification purposes, the two Proposed Actions are referred to frequently throughout this document as the "Proposed Action".

The A-6 Plan/ROW, if approved, would:

(1) Add up to *819.52* acres of new mining disturbance on federal lands administered under 43 CFR 3809, and;
(2) Add up to *53.14* acres of new mining disturbance on federal lands administered under 43 CFR 2800 for a total of up to *872.66* acres of new disturbance on federal lands, as well as;
(3) Add an additional *229.50* acres of disturbance on BPM-patented lands/minerals and;
(4) Approximately 5.41 acres of disturbance on State of Wyoming lands.
(About 20.38 acres of these lands are proposed to be disturbed as haul roads).

This adds up to an approximate total of up to *1,107.12* acres of proposed new disturbance on lands with various surface and mineral ownership status, within a 4-section area.

The anticipated A-6 mine schedule is for a 23-year mine plan from the initial year (2012) through 2035. Detailed year-by-year tables have been provided by BPM in the Mine Plan binder for each claim and bentonite bed targeted, which is further described below. **Figures 1a, 1b,** and **1c** provide location maps for the proposed A-6 Plan/ROW.

1.2 PURPOSE AND NEED

The purpose of this Plan/ROW (the Proposed Action(s)) would be to allow BPM to mine bentonite on its unpatented mining claims under the 3809 regulations on specific lands, and to mine bentonite on split estate lands within a BLM Stock Driveway under a Right-of-Way (where the bentonite was patented to BPM or its predecessors, but the surface was retained by the BLM for stock driving purposes). The need for this project would be established by the BLM's responsibility to the rights of entry and use under the Mining Laws (1872), as amended; the requirements in the regulations at 43 CFR 3809 and 2800; to review the submitted Plan of Operations and Right-of-Way application, to ensure prevention of unnecessary or undue degradation, and ensure proper reclamation bonding for each year of mining disturbance. Portions of this submittal fall under the purview of the regulations governing Rights-of-way on split estate – BLM surface/private mineral.

Decision to be Made

The Authorized Officer (AO), in this case the BLM-Cody Field Manager, must determine whether or not the Proposed Action(s) with attached stipulations, mitigation and monitoring measures, or the No Action Alternative, could result in significant impact to the human environment. If not, this determination would be documented in a "Finding of No Significant Impact" (FONSI) as a part of the EA. If impacts are determined to be significant, preparation of an acceptable Environmental Impact Statement would be necessary, prior to Plan approval.

(1) Approve the Plan and Right-of-Way as submitted, with any additional needed stipulations, mitigation and monitoring measures determined during review;

(2) Disapprove/withhold approval of the Plan/ROW because they would result in unnecessary or undue degradation.

1.3 ISSUES IDENTIFIED DURING SCOPING

Internal scoping relative to the Proposed Action (Plan/ROW) was conducted in the BLM CYFO during 2011 and 2012, and concluded in the Spring of 2012. In addition, several joint BLM, Wyoming Department of Environmental Quality-Land Quality Division (WDEQ-LQD), and BPM field outings have been made to the general A-6 Big Block area over the past 3 years. Internal scoping resulted primarily in the following BLM specialist concerns:

- Air quality could be affected by dust and exhaust generated by burning fossil fuels associated with bentonite mining.
- Bentonite mining could affect surface water, wetlands, riparian areas, floodplains, and aquatic habitats/life-forms by modifying flow, sediment, and dissolved solids regimes.
- Disturbance caused by bentonite mining could affect drainages within and near the proposed mine area, which may be waters of the United States or contain jurisdictional wetlands.
- Area soils would be disturbed by the proposed mining.
- Revegetating areas disturbed by mining would be difficult due to changes in post-mining soil characteristics, the area's dry climate, and the presence of invasive weeds.
- Invasive weed species could spread through the proposed mining process.
- Active or inactive raptor nests, if present in the area, as well as nesting success, could be affected by proposed mining disturbance.
- Disturbance caused by proposed mining could affect habitat for sage grouse, prairie dogs, mountain plover and Migratory Birds of High Federal Interest.
- Bentonite mining would generally affect and fragment wildlife habitat in the proposed mining area.
- Bentonite mining could disturb buried cultural sites.
- Bentonite mining would increase the number of roads into the proposed mining area, which could increase human disturbance to cultural and wildlife resources.
- The proposed mining would cause a temporary loss of forage for livestock and wildlife.

Public scoping for this Proposed Action includes placing this Environmental Assessment on the BLM Cody Field Office NEPA Register at its inception, and placing the EA online for a 30-day public review, as well as to the local newspaper, prior to issuing a decision on the Proposed Action.

1.4 RELATIONSHIP TO STATUTES, REGULATIONS, POLICIES, PLANS OR OTHER ENVIRONMENTAL ANALYSES

The A-6 Plan/ROW has been reviewed to determine if they conform with the approved Cody Resource Management Plan (RMP)/Land Use Plan relative to locatable minerals actions, as required by 43 CFR 1610.5. The Cody RMP provides that, "*Except for specific areas identified as closed, the planning area is open to staking of mining claims and operation of the mining laws for locatable minerals*," (pg. 21, Record of Decision (ROD)/RMP). The area proposed for new mining under this A-6 Plan/ROW has not been withdrawn from mineral entry, and is therefore open to mining claim location, and subsequent mineral development, after proper review and approval. The Proposed Action(s) are in conformance with the Cody RMP ROD, signed November 8, 1990.

The BLM is required under the mining laws, and the surface management regulations at 43 CFR 3809, to review Plans of Operation for compliance with the regulations, and to ensure the mining plan will not cause unnecessary and undue degradation as defined in 43 CFR 3809.5.
The No Action Alternative (Alternative I) could only be selected should the proposed A-6 Plan/ROW result in unnecessary and undue degradation of the public lands.
"Mining laws" means the Lode Law of July 26, 1866, as amended (14 Stat. 251); the Placer Law of July 9, 1870, as amended (16 Stat. 217); and the Mining Law of May 10, 1872, as amended (17 Stat. 91); as well as all laws supplementing and amending those laws, including the Building Stone Act of August 4, 1892, as amended (27 Stat. 348); the Saline Placer Act of January 31, 1901 (31 Stat. 745); the Surface Resources Act of 1955 (30 U.S.C. 611–614); and the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 *et seq.*).

RMP Maintenance: On April 17, 2007, Wyoming BLM Instruction Memorandum (IM) No. WY-2007-018 was issued, entitled "Resource Management Plan (RMP) Maintenance Action: Incorporation of the Bureau of Land Management's (BLM) Programmatic Biological Evaluation (BE) for the Mountain Plover (*Charadrius montanus*) and the United States Fish and Wildlife Service (FWS) Inter-agency Coordination Memorandum into Field Office (FO) Resource Management Plans (RMPs) by Maintenance Action". This IM conveyed the FWS Memorandum on mountain plover conservation measures, as well as the BLM Wyoming Programmatic Biological Evaluation of the Mountain Plover, and applies to the existing Cody ROD dated November 1990. This EA takes this IM into account, and a copy of the IM is attached in **Appendix A** for reference.

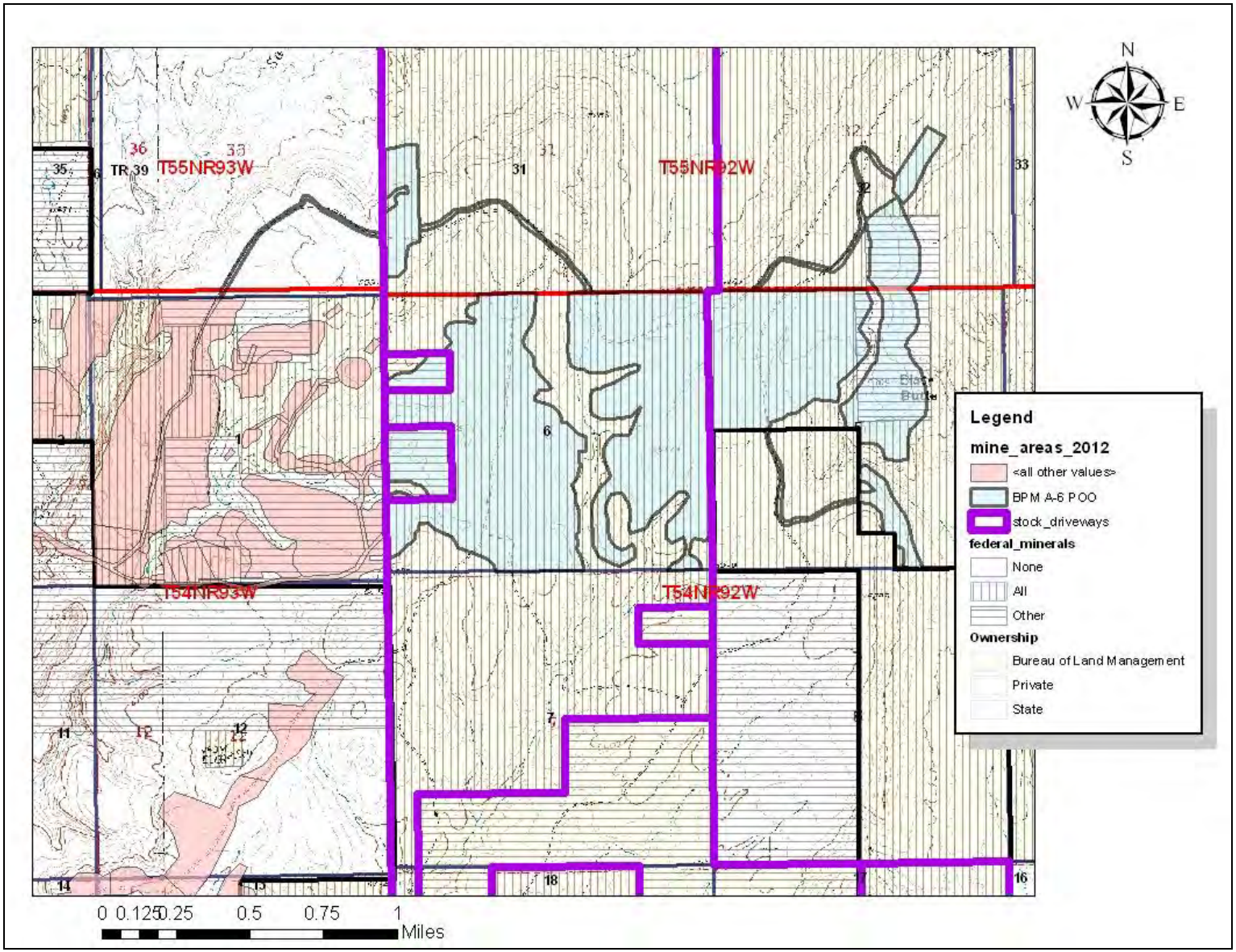
State Statutes and the WDEQ-LQD/BLM MOU: In Wyoming, the Wyoming Department of Environmental Quality – Land Quality Division (WDEQ-LQD) administers and enforces all state statutes and regulations on land disturbances dealing with mining and reclamation within Wyoming, including on federal lands. The WDEQ-LQD's authority derives from the Wyoming Environmental Quality Act and the LQD Non-Coal regulations which are related to Article 4 of the Wyoming Environmental Quality Act (W.S. 35-11-401 through 437).WDEQ-LQD has the authority to require permitting and licensing of all operator actions of surface mines, and works in conjunction with the BLM under a Memorandum of Understanding (2003) for mines proposed on federal lands.

Each mine/permit area is required by statute and regulation to be covered by a **reclamation bond**, in the event the operator for some reason is not able to fulfill reclamation requirements. BPM is covered by such a bond, which is reviewed annually by the WDEQ-LQD and BLM to ensure it is adequate for the amount of disturbance taking place in a given year.

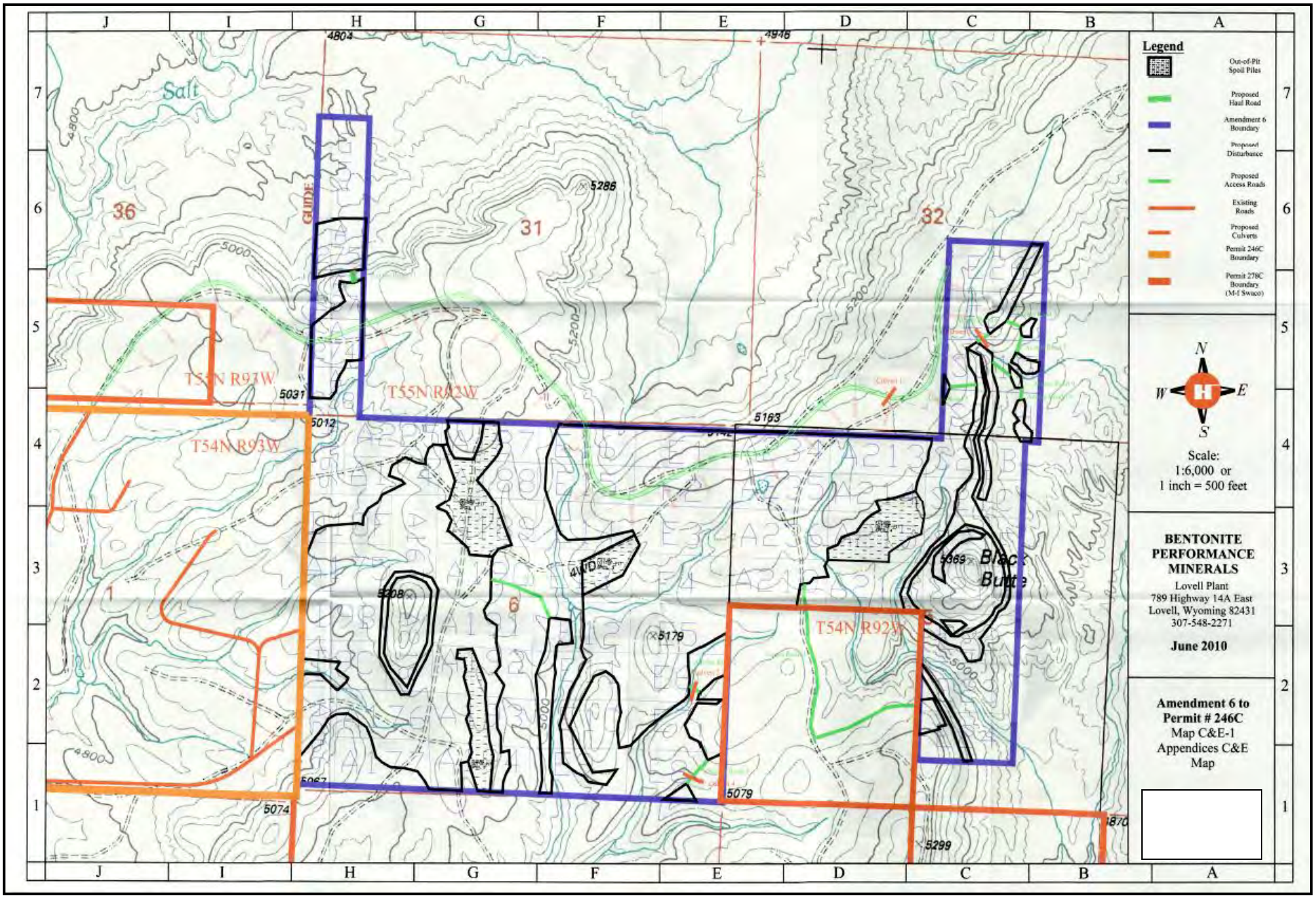
- **Clean Water Act Compliance**: If implementation of the Proposed Action would result in the placement of fill or dredge material in a pond, wet meadow, stream channel, or any other water feature, BPM would need to coordinate with the U.S. Army Corps of Engineers (COE) to determine if the feature is a "jurisdictional" wetland, or a "Water of the U.S.", and whether a Clean Water Act (CWA) Section 404 Permit would be needed. The WDEQ-Water Quality Division (WQD) is responsible for administering Section 401 of the CWA in the State of Wyoming. According to Federal and State law, activities that would result in surface disturbance in excess of 1-acre, require a Storm Water Discharge Permit (SWDP), and associated Storm Water Pollution Prevention Plan (SWPPP) from the State of Wyoming. The mining plan analyzed in this EA proposes to disturb more than one acre, therefore BPM has/will coordinate with the WDEQ-WQD to obtain the necessary SWDP(s) and associated SWPPP(s).

- **Sage Grouse**: On Feb. 10, 2012, the BLM Wyoming State Office issued **Instruction Memorandum (IM) WY-2012-019 entitled "Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate**". Though mining activities regulated under 43 CFR 3809 on federal surface/federal mineral estate may not be affected by this new sage grouse IM, mitigation for sage grouse as spelled out in this IM on split estate lands (43 CRFR 2800 regulations) are subject to the terms of this IM. As stated in the IM, "…*determinations that do not apply the measures located in*

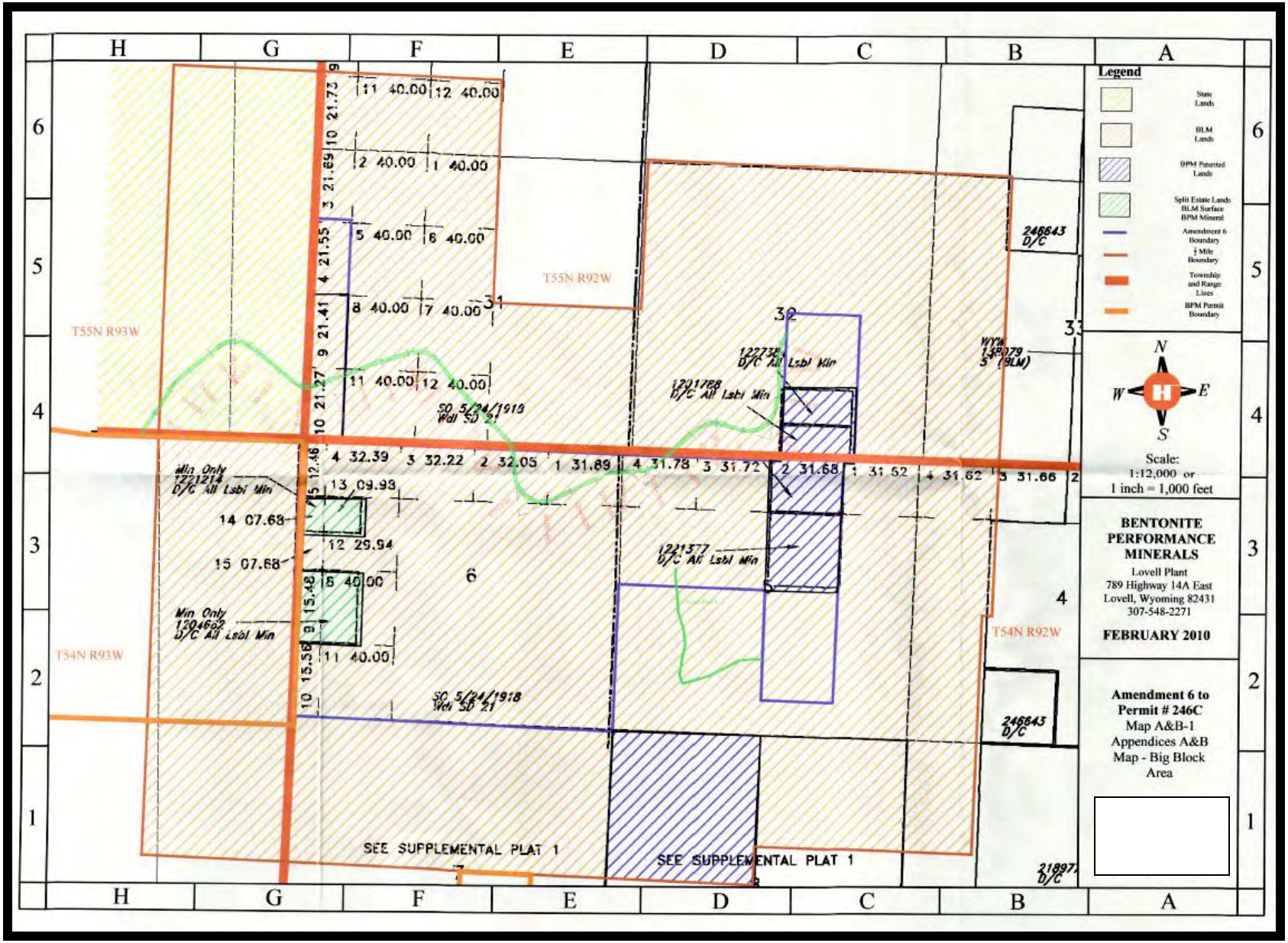
this policy IM may be necessary where BLM is required to comply with other non-discretionary statutes and regulations (i.e., valid existing rights, oil and gas "drainage", etc.)."



Map 1a. General location and land/mineral status map of BPM's "A-6" Plan of Operations/Right-of-Way areas (shaded in light blue); as mapped in GIS by BLM; located in Sections 5 & 6, T. 54 N., R. 92 W., and Sections 31 & 32, T. 55 N., R. 92 W.; Lands shown with *horizontal hatching* within the purple boundary lines are BPM-patented lands the "BLM Stock Driveway"; BPM patented lands are shown with horizontal hatching and outside the SD; Lands with vertical hatching are BLM surface/BLM mineral (3809 regulations) lands under the A-6 Plan of Operations.



Map 1b. Topographic location map of the proposed "A-6" Plan of Operations; as provided by BPM. See legend.



Map 1c. Color-coded Master Title Plat for BPM's "A-6" Plan of Operations and Right-of-Way areas; as provided by BPM (T. 54-55 N., R. 92 W.). Lands with orange diagonal hatching are BLM surface/BLM mineral (3809) lands; lands with blue diagonal hatching are BPM patented lands. Lands with green diagonal hatching are split estate BLM surface/BPM-patented mineral (2800) lands within the Stock Driveway.

Lands with blue diagonal hatching are outside BLM jurisdiction.

2.0 PROPOSED ACTION (ALTERNATIVE I) & NO ACTION (ALTERNATIVE II)

2.2. Alternative I – Proposed Action

The following information applies to the Proposed Action involving the new Plan of Operations under 43 CFR 3809, and the new Right-of-Way under 43 CFR 2800.

(1) Operator Information (as per 43 CR 3809.401(b)(1)):

The operator for the Proposed Action is **Bentonite Performance Minerals, P.O. Box 547, Lovell, WY 82431**. The following unpatented mining claims are involved in the proposed A-6 Big Block project.

Table OI-1 BLM Serial Numbers of Unpatented Mining Claims

Claim	Serial #		Claim	Serial #
E1	WMC-119387		A275	WMC-4356
E2	WMC-119388		A237	WMC-119821
E3	WMC-119389		A274	WMC-119835
E4	WMC-119390		A238	WMC-119822
E5	WMC-119391			
E6	WMC-119392		A234	WMC-119818
E7	WMC-119393		A235	WMC-119819
E8	WMC-119394		A236	WMC-119820
E9	WMC-119395		A210	WMC-119809
E1O	WMC-119396		A213	WMC-119803
E11	WMC-119397		A214	WMC-119804
E12	WMC-119398		A215	WMC-119805
E13	WMC-119399		A216	WMC-119806
E14	WMC-119400			
E15	WMC-119401		A187	WMC-119777
E16	WMC-119402		A188	WMC-119778
			A189	WMC-119779
E22	WMC-119408		A190	WMC-119780
E23	WMC-119409		A191	WMC-119781
E24	WMC-119410		A192	WMC-119782
E25	WMC-119411		A193	WMC-119783
E26	WMC-119412		A194	WMC-119784
			A166	WMC-119766
A167	WMC-119767		A175	WMC-119769
A225	WMC-119814		A266	WMC-4377
A174	WMC-119768		A225	WMC-119814
A218	WMC-119807		A174	WMC-119768
A176	WMC-119770		A167	WMC-119767
A177	WMC-119771		A218	WMC-119807
			A176	WMC-119770
			A177	WMC-119771

(2) Description of operations (as per 43 CFR 3809.401(b)(2)):

Detailed descriptions of proposed mining operations under the regulations at 43 CFR 3809, and for the portion that is a Right-of-Way under 2800, are presented below. This Plan would add a total of up to **872.66** acres of new mining and haul road disturbance on public lands administered under 43 CFR 3809 (819.52 acres); under 43 CFR 2800 (53.14 acres*); and **229.50** acres of new mining/road disturbance on BPM-patented lands outside BLM jurisdiction; as well as 5.41 acres of new disturbance on State lands. Of these totals, **20.38** acres are proposed to be disturbed as parts of haul roads (14.97 acres of BLM land).

This results in an approximate total amount of new surface disturbance of up to 1,107.12 acres over 23 years due to mining and road construction. Please refer to Table 1 below. The anticipated mine schedule is for a **23-year mine plan** from the initial year (2012 through 2035). Detailed tables were provided in the Mine Plan for each claim and bentonite bed targeted, which is further described below.

Table 1. Proposed Acres of Disturbance under A-6 Plan of Operations

Surface Ownership

Pit Areas	Pit Area Acres			
	Private	Federal Surface	State	Total By Pit Area
Big Block	229.05	857.69	0.00	1,086.74
Roads	0.0	14.97	5.41	20.38
TOTALS	229.5	872.66	5.41	1107.12

Roads Outside of Amendment Boundary	**Disturbance Acreages**
Amendment 6 Haul Road	18.20 Acres
Access Road 4	2.18 Acres
TOTAL New Road Disturbance	**20.38 Acres**

APPROX. PROPOSED DISTURBANCE BY LEGAL DESCRIPTION – A-6 "BIG BLOCK" AREA

T. 54 N., R. 92 W.: Section 5: NW¼, E½NE¼, N½SW¼, NWSE, S½SWSE
275.18 acres disturbance
Section 5: SW¼ — **2.18 acres disturbance**
Section 6: All — **667.33 acres disturbance**

T. 55 N., R. 92 W.:
Section 31: Lots 4, 9, 10, SWSE, SW¼ — **71.75 acres disturbance**
Section 32: W½SE, SW¼ — **85.27 acres disturbance**
Section 36: (State land) SE¼ , SESW — **5.41 acres disturbance**

TOTAL 1,107.12 acres +/-

***SPECIFIC LANDS THAT WOULD BE ADMINISTERED UNDER THE 2800 REGULATIONS AS RIGHTS-OF-WAY:**

T. 54 N., R. 92 W.:
Section 6 – **Lot 8 (20 acres)**
Lot 9 (15.48 acres)
Lot 13 (9.98 acres)
Lot 14 (7.68 acres)
TOTAL = 53.14 acres

TABULATION OF LANDS

Big Block Area

Claim	Acres	Ownership	Legal Description
A210, A213, A214, A215, A216, A234, A235, A236	143.5	BLM	S1/2NW1/4, Lot 4 (NW1/4NW1/4), Lot 3 (NE1/4NW1/4), Sec. 5, T54N, R92W
S21B, S21C, S21F, S21G	71.68	BPM	SW1/4NE1/4, Lot 2 (NW1/4NE1/4), Sec. 5, T54N, R92W
E22, E23	40	BLM	NW1/4SE1/4, Sec. 5, T54N, R 92W
E24	20	BLM	N1/2SW1/4SE1/4, Sec. 5, T54N, R92W
E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16	303.94	BLM	Lot 1 (NE1/4NE1/4), Lot 2 (NW1/4NE1/4), S1/2NE1/4, SE1/4, Sec. 6, T 54N, R 92W
A187, A188	32.22	BLM	Lot 3 (NE1/4NW1/4), Sec. 6, T54N, R92W
A189, A190, A191, A192, A193, A194	120	BLM	SE1/4NW1/4, E1/2SW1/4, Sec. 6, T54N, R92W
A225, A174	32.39	BLM	Lot 4, Sec. 6, T54N, R92W
A166	12.46	BLM	Lot 5, Sec. 6, T54N, R92W
D10F	17.66	Split Estate	Lot 13, Lot 14, Sec. 6, T54N, R92W
A167, A175	37.62	BLM	Lot 12, Lot 15, Sec. 6, T54N, R92W
A218	20	BLM	E1/2 Lot 8, Sec. 6, T54N, R92W
D9B, D9C	35.48	Split Estate	W1/2 Lot 8, Lot 9, Sec. 6, T54N, R92W
A176, A177, A266	55.56	BLM	Lot 10, Lot 11, Sec. 6, T54N, R92W
A238, A274, A237, A275	42.68	Split Estate	Lot 9, Lot 10, Sec. 31, T55N, R92W
G5C	21.55	BLM	Lot 4, Sec. 31, T55N, R92W
E25, E26	40	BLM	NW1/4SE1/4, Sec. 32, T55N, R92W
S31G, S31H	40	BPM	SW1/4SE1/4, Sec. 32, T55N, R92W
Total	1086.74		

Proposed Amendment 6 Haul Road Disturbance

T55N R93W

	Center Line Length	Ride-of-way Width	Disturbance Width	Disturbance Area	Surface
Sec. 36	ft	ft	ft	Acre	Ownership
SE¼SW¼	544	120.0	Variable	.69	State
SW¼SE¼	1,131	120.0	Variable	1.42	State
NW¼SE¼	685	120.0	Variable	.99	State
NE¼SE¼	624	120.0	Variable	1.09	State
SE¼SE¼	885	120.0	Variable	1.22	State

T55N R92W

	Center Line Length	Ride-of-way Width	Disturbance Width	Disturbance Area	Surface
Sec. 31	ft	ft	ft	Acre	Ownership
SW¼SW¼	235	120.0	Variable	.32	BLM
NW¼SW¼	632	120.0	Variable	.92	BLM
NE¼SW¼	1,880	120.0	Variable	3.27	BLM
SE¼SW¼	681	120.0	Variable	1.22	BLM
SW¼SE¼	1,092	120.0	Variable	1.79	BLM
Sec. 32					
SW¼SW¼	842	120.0	Variable	1.22	BLM
NE¼SW¼	988	120.0	Variable	1.44	BLM
SE¼SW¼	1850	120.0	Variable	2.61	BLM

Proposed Amendment 6 Access Road Disturbance

T54N R92W

	Center Line Length	Ride-of-way Width	Disturbance Width	Disturbance Area	Surface
Sec. 5	ft	ft	ft	Acre	Ownership
NW¼SW¼	1300	60.0	30.0	0.90	BLM
SW¼SW¼	459	60.0	30.0	0.32	BLM
SE¼SW¼	876	60.0	30.0	0.60	BLM
NE¼SW¼	526	60.0	30.0	0.36	BLM

Proposed Action Alternative I continued

Material Management - Mining/Backfilling/Recontouring:

Initial Stripping/Salvage/Spoil Pile Handling:
Disturbance areas are surveyed in prior to any disturbance. Economical mining depths are determined by stripping ratios and equipment cost. BPM mines the bentonite using progressively cast-back multiple pit series, frequently involving blasting. First, topsoil and subsoil from pit and stockpile areas is scraped and salvaged, then stockpiled adjacent to the pit series. Next, dozers are used to rip the overburden (and interburden between clay layers) in lifts, and rubber-tired scrapers or other equipment move it away from the clay bed, to the designated stockpile area. The overburden stockpile on adjacent land is referred to as an "out of pit spoil pile" or OOPS.

BPM (and its contractors GK Construction of Cowley, Wyoming) generally use rubber-tired scrapers to salvage topsoil and subsoil. Topsoil and subsoil will be separately and selectively salvaged. If backfilled and re-graded lands are available, BPM will seek to direct haul and redistribute the salvaged topsoil and subsoil in their pre-mining vertical arrangement. If re-graded lands are not available the material will be stockpiled separately adjacent to the area where the topsoil or subsoil will be used during reclamation. The final pit in a pit series will have subsoil and topsoil material from the initial pit and subsequent pits placed on top of regraded spoil. This material will be blended into the surrounding native lands with the intent of disturbing as little of the unmined land as possible.

The predominant spoil being stripped in the A-6 area is mudstone/shale. The use of scrapers and utilization of an out of pit spoil pile for initial pits (as described above) is necessary to alleviate any stability problems given the generally high overburden swell and limited thickness of the seam(s) being mined. In some pits where the lower spoil is too hard for dozers to rip, BPM uses blasting to loosen the rock. A truck-shovel operation or dozers are then used to remove blasted material out of the pit. Scraper material is always placed on top of dozer or truck spoil. If the spoil is not directly backfilled (such as in the initial pit sequence), it is stockpiled on lands stripped of subsoil and topsoil. A containment berm would prevent runoff from stockpiles contaminating native soils and minimize material loss. Temporary overburden stockpiles would not be allowed to block intermittent or perennial stream channels. Stockpiles would be placed far enough from the high water mark of adjacent water bodies, and bermed to prevent runoff and sediment/dissolved solids from reaching surface water features.

Next, the bentonite bed is cleaned, ripped and mined using various equipment including dozers, front end loaders, scrapers and haul trucks. Sometimes the bentonite is stockpiled near the pit series for field drying, other times it is hauled directly to the mill for processing. Once the bentonite is removed from the first pit, overburden from the next open pit of the sequence is "cast back" into the first pit. ***Thus, reclamation begins to take place concurrently with mining, resulting in smaller amounts of open un-reclaimed disturbance overall.*** After backfilling the pit, it is recontoured, covered with subsoil, then topsoil, and then finally, seeded by BPM. This process repeats itself until the end of the pit sequence is reached (**Figure 1**).

Sufficient volumes of topsoil and suitable cover material must be preserved to cover the final sequence recontouring of a mine series. BPM would salvage and stockpile these all suitable reclamation materials from the first cuts of a mine series, to be used as cover for the final cuts. In all cases, permanent out-of-pit spoil piles and mine backfill slopes would be contoured to slopes not exceeding 4(h):1(v), and that conform to surrounding topography.

It is anticipated that mining of all pits and reclamation of associated disturbances would be completed through seeding within **23 years** of commencement. Reclamation success ultimately leading to bond release by WDEQ, along with BLM consensus, could possibly take up to fifteen years or longer, depending on many factors. Companies are eligible for bond release five years after reclamation is complete. All topsoil and subsoil would be salvaged and stored using Best Management Practices (BMPs) to preserve biological integrity.

More information on proposed Out-of-Pit-Spoil Piles (OOPS piles)
Four OOPS piles are planned for the A-6 Plan/ROW (**Please also refer to Appendix B**). Three are located in the "Big Block Area" in Section 6, T. 54 N., R. 92 W., and the fourth one is proposed in Section 5. Below is a list of the out-of-pit spoil pile volumes proposed:

- Out-of-Pit Spoil Pile 1 – 1,000,000 cyds
- Out-of-Pit Spoil Pile 2 – 260,000 cyds
- Out-of-Pit Spoil Pile 3 – 250,000 cyds
- Out-of-Pit Spoil Pile 4 – 1,000,000 cyds

WDEQ/LQD NonCoal Rules and Regulations (R&R), Chapter 3, Section 2 (c)(iv)(B)(II) requires that spoil not be deposited on slopes exceeding 20° (36% slope). Based on analysis of pre-mine topography the steepest slopes appear to be located within the footprint of OOPS Pile #1 and #3 at approximately 18° or 3(h):1(v) (33% slopes). OOPS piles would not be terraced, and will be built with 4(h):1(v) or shallower slopes. A maximum slope of 3(h):1(v) may be used for blending purposes. The stability analysis for the BLM- approved Elk Haul Road in the Amendment 5 Mine Plan demonstrates stability characteristics for similar slopes in the area with the worst case scenarios, as the slopes were greater than 20%. This analysis should adequately demonstrate stability for the OOPS pile in A-6 as the geology and soils are similar and the slopes appear to be less than 20%.

Generally, spoil hauled to an OOPS pile would be derived from the first few cuts within a pit series until sufficient space is available to proceed with traditional cast-back mining, and hauled to the individual piles using a combination of scrapers and haul trucks. Spoil placed by truck would be re-graded with rubber tired dozers. Compaction of fill material would be achieved through wheeled vehicular traffic. Each pile would be rough contoured using dozers, with final grading being done with a combination of graders and scrapers. Final reclamation of the piles would follow procedures outlined in section B of the Reclamation Plan provided with the application.

Recontouring: After backfilling, the area would be recontoured to match as much as possible, the original topographic contours. Recontoured overburden would then be prepared to receive the salvaged subsoil and topsoil. Once the sub and topsoils are spread and prepared, the disturbed area would be seeded as per the terms of the approved reclamation plan.

Haul Roads: The proposed A-6 Haul Road would have a 120-foot right of way, with a running surface width of about 40 feet. With the construction of ditches, turnouts, and the 3:1 slopes associated with any cuts and fills the actual disturbance width would vary. The proposed haul road is located along the heads of area watersheds, small swales and drainages. Given these conditions, culverts will be installed in various locations while the rest of the road will be handled with ditches and turnouts. More detailed information is presented in **Appendix B.**

All haul roads and access roads constructed under this project would be built and maintained in accordance to the performance standards of BLM Manual 9113, Wyoming BLM Manual 9113 Supplement, BLM Manual Handbook H-9113-1, and BLM Manual 9112, which deal with road and drainage design, as well as State statutes W.S. 35-11-406(b)(xv), Land Quality Division (LQD) Noncoal Rules and Regulations Chapter 3, Section 2(i).

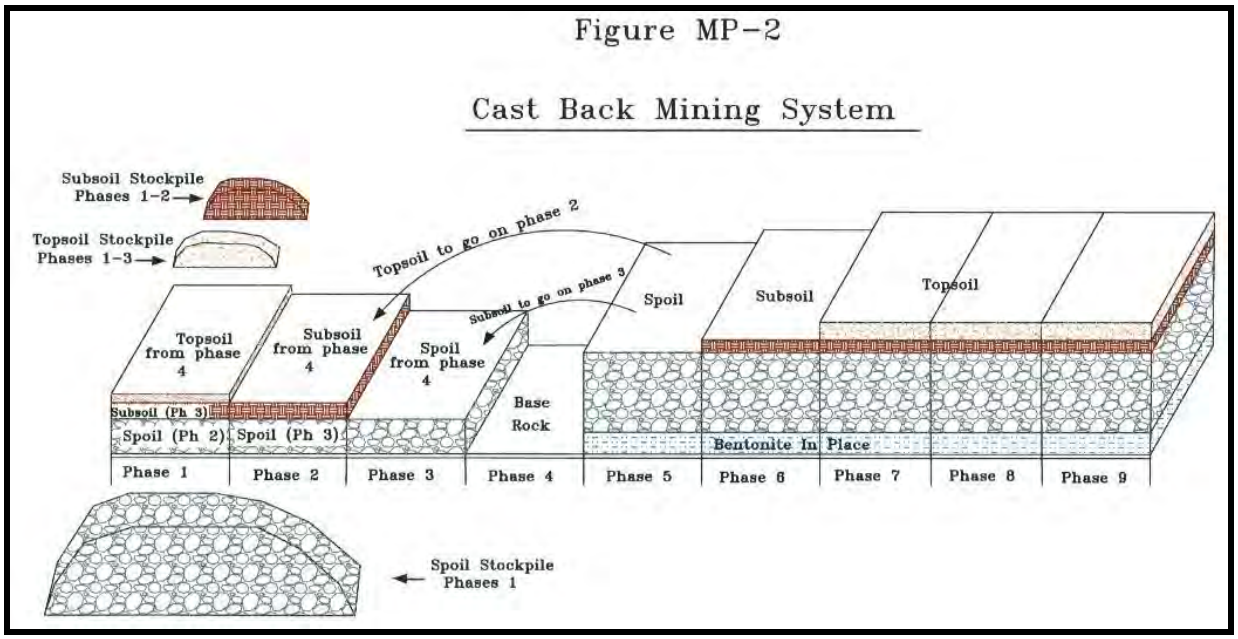


Figure 1. Theoretical schematic of a castback bentonite mining sequence (*this schematic generally assumes horizontal bedding and fairly uniform overburden thicknesses).*

(3) <u>Reclamation Plan (as per 43 CFR 3809.401(b)(3):</u> (See also Appendix B for more detailed information)

<u>Slope restoration</u>: In general, the post-mining slopes would be reconstructed to approximate pre-mining slope configurations except where initial "box cut" spoil material is permanently reclaimed as a hill feature. The reconstruction of approximate original slope gradients and timely completion of reclamation helps stabilize post-mining landscapes.

<u>Drainage restoration</u>: All backfilling, grading and contouring operations would replace existing drainage patterns. No permanent water impoundments would be created with this Amendment. Restored drainage patterns would prevent excessive erosion or stream and watershed instability. This includes sinuosity, slope and channel hydraulic geometry. Drainages would be restored to erosion resistant contours with stream bank and channel geometry that is as stable as pre-mine conditions. Generic concave stream channels would be reconstructed for minor channels and swales within small watersheds. Larger channels, and topography would generally be constructed with rubber tired scrapers and dozers. Through the use of this equipment, channels would be constructed with large concave or trapezoidal bottoms that average between 10 and 12 feet in width.

<u>Wetland restoration</u>: BPM states that no jurisdictional wetlands would be disturbed by the proposed operations.

<u>Replacement of Topsoil, Subsoil, Suitable Material, and Rock</u>: BPM would use scrapers to replace all spoil cover material (clean overburden, suitable overburden, subsoil, and topsoil) during reclamation efforts. Timing of replacement is dependent on the operation's location within the pit series. For example, as mining progresses through a pit series, cover material would be direct hauled to a previously mined out, backfilled and contoured pit. Redistributed cover would be graded, but always be left in a roughened condition to protect it from wind and water erosion. All surfaces in final cover would be ripped along the contour with a ripping depth not to exceed two feet, to prevent contamination from underlying material.

Proposed Action Alternative I continued.

Whether the area was barren or vegetated pre-mine, BPM's proposal would involve covering contoured overburden and any bentonitic spoil with **a minimum of two (2) feet** of clean or chemically suitable material, to include topsoil and/or subsoil.

If opportunities arise during mining to salvage additional suitable cover material (e.g., subsoil and chemically suitable overburden) beyond what is required to meet revegetation commitments, the material would be salvaged and spread over lands that were naturally barren. Chemically suitable material would be used as partial or complete cover where applicable, in areas that will be revegetated, postmine.

Postmine Sediment and Erosion Control: During reclamation sediment control would be provided by using a combination of Best Management Practices (BMP's). Following final contouring and topsoiling of a reclaimed area it will be ripped along the contour, which will serve to reduce any compaction present as well as create furrows that will reduce runoff potential. In addition, BPM may elect to utilize weed-free mulch to assist in reduction of runoff potential and increase moisture retention. For reclaimed drainage channels straw bale check dams would be placed within the postmine drainage to serve as energy dissipaters/sediment filters. *Straw bales used on federal lands must be certified weed-free*. One double set of dams would be placed at the lower boundary of the disturbance, with further check dams installed up-drainage if conditions warrant. These check dams will remain in the drainage until revegetation has been established.

If through time erosional features, such as head cuts, develop within a reclaimed channel BPM will implement one of several remediation measures, depending on the conditions present. *These mitigation measures could include, but are not limited to: (1) armoring problematic channel reach with rock, (2) installation of rock check dams to reduce channel gradient, or (3) construction of a drop structure(s) using rock or gabion baskets that are keyed into the channel bed and banks.*

Haul Road Restoration: Haul roads will be restored to pre-mine topography and vegetation conditions. This will include the removal of fills, restoration and backfill of cuts, removal of culverts, and the reconstruction and restoration of channels. If a road was present before mining operations, and upgraded for mining purposes, the road will be replaced back to its original state.

Reclamation Schedule: Reclamation would begin within two years, and be completed within four years of the date the land was first affected, except in cases where field drying of clay is occurring, whereby reclamation would be initiated within three years, and be completed within five years of the date the land was affected. If this cannot take place, a variance request may be submitted to WDEQ under the provisions of W.S.§ 35-11-601(a). Variance requests will specify the alternate reclamation schedule and explain reasons for the adjustment. BPM understands that the WDEQ/LQD will decide whether Variance request will be accepted or denied. In no instance will cessation of operations exceed five years without reclamation.

Seeding: BPM would prepare the seedbed with either a pitter or a spring-tooth chisel plow. The seed box is mounted on the chisel plow or pitter, and set to release seed behind one of the implements. These techniques prepare the soil for seed, create a micro-topography advantageous to trapping soil and nutrients and improve the probability of seed germination and establishment. All seeding will be on the topographic contour unless safety considerations take precedence or perpendicular to the prevailing wind direction on very flat lands.

All permanent seeding will occur from October to November of each year or as long as the topsoil remains not frozen. Generally fall seeding allows maximum moisture retention and utilization of winter and spring precipitation.

If approved, BPM will use certified weed-free seed (per BLM policy IM-2006-073) and standard agricultural practices to minimize introduction of noxious weeds. BPM will consult with appropriate federal (BLM), county, and state agencies when other weed control methods, for example spraying, are appropriate to control localized weed infestations on stockpiles or revegetated lands. BPM would continue these practices until the reclaimed lands are fully released from the reclamation performance bond. Bentonite Performance Minerals would seed subsoil and topsoil stockpiles with seed mix number 1 described below if they won't be respread within 6 months.

In addition, BPM would seed haul road cut and fill slopes using broadcast methods if they are 3 to 1 or flatter, with a mixture comprised of only the perennial grasses listed in seed mix number 1. BPM does not propose irrigation of any reclaimed or revegetated A- 6 lands.

Protection of Reclamation Efforts: BPM would protect young vegetative growth from being destroyed by livestock until the vegetation is capable of renewing itself. BPM would employ some combination of grazing deferral, controlled grazing and/or fencing based upon agreement with respective surface owners (and/or public land livestock grazing permittees/lessees). BPM would also seek to coordinate domestic cattle grazing on revegetated lands so that the self-renewing capacity of the revegetation is not negatively impacted. Based upon agreements with respective surface owners, BPM may selectively fence reclaimed lands to control the pattern and duration of domestic cattle grazing. Fences would be removed after bond release unless the surface owner requests that they remain and agree to maintenance in writing.

Habitat Restoration Plan for Sagebrush Vegetation Communities: The A-6 Plan/ROW area includes lands with important wildlife habitat that revolves around sagebrush, therefore, BPM would prioritize the reestablishment of sage lands as part of post-mine reclamation. Specific to re-establishment of Big Sagebrush, BPM may choose to experiment with other known sagebrush species that could be accepted as either a substitute or an addition to Basin Big Sagebrush.

BPM would commit to selective seeding a *Shrub* (*sagebrush) Mix* on one acre per every 20 acres of disturbed land that was identified, pre-mine, as Mixed Desert Shrub (MDS - which equates to approximately 25 acres - reference Table RP-2 in the Reclamation Plan). To maximize success potential, every attempt would be made to select seeding areas with a reduced exposure to wind and with the potential to trap moisture. Prior to seeding the *Shrub Mix,* BPM would either avoid the target areas with the *Standard Mix,* or would seed all areas with the *Standard Mix,* and then chemically treat the areas after the immediate growing season and prior to seeding the *Shrub Mix*. While the latter technique would put the sage seeding a year behind the general seeding, it may be a preferable alternative for seeding smaller plots where there is concern of broadcast seed drift from the *Standard Mix*.

In addition to sagebrush seed, the *Shrub Mix* consists of select forbs, shrubs, and grasses that would be less likely to out-compete the sagebrush. The presence of non-sagebrush species in the *Shrub Mix* not only enhances the habitat value of the mix, but also provides weed and erosion control in the form of ground cover. Specific to re-establishment of sagebrush, BPM may at some point choose to experiment with other known full-shrub sagebrush species that could be accepted as either a substitute, or an addition to sagebrush. Examples of non-Big Sagebrush species that could be added to the *sagebrush mix* include:

(1) **Other full shrubs** (fourwing saltbush and spiny hopsage);
(2) **Sub-shrubs** (shadscale, winterfat, fringed sage, and dragon sagewort);
(3) **Grasses** (bluebunch wheatgrass, bottlebrush squirreltail, Indian ricegrass, prairie sand reed, Sandberg bluegrass, and basin wildrye); and
(4) **Forbs** (sweet vetch, globemallow, bee plant, evening primrose, basin daisy, and phlox).

In cases where the plot-seeding of sagebrush does not result in visible sagebrush germination and persistence, other application techniques may be utilized to mitigate lack of response. These mitigation measures may utilize one or more of several promising techniques, including:

Proposed Action Alternative I continued.

(1) Reseeding with Zeba® treated seed,
(2) Irrigated bare root transplants,
(3) Water enhancing products [Rainbird® gel packs or Zeba® granular application(s)],
(4) Supplemental watering efforts,
(5) Soil amendments, or
(6) Any other technique identified by research or practice as a likely means to increase sagebrush establishment success.

Specific to the bond release process in this type of vegetative community, BPM and the WDEQ/LQD agree generally that "**Sagebrush Enhancement Areas**" are not to be evaluated independently of the parent MDS vegetation community type. Rather, the enhancement areas would be lumped in with the other MDS community for purposes of quantitative vegetative sampling. The eventual Bond Release request would include a map that illustrates locations of these "Sagebrush Enhancement Area(s)". BPM has proposed in their reclamation plan that "*…bond release would be granted provided that perennial vegetative cover of the entire bond release community type is equal or greater than its native counterpart". However, BPM (and WDEQ-LQD and BLM) understands that it is important to establish which techniques and species provide the best chance for reclamation success and, thus, will provide a qualitative evaluation of the "Sagebrush Enhancement Area" reclamation success.*

Methods for the evaluation of reclamation success (generally): Reclamation successes are based upon restoring landscapes to the approximate original contour in a stable, non-erosive manner and restore the postmine land use of grazing and wildlife habitat. BPM acknowledges bond release may only be approved when reclamation demonstrates that vegetation cover is equal to or greater than a similar native parcel, and be as hydraulically stable as pre-mine conditions. Revegetation would be reestablished and provide sufficient cover to prevent erosion. Bond release procedure to determine revegetation success would utilize the "Extended Reference Area" for comparison analysis. Vegetation transects on adjacent undisturbed lands for each affected vegetation map unit will be sampled for perennial species cover and species diversity. A minimum of 20 transects and a maximum of 50 would be sampled for each affected plant community map unit. Adequate sample size would be calculated using sample adequacy calculations outlined in Appendix D8 and LQD Guideline 2. Establishment of suitable vegetation and wildlife habitat will be evaluated through vegetation and wildlife monitoring described in Appendices D8 and D9.

The two general proposed BPM A-6 Seed Mixes, with BLM requirements based on NEPA analysis and specialist input, are provided in Appendix G of this EA.

(4) Monitoring Plan (as per 43 CFR 3809.401 (b)(4)):

Monitoring of many different activities of mining, and of potential impacts from mining would occur throughout the A-6 mining area during operations. BPM would continuously visit and document mining activities throughout the life of the mine. Monitoring would assess the impacts of mining on surface water runoff, mine area drainage and berm stability, haul road stability, high wall stability, to establish the extent of any spills that may occur and any other undue or unnecessary degradation. Monitoring would be done during times of non-operation or down time, if due to weather, mining or market conditions some pits would not be active. Occupation of high walls by raptors, incidence of vandalism, failure of roads, berms or other mining features and the general stability of the pit area and mine site would be regularly noted and photographed.

Additional Monitoring Efforts:
Noise levels of mine operations are monitored during regular inspections by the Wyoming State Mine Inspector, and Federal Mine Safety Inspectors. BPM would operate in compliance with Mine Safety Health Administration (MSHA) noise standards. Air quality and revegetation monitoring would be conducted on an on-going basis by company personnel during normal field operations.
These conditions would also be reviewed during annual and biennial field inspections by WY-LQD and BLM personnel, and reported in BPM's annual report.

Noxious weeds, if present, would also be monitored throughout the A-6 area during mining operations. If any noxious weeds found on the Wyoming State list including Russian knapweed, white-top, or Canada thistle are observed, the BLM would be contacted regarding treatment. Before any herbicides are used the BLM would also be contacted for approval of such use.

For quality assurance purposes road construction and maintenance will be monitored by BPM, their contractors, and during annual and biennial field inspections by WY-LQD and U.S.BLM personnel. All will assure that haul roads have been built using acceptable crushed aggregate road base and BLM and WY-LQD road construction standards have been met along with any design standards found in this mine plan. Through road maintenance, BPM and their contractors will maintain culverts and ditch turnouts to assure that proper road drainage occurs.

Storm Water Discharge Permit (SWDP) and Storm Water Pollution Prevention Plan (SWPPP): BPM's SWPPP was provided with the application binder. It includes protocols for spill and runoff prevention, emergency response and notification, and training and monitoring.

Wildlife monitoring and protection: Instances of wildlife mortality, if any, would be noted during normal operations and reported to the Wyoming Game and Fish Department (WGFD) when appropriate. Bentonite Performance Minerals has begun a schedule of wildlife surveys including the proposed A-6 mining area. These surveys are conducted eight times per year, and are scheduled during key periods for the various species which inhabit the area. In this way wildlife utilization trends can be monitored and the use of current wildlife observation data will enable adjustment in mining operations to avoid conflicts.

If black-footed ferrets are seen during mining activities, the USFWS would be contacted immediately. If bald eagles are discovered nesting within ½ mile of the permit Amendment boundary, the USFWS and BLM would be contacted immediately to discuss mitigation measures.

USFWS: According to a February 26, 2012 United States Department of the Interior Fish and Wildlife (USFWS) letter, all areas within Permit 246C have been block-cleared from black-footed ferret habitat consideration, thus removing survey consideration of prairie dog populations within the permit. Prior to opening any new pit or area, BPM personnel would inspect the site for presence of raptors, sage grouse (specifically leks, nesting, and brood rearing), and Migratory Birds of High Federal Interest (MBHFI), to include sage sparrow, lark bunting, mountain plover, and horned lark, and Threatened and Endangered (T&E) species. In the action of performing these surveys, US Fish and Wildlife Service observation guidelines would be used. Should any evidence of these species be observed, mining activity would be suspended until the Wyoming Game and Fish Department (WGFD), BLM and/or the WDEQ-LQD have been contacted and approval to continue mining has been secured.

All known raptor nests in the proposed mine area would be monitored for activity starting in February and continue through the nesting season to July 15th. MBHFI and Mountain Plover nest searches would be conducted prior to any initial surface disturbing activities during the dates April 15 to July 15.

WGFD: In their comment letter dated March 17, 2010, the state agency has requested that BPM monitor all sage grouse activity within and near the proposed A-6 mine area, and when possible, implement offsite mitigation projects to benefit sage grouse.

Proposed Action Alternative I continued.

(5) <u>Interim Management Plan (as per 43 CFR 3809.401(b)(5)):</u>
In the event BPM would temporarily close a mining area, the interim management plan would be implemented. Berms would be placed in all pit areas around a highwall. A berm would also be installed at the ramps of a pit to prevent entrance. Temporary water diversions in place around the pit would be left in place to prevent water from entering the pit. Bentonite stockpiles and stockpiles with potential deleterious material (spoil piles, etc.) would be bermed to prevent off-site sedimentation and contamination. If soil piles are expected to be in place for an extended period due to temporary closure of a pit, they would be seeded to prevent erosion and loss of soil. Finally, the pit area would be monitored on a regular basis to determine if problems, such as erosion, are occurring and need to be addressed.

2.2 Alternative II – No Action

Under the No Action alternative, the BLM would not approve BPM's A-6 Plan of Operations and Right of Way, if determined that they would cause unnecessary or undue degradation ("U&U" as per 43 CFR 3809.5). BPM's proposed new mining in the A-6 area would not be approved and no new mining in this area would occur unless the Plan and/or ROW were revised to prevent unnecessary and undue degradation of the public lands.

3.0 AFFECTED ENVIRONMENT; ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND NO ACTION ALTERNATIVES; AND PROPOSED STIPULATIONS, MITIGATION AND MONITORING MEASURES

This chapter presents site specific information on the environment (i.e., the physical, biological, social, and economic values and resources) that could be affected by the Proposed Action (Alternative I) and No Action (Alternative II) alternatives, as well as the potential environmental effects/consequences of the two alternatives, as identified during scoping with the BLMs Interdisciplinary Team. **Stipulations and Mitigation/Monitoring Measures, either proposed by BPM, *or those that would be required by BLM should the Proposed Action be approved*, are then provided in italics.** Resource issues or concerns, which were considered during this analysis, which may (or may not) be affected by the Proposed Action are presented in **Table 2** (below).

Under the CEQ NEPA regulations, (40 CFR 1508.8), "Effects" are defined as:

(a) **Direct effects/impacts -** are caused by the action and occur at the same time and place

(b) **Indirect effects/impacts -** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Table 2.		
Resource, Issue, and/or Concern	**May Affect**	**No Affect**
Air Quality	X	
Cultural Resources and Native American Religious Concerns	X	
Water (Surface and Ground)/Floodplains	X	
Wetlands/Riparian/Aquatic Resources	X	
Geology/Minerals	X	
Paleontological Resources	X	
Soils	X	
Vegetation	X	
Invasive, Non-native Plant Species	X	
Wildlife/Migratory Birds/Raptors	X	
Threatened & Endangered Species/T&E Habitat		X
BLM Sensitive Species	X	
Livestock Grazing and Range Management	X	
Socioeconomics	X	
Lands with Wilderness Characteristics		X
Recreation, Visual Resource Management, Caves and Karst		X

3.1 Climate and Air Quality

3.1.1 Affected Environment

The climate of the area is typical of upland desert regions of the inter-mountain west. Based on 1971-2000 Climate Normals, as cumulated by the Wyoming State Climatologist, and subsequent data through 2009, the mean temperature is 44.5 degrees F for Lovell, WY. The annual mean precipitation is 6.74" for Lovell, WY.

No site-specific air quality data are available from the A-6 Plan area; however, air quality in the area is generally considered to be good. The air-shed within the A-6 Plan area is classified as Class II, which allows concentrations of some air pollutants to increase to accommodate regional economic development. The primary air-borne pollutant in the A-6 area is Particulate Matter (PM) in the form of fugitive dust (uncontrolled wind-carried particulates) generated from natural and human sources, primarily bentonite mining in this area.

Total suspended particulate matter (TSP) is the only contaminant for which long-term data are available (BLM, 1988) - the long-term mean for TSP at Lovell is 32 micrograms per cubic meter. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of gasoline and diesel fuels, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, oil and gas fields, agricultural and forest burning, and operation of fireplaces and woodstoves. Emission levels in northwest Wyoming are much lower than levels in other highly developed and industrialized areas.

Other air quality contaminants that may be present, most related to fuel combustion related to mining, include hydrogen sulfide (H_2S), sulfur dioxide, nitrogen oxide, carbon dioxide, and vaporous hydrocarbons. Visibility in the region is typically very good (>70 miles) and fine particulates (PM) are generally considered to be the main source of visibility degradation.

Additional air quality and climate data and information pertinent to this application can be found in Appendix C.

3.1.2 Environmental Consequences of the Proposed Action Alternative I

The air quality of the local area would be moderately impacted for the life of the A-6 Plan as a result of increased surface disturbance due to mining activities. Soil and overburden stripping, blasting, bentonite removal and hauling would result in temporary increases in the amount of particulate matter, fugitive dust, and fossil fuel combustion-related air pollution affected air quality locally. Haul trucks would increase the amount of dust in the air until the roads were reclaimed or were longer used as haul roads. An increase in the amount of combustion-related by-products released by operation of heavy equipment and hauling would take place; it would dissipate into the air/atmosphere. This combustion-related effect on air quality would not be able to be mitigated during mining operations. The temporary loss of vegetation would result in a somewhat lowered capacity for natural carbon sequestration by plants. If the WDEQ determined that air quality in the area is impaired, and mining was found to be the cause or one of the contributing causes, BMP's to mitigate this impact could be implemented. If air quality is determined to be impaired the Air Quality Standard #6 (Air Quality) for Healthy Rangelands in Wyoming could fail.

- ***Mitigation: If approved, dust suppression measures will be required of BPM in order to control fugitive dust emissions. These measures would include application of dust suppression water to the mine/work area and haul roads, using water trucks as needed, during mining and hauling activities.***

3.1.3 Environmental Consequences of the No Action Alternative II

There would be no additional direct or indirect effects on air quality in the A-6 area under this Alternative, because the proposed Plan/ROW would not be reviewed or approved. Additional particulate matter and other contaminants as a result of exhaust would not be released into the air by equipment or haul trucks used in the proposed mining process, because the additional surface disturbance would not be permitted.

3.2 Cultural Resources and Native American Religious Concerns

3.2.1 Affected Environment

Class III cultural resource inventories meeting the requirements of the Wyoming State Historic Preservation Office (WYSHPO) Format, Guidelines, and Standards for Reports for the proposed mining area were conducted by High Country Archaeology in 2005, (BLM, CYFO 020-2005-123) which resulted in documentation of three (3) isolated resources, and one (1) historic debris scatter, and in 2007 (020-2007-116) locating one (1) prehistoric open camp and one (1) historic isolated resource. None of the resources were determined to be eligible for listing on the National Register.

No historic properties were found on lands within the proposed A-6 area, and no additional investigations or mitigations are anticipated. However, if sites would be noted during mining operations, BPM would follow all commitments as required by law, and adhere to all stipulations required by the BLM Cody Field Office (Appendix G).

3.2.2 Environmental Consequences of the Proposed Action Alternative I

The previously recorded, not-eligible sites received "no effect" determination under the Wyoming State Protocol between the BLM and the SHPO. Any other unknown cultural resources that exist in the proposed mining area that were not detected by the Class III cultural survey would be reported to the BLM, if found by BPM as required in the Cultural Resources Stipulations found below Appendix G. Improvement of haul roads could facilitate access to and within the project area, thereby increasing potential for additional unauthorized surface collection and looting. If any areas or locations of traditional gathering areas, or religious or of cultural concern to Native Americans are subsequently identified or become known through the Native American notification or consultation process they would be considered during the implementation phase. The BLM would take no action that would adversely affect these areas or locations without consultation with the appropriate Native Americans.

- ***If approved, stipulations to protect cultural resources will be attached to any approval document should this Plan be approved by BLM.***

3.2.3 Environmental Consequences of the No Action Alternative II

Under the No Action Alternative, there would be no additional impacts on Cultural Resources, as surface disturbance under the proposed A-6 Plan would not be approved. No impacts to Native American Religious concerns would occur under the No Action alternative, as BLM would take no action that would adversely affect these areas/locations without consultation with appropriate Native American tribes. There would be no additional surface disturbance therefore there would be not be any chance for a discovery situation, nor would there be any actions that would require Native American religious consultation.

3.3 Water Resources (Surface and Ground)/Wetland and Riparian areas

3.3.1 Affected Environment

Water Resources:

Surface Water: Eight watersheds and two sub watersheds were mapped within the areas of disturbance in Amendment 6. Watersheds within the Amendment 6 Area are typical of those found at low elevations in the arid west, as they support sparse vegetation and contain topography shaped by fluvial erosion. The watersheds range in size from 1,352 acres (A'), up to 162 acres (C2). The highest watershed elevation is 5,488 feet (A'). The average slope of the watersheds is 6.5%. The predominant aspect of the watersheds is south. Water discharging from all streams associated with the mine area is ephemeral and discharges into the Big Horn River between 10 and 15 miles downstream of the mine disturbance area.

Lovell has an annual mean precipitation of 6.62 inches, and Greybull has an annual mean precipitation of 6.95 inches, of which roughly 50% falls in both locations between April and July, the majority as rain showers and thunderstorms (Martner, 1986). Stream channels in the areas proposed to be mined flow water in response to snowmelt and precipitation events and are dry most of the time.

Flow events in ephemeral drainages in arid and semi-arid regions occur in response to snowmelt and storm events which can occur several times during any given year. Channel substrate is a poorly sorted cobble, gravel, sand, and silt. Surface water quality and suspended sediment data for any of the watersheds that would be affected by the proposed mining has not been collected by BPM, as in-channel flows have not been observed in the Amendment area. Suspended sediment naturally discharges from all watersheds surveyed in this report. Depending on the amount of water flowing, the length of time of flow, conditions of vegetation and soil within the watershed, turbidity of flow, size of material moving downstream, and total amount of sediment discharged vary from storm to storm and year to year. Dissolved constituents in natural ephemeral streams of the area are composed of salts found in the exposed geology, which are dissolved by water. However, in proportion to suspended sediment, the volume of dissolved components flowing downstream is relatively minor.

Groundwater: Mining in the A-6 area will encompass the Canadian bed, D bed, E bed, Commercial Bed, Upper Bed, 2nd Bed, 3rd Bed, 9th bed, 10th bed, and the Rusty Bed. Thus, the Cretaceous Mowry Shale, and the Upper Thermopolis Shale would be affected by mining. Above and immediately below these formations, several other formations have been identified as aquifers: Quaternary deposits, the Willwood Fm., Fort Union Fm., the Mesaverde Fm., the Frontier Fm., and the Muddy Sandstone Member of the Thermopolis Shale. These aquifers, except for the Muddy Sandstone, are either nonexistent or relatively close to the outcrop, deep gullies have drained the shallower beds, so any shallower aquifers have been breached and drained. During exploration drilling, no water was encountered above beds of bentonite, and because the Muddy Sandstone averages 20' below the 1st bed, the likelihood of encountering ground water during mining is minimal.

Adjacent terrace gravel and fan deposits often act as recharge zones for deeper geologic units. These areas would only be impacted by limited surface activity ancillary to mining, thus, it is believed there should be virtually no impact to recharge characteristics.

Unconfined aquifers are associated with waterways downstream of the proposed mining area. These aquifers occur in unconsolidated Quaternary alluvium of Crystal Creek and the Big Horn River, and are recharged predominately by water flowing in these waterways.

Wetlands/Riparian/Aquatic Resources:
This assessment was initiated by reviewing relevant National Wetland Inventory (NWI) maps (Bear Creek Ranch USGS Quadrangle Map) looking for potential wetlands. The NWI maps indicated three Cowardin sites or potential jurisdictional wetland sites within the proposed Amendment 6 Boundary. Field investigations were conducted to verify those observations and search for other potential wetlands. The location and description of the three potential jurisdictional wetlands are as follows:

- Site 1 - NW1/4NW1/4, Section 5, T54NR92W – Freshwater Emergent Wetland – 0.51 Acres
- Site 2 - SW1/4NE1/4, Section 6, T54N R92W – Freshwater Pond – 0.30 Acres
- Site 3 - NW1/4SE1/4, Section 6, T54N R92W – Freshwater Pond – 0.26 Acres

Upon field investigation none of the three potential sites were found to qualify as jurisdictional wetlands based on the Wetland Determination Form for the Arid West Region. ***Note: Additional water resources data and information pertinent to this application can be found in Appendix D.***

3.3.2 Environmental Consequences of the Proposed Action Alternative I

Surface Water: The Proposed Action could impact surface water/quality, primarily suspended sediment values and TDS, if sediment was allowed to leave the mine areas and flow into live waters. During the proposed mining process, natural drainage patterns would temporarily be disrupted, altering drainages and modifying overland flow, sediment, and chemical regimes. Run-off from proposed mining areas could transport excess sediment and water with a higher level of acidity into watersheds than was previously present in the system. Watersheds that would be impacted by mining in the A-6 area are diverse in size and as a result, discharge volumes and magnitudes are highly variable. Mining activities would alter natural flow patterns, fill and reroute natural channels, thus in some areas, culverts would be installed and stream crossings constructed.

Mitigation Measures applied with approval:

- ***Sediment Control:*** *Larger ephemeral channels (those having drainage basins greater than 5 acres) will be temporarily directed by BPM around open pits during active mining stages and straw bale sediment barriers would be utilized as sedimentation control measures.*

- ***Sediment Control:*** *Ditches will be constructed upslope of active pits and dump areas to divert runoff around the operation and back to native and/or reclaimed areas. By diverting native land runoff around the operation, surface water erosion within disturbed areas and reduction in runoff quantity should be minimized. Ditches will be constructed on contour to minimize erosion potential.*

- ***Sediment Control:*** *In some circumstances, riprap, energy dissipaters (i.e., straw bales, wattles, and rock checks) and buried grade control structures, will be installed where necessary, depending on conditions. Precipitation that falls on disturbed areas will generally be contained within active pit areas. Through the use of berms and grading, runoff from the disturbed areas will drain to specific locations, where small sumps would be constructed. Water contained in these sumps will not be discharged, rather allowed to evaporate. If conditions exist where it is not practical to divert and store runoff from disturbed areas, Alternate Sediment Control Measures (ASCM's), such as check dams, will be utilized to treat runoff before being discharged on to native or reclaimed lands.*

- ***Sediment Control:*** *To preserve water quality, all sediment control measures constructed during the mining phase (i.e., check dams, silt fence, sumps, water bars, etc.) will be left in place until the vegetation*

becomes adequately established. Once established all sediment control measures will be removed with the possible exception of sumps, which may be left for livestock and wildlife watering purposes assuming landowner consent is obtained.

- ***Haul Road Construction and Culverts:*** *All haul roads will be constructed using standard engineering practices and meet BLM Manual Section 9113 requirements. Standard construction practices include crowning and ditching of roads to allow the water to be shed from the road surface rather than concentrating and developing ruts. Ditch turnouts would be constructed at regular intervals to expedite drainage, and alleviate potential for increased erosion or gully formation.*

- *Culverts with the capacity to pass the predicted peak flow from the 10-year storm or greater will be installed at each stream crossing. Should erosion problems develop at the outlet, riprap or a similar form of energy dissipation will be installed. All of these construction and drainage control measures should minimize the potential for water quality degradation as a result of road construction.*

- ***Reclamation:*** *All disturbed lands will be revegetated unless initially barren, and will have a cover that is equal to or greater than its native vegetative counterpart. Due to the rather significant swell of the spoil material and the relatively limited thickness of the bentonite seams, there is sufficient material available to ensure that a condition of Approximate Original Contour (AOC) can be achieved. As such, slope, aspect and reclaimed basin size should mimic pre-mine conditions.*

- ***Reclamation:*** *Drainage channels will be reconstructed at a density equal to or greater than what existed pre-mine. Reclaimed channels will have a gradient and sinuosity that mimics pre-mine conditions. Many of the pre-mine channels are narrow and confined, with incision ranging from three to 15 feet. Channel reconstruction will primarily be performed using scrapers and, thus, have a bottom width of 10 to 12 feet depending on the equipment size utilized. Channel banks will be shaped to have a slope of 3(h):1(v) or less. Reclaimed channels will have sufficient capacity to convey flows from the 100-year event, but are not anticipated to be stable during an event of this magnitude; a condition that is similar to what exists naturally.*

- ***Reclamation:*** *Placement of sediment bars and other discharge control items will reduce runoff velocities and increase meandering. Where possible the transition zone will be established on a rock outcrop. Riprap and/or grade control structures will be installed along the transition zone if erosion problems develop.*

Groundwater: The proposed A-6 mining would have little to no effect on any shallow aquifer in the area. Important aquifers that produce large amounts of high quality water lie at least 2,000 feet below the surface and would most likely not be affected by the Proposed Action. These include the Ten Sleep Sandstone, Madison Limestone, Big Horn Dolomite and Flathead Sandstone. Cretaceous formations proposed to be mined include the Frontier Formation, Mowry, Thermopolis Shales, and the Cloverly Formation. During exploratory drilling no water was found above beds of bentonite. Thus effects to the shallower or deeper confined aquifers are anticipated to be very low as a result of the Proposed Action.

An adjudicated spring is located in the NWSW Section 5, T. 54 N., R. 92 W., south of the proposed A-6 Plan/ROW boundary. BPM has committed to monitor the spring's flow during mining operations to determine if mining activities have any effect on it.

Wetlands/Riparian Areas/Aquatic Resources: The wetland in the NW¼NW¼ Section 5, T. 54 N., R. 92 W., is proposed to be disturbed. NWI classifies this wetland as a freshwater emergent wetland with a total area of 0.51 acres. Field inspection verified that the site did not qualify as a jurisdictional wetland, due to the vegetation requirement, but functions as a wetland that provides habitat for wildlife in the area.

- ***Mitigation:*** *During reclamation, BPM will restore the vegetation and soils as described above. Erosion prevention measures outlined in the Mine Plan and Hydrology sections will be implemented to ensure that sediment associated with proposed Amendment disturbances will not impact or accumulate in the other two wetlands or any other adjacent or downstream riparian areas or wetlands.*

- ***Mitigation:*** *If future mine plan modifications indicate that wetland or water course disturbances other than those indicated will be necessary, all disturbance will be contingent on jurisdictional determinations made by the U.S. Army Corp of Engineers.*

- ***Mitigation:*** *BPM will monitor the adjudicated spring located south of the Amendment 6 boundary in T54N R92W NWSW Section 5. They would begin monitoring in the spring prior to, during, and after mining concludes, to document any impacts.*

Additional data and information on hydrology and wetland/riparian resources in the A-6 area is provided in Appendix D.

3.3.3 Environmental Consequences of the No Action Alternative II

There would be no effect on surface water, ground water, or floodplains because the proposed A-6 Plan mining would not be approved. This alternative would result in no additional effect on wetlands, riparian areas, or other aquatic resources, because the proposed A-6 Plan/ROW mining would not be approved and no additional surface disturbance would take place.

3.4 Geology/Minerals

3.4.1 Affected Environment

Information on stratigraphy, structure, overburden characteristics, and mineral resources in the area is provided below. BPM's permitted mine lands are representative of the semi-arid, dissected, upland topography of the Big Horn Mountain foreland in the northern Big Horn Basin.

Geologic Structure – Bighorn Basin and A-6 Area

The Bighorn Basin is bounded by the Bighorn Mountains to the east, the Owl Creek Mountains to the south, and the Absaroka Mountains to the west. The Bighorns and the Owl Creeks are a result of the Laramide Orogeny that occurred from the end of the Cretaceous Period through the beginning of the Tertiary Period. The various anticlines and synclines found in the Bighorn Basin formed during the Laramide Orogeny, a mountain-building event that took place during Late Cretaceous to Eocene time approximately 80 to 40 million years ago (mya). Locally the average dip of the A-6 area is about 6% sloping away from the Big Horn Mountains, while the strike in the area averages about 4-5% sloping southerly and perpendicular to the dip.

Alternating beds of incompetent and resistant sedimentary rocks, structurally affected by low-angle folding, have been carved by cyclic runoff into a pattern of broad bedding plane surfaces with steep scarp slopes and deeply incised drainages. The Laramide Orogeny, a regional mountain-building episode that began during the late Cretaceous period, initiated the ending of the Western Interior Sea, and the structural development of the modern Big Horn Mountains. This orogenic episode caused a discontinuous series of incidental folds and faults along the perimeter of the basin, which are responsible for the variable dip angles, and thus the variable outcrop patterns, of bentonite beds targeted by BPM for bentonite production.

In the Bighorn Basin, commercial bentonite is limited to middle-lower Cretaceous strata, identified as the Thermopolis, Mowry, and Frontier Formations. These bentonite-bearing strata are generally composed of sodium bentonite beds of varying thicknesses, interbedded with gray, marine shales and claystones which were deposited in the Cretaceous Interior Seaway around 100 million years ago. The A-6 Plan/ROW proposes to mine various bentonite beds in the Thermopolis Shale, Mowry Shale, and Frontier Formation.

Stratigraphy – A-6 Area
The stratigraphic column for the area (**Figure 2 below)** is comprised of a sequence of marine beds that were deposited during Cretaceous time during several advances of the Cretaceous Western Interior Seaway. The Thermopolis Shale forms the bottom of this sequence, followed by, in ascending order, the Muddy Sandstone and Shell Creek Shale members of the Thermopolis Shale, the older Mowry Shale, and the oldest bentonite bearing Frontier Formation.

Lithologic Description of Strata (in descending order younger to older)
Bentonite clay is a fine-grained mineral composed mainly of montmorillonite clay. Bentonite forms as a result of in-situ alteration of rhyolitic volcanic ash. Pyroclastic material was ejected into the atmosphere by volcanic activity during Cretaceous time, and deposited in a marine environment. Though as many as seven bentonite beds in the area may be of some interest the Commercial Bed is of the greatest value (**Figure 3**). The E bed is the boundary between the Mowry Shale and Thermopolis Shale. Typically, the bottom of the Commercial Bed is characterized by an abrupt boundary with a silicified shale or chert-like material.

The Mowry Shale represents the uppermost strata of the Lower Cretaceous, and is approximately 330 feet thick. It consists of brownish gray to dark gray siliceous shale that weathers to hard, brittle, light silvery-gray chips. The interbedded shale is a brownish, silty mudstone, and fish fossils (scales) are abundant in portions of the Mowry Shale. Bentonite beds are usually less than six inches thick, and are common throughout this formation. Underlying the Mowry Shale is the Upper Thermopolis Shale, a softer black fissile marine shale, which is the overburden for the Rusty Bed. Other beds found in the Thermopolis Shale include the 1st, 2nd and 3rd beds, which BPM intends to mine.

Bentonite beds found in the Mowry Shale formation that BPM intends to mine (along with average thicknesses) are the Upper Bed (3.5 feet), Commercial Bed (2.5 feet), Canadian Bed (3 feet), D Bed (4.5 feet), E Bed (2.5 feet), 9th bed (2.5 feet) and 10th Bed (3 feet). BPM also intends to mine the 2nd Bed (1.5 feet), 3rd Bed (1.5 feet) and Rusty Bed (2.5 feet) of the Thermopolis Shale. Most mining depths are very variable as mining will progress from outcrop to depths as deep as sixty feet for single beds. In some pits BPM intends to mine multiple beds. On average the D bed is 55-60 feet below the Canadian bed and the E bed is 20-24 feet below the D bed. In other multiple bed pits the Commercial Bed averages around 35 feet below the 10th bed. These depths are derived from the extensive drilling that has been done by BPM in the A-6 area.

Overburden Characteristics (Site Specific)
High Sodium Absorption Ratio (SAR), low Acid Base Potential (ABP), bentonite contaminates, and other unsuitable characteristics as defined by LQD Guideline 1 were tested and found in A-6 overburden by Inter-Mountain Labs. Where BPM intends to mine the 10th bed, high SAR and Low ABP can be expected. The Commercial bed has the potential for high SAR below 6 foot, while the Upper Bed has the potential for Low ABP. The Canadian, D and E beds have high SAR, and Low ABP. Some unsuitable overburden material at depths of 11-35 feet is also possible.

Mineral Resources
Bentonite is the only locatable mineral found in this area. Thick deposits of colluvium (granitic and mixed angular unconsolidated deposits) are present in the area on BPMs unpatented claims. BPM uses this material in road construction where necessary. No oil and gas leases are known to be located within this area. No solid leasable minerals such as coal or trona occur in the area.

3.4.2 Environmental Consequences of the Proposed Action Alternative I
Under the Proposed Action, commercial quantities of bentonite would be removed from beds in the Cretaceous Thermopolis and Mowry Formations. Mining would disrupt the natural stratigraphic order of beds within the open pit areas, and disturb overburden, as well as top and subsoil profiles, as described in the Mine Plan. No other locateable mineral resources would be affected by the Proposed Action.

Overburden sampling characterizes soils and rock units below the surface to determine if their exposure to potential ground or surface water would adversely affect the environment and whether the overburden may be suitable soil for plants. Overburden considered adverse to ground or surface water and plants must be managed to minimize its impact to the environment and potential rooting zones. This includes burying such unsuitable material above groundwater zones and well below the surface to prevent any wicking or capillary draw. Bentonite Performance Minerals recognizes overburden with a high SAR and low ABP is not desirable for cover/cap material. Areas where the overburden would be unsuitable for cover material have been characterized by BPM.

- ***Mitigation:*** *BPM will replace salvaged native cap/cover material wherever possible, and replace all overburden in the tiered manner, as it was originally found. Measures outlined in the Mining Plan and Reclamation Plan describe mining and reclamation of areas in high SAR and low ABP overburden. These measures include placing of these materials below the cap material when possible, and avoiding mixing the overburden of high SAR and low ABP with better quality overburden.*

The Proposed Action would have a moderate impact on any saleable mineral resources located on public lands proposed to be mined, as any deposits of sand and gravel/colluvium present would either be used in road construction, or salvaged with top and subsoils to be used in later reclamation. No active oil and gas leases or leasable minerals are present in the proposed A-6 mine area.

3.4.3 Environmental Consequences of the No Action Alternative II

There would be no effect on the geology or minerals of the area under Alternative I, because the proposed A-6 Plan mining would not be approved, and additional surface disturbance would not take place.

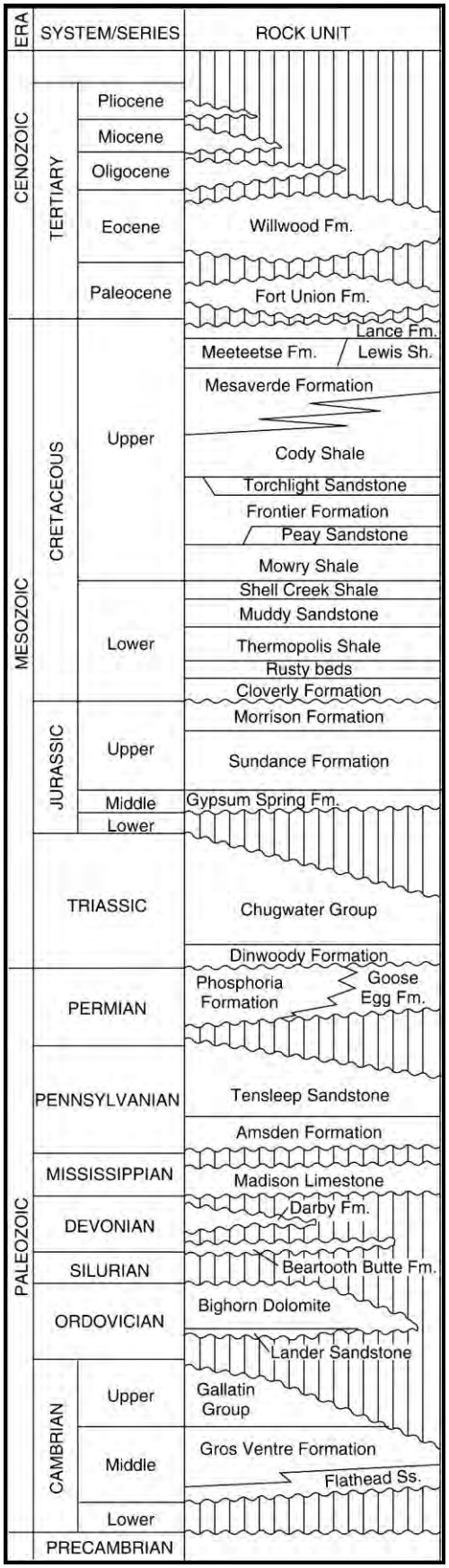


Figure 2. General Stratigraphic Column of the Bighorn Basin and A-6 Plan/ROW area
Source: Wyoming Geological Association (1989)

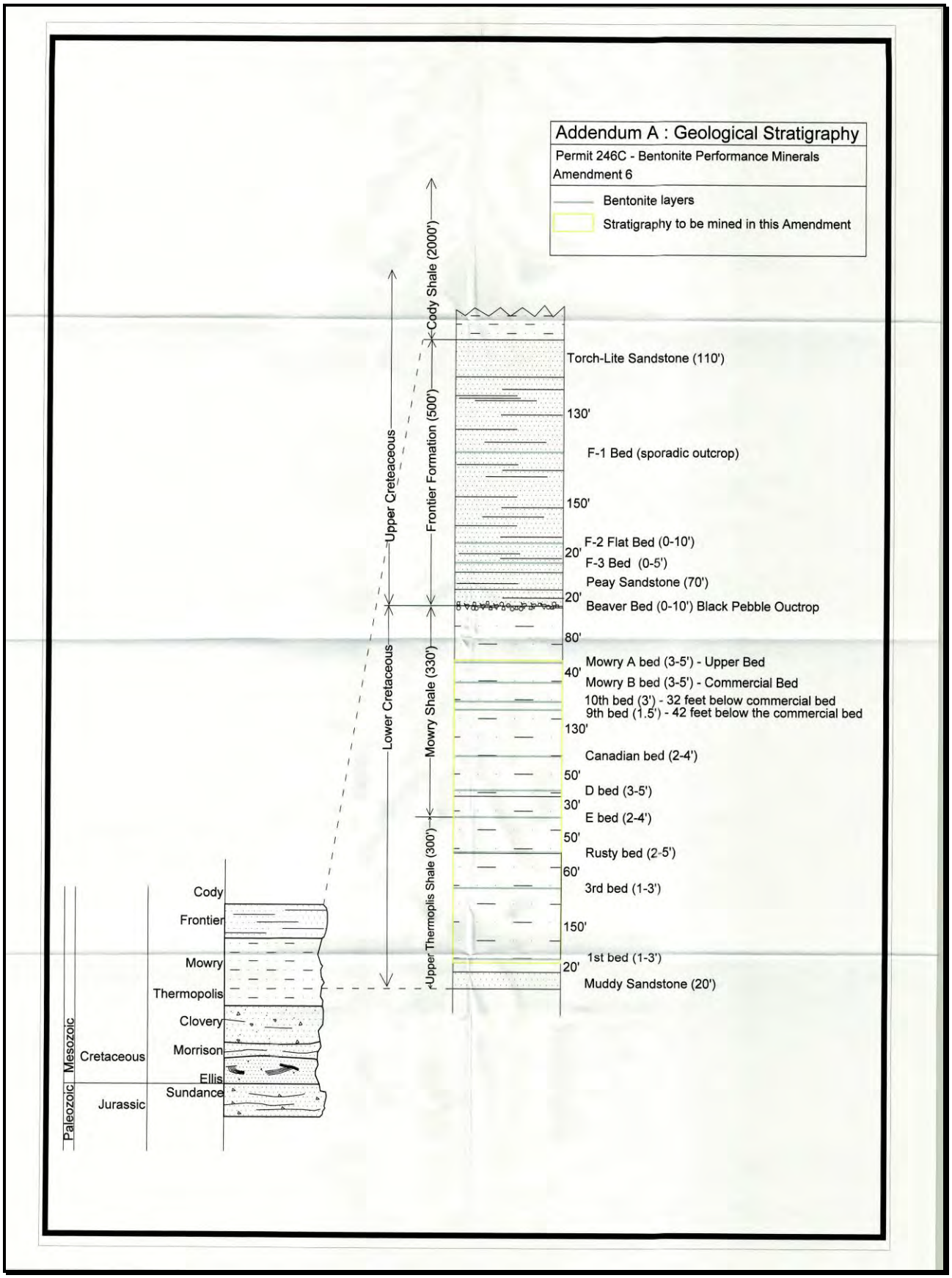


Figure 3. Cretaceous stratigraphy & bentonite beds proposed to be mined by BPM in the A-6 Plan/ROW area (from the A-6 application)

3.5 Paleontological Resources

3.5.1 Affected Environment

BLM uses a classification known as the "Potential Fossil Yield Classification" (PFYC) during site specific analysis of a Proposed Action, to determine the potential for vertebrate or scientifically significant fossil resources to be found there. The A-6 area has been rated as a **PFYC=3a**, meaning there is moderate potential for such fossils. The geologic formations in the area are dominated by the Mowry and Thermopolis shales, representing ancient sedimentation in the Cretaceous Interior Seaway that covered most of Wyoming at the time. Marine and flying reptiles, as well as various types of fish, lived in this seaway. Multiple types of invertebrates also occupied these ancient environments. The Cretaceous Mowry Shale is known for its abundance of fossil fish scales in certain units. The Muddy Sandstone Member of the Thermopolis Shale also yields vertebrate fossils such as teeth and occasional chunks or chips of fossil bone. The Muddy Sandstone Member of the Thermopolis Shale is located stratigraphically below any of the bentonite units proposed for mining.

3.5.2 Environmental Consequences of the Proposed Action Alternative I

Paleontological resources in the proposed mining area may be affected under the Proposed Action, which would involve mining in the Frontier Formation, which has been rated by BLM with a PFYC=3a, meaning that vertebrate fossils may occasionally be found, though they are not found with great frequency. Standard paleontological stipulations (Appendix G) would be applied to any approval document, in order to protect any paleontological resources that might be found during mining.

- ***Stipulations: If vertebrate or scientifically significant fossil materials are discovered, BPM would be required to immediately suspend all operations that might further disturb such materials, and contact the BLMs Authorized Officer (Cody Field Manager) so the fossil resource could be investigated and assessed. Significant scientifically valuable fossil resources would be removed from the area prior to resumption of mining. Stipulations to protect paleontological resources would be attached to any plan of operations approval letter.***

3.5.3 Environmental Consequences of the No Action Alternative II

There would be no effect on paleontological resources under Alternative I, because the proposed A-6 Plan mining would not be approved and no additional surface disturbance would take place.

3.6 Soils

3.6.1 Affected Environment

The A-6 Plan/ROW Area is within a "mesic" soil temperature regime (mean annual air temperature about 48 to 52F) and a "typic-aridic" soil moisture regime (mean annual precipitation about 5 to 9 inches). The average frost-free period is about 110 to 140 days. The permit area is characterized primarily by the presence of shallow moderately deep soils that include gravelly loams and clays, shallow to moderately deep saline/alkaline soils and deeper loamy soils. There are also several bedrock types mapped in the project area including Badlands (BL); Shale - Bentonite Outcrops (SBO); and Badlands – Shale – Bentonite Outcrops complex (BL-SHO). Pre-Law Disturbed Land (PL), Disturbed Land (DL), and Intermittent Pond (IP) were also delineated in the Project Area. ***Additional soils data and information pertinent to this application can be found in Appendix E.***

3.6.2 Environmental Consequences of the Proposed Action Alternative I

Soils in disturbed areas would be permanently affected by mining. Because of the harsh environment and the bentonitic parent material, site specific soils took thousands of years to develop. By disturbing these soils, a complex ecosystem would be disrupted. Some of the integrity of the soil could be preserved by properly separating and storing suitable topsoil from subsoil, overburden, and especially from bentonite and "ash" stockpiles. If topsoil would be exposed to bentonite or "ash" materials, it would become contaminated and no longer able to support life.

WDEQ-LQD requires all soil stockpiles be separated from all other materials by a buffer zone of at least one bulldozer width to prevent contamination. Organisms living in the topsoil have a relatively short lifespan when soil is stockpiled, due to the disturbance of normal processes including the following: lack of oxygen, lack of new organic material, lack of water, and the increase in depth to surface. Topsoil must be redistributed within a few months of being stockpiled in order for the soil to maintain a functioning ecosystem. These microorganisms help to reduce water and wind erosion, hold water in the soil, and prevent weed establishment. The castback mining system is designed to quickly reclaim disturbed areas so topsoil remains viable and will more easily support re-vegetation efforts. Live-spreading is currently the best method for reclamation because topsoil that is removed from an open pit is immediately placed on the area that has already been mined, backfilled and recontoured. This preserves many of the topsoil's important biological and physical qualities.

The loss of topsoil biological viability, as a result of stripping and stockpiling, would increase as the length of stockpiling time increases (loss would occur very rapidly at first and then gradually taper off), depth of stockpile, and having no or little deeply-rooted plant growth. Impacts of the Proposed Action to soils would require mitigation (required by both BLM and LQD), as per the terms of any approved mining and reclamation plan(s) and as presented in the A-6 Plan application.

- ***Mitigation:*** *If approved, and as per BLM requirements, BPM will use live-spreading of topsoil whenever possible and stockpile topsoil for as short a time as possible before re-spreading. BPM will also seed its topsoil stockpiles to prevent weed growth, reduce erosion, and maintain the soil's biological integrity. Associated disturbance relative to proposed mining would be kept to a minimum in order to prevent unnecessary and undue disturbance of native soil profiles. The areas will be seeded in a timely manner to promote speedy plant growth and further reduce erosion.*

3.6.3 Environmental Consequences of the No Action Alternative II

There would be no effect on soils under Alternative II, because the proposed A-6 Plan/ROW would not be approved, and no additional surface disturbance would take place.

3.7 Vegetation

3.7.1 Affected Environment

The majority of land within the proposed mining area lies within the 5-9" precipitation zone for the Bighorn Basin. Vegetation types for Amendment 6 Big Block Area were delineated into the following three different map units: (1) Mixed Desert Shrub (MDS), (2) Salt Desert Shrub (SDS), and (3) Barren Outcrop (OC). Topography varies from dissected badland drainages and escarpments to relatively gentle upland hills and benches. Slopes range from 0 to 45 percent. Aspects are primarily southerly. Fifty-six transects were run within the MDS map unit and forty-two transects were run within the SDS map unit.

When the field work began there was another map unit to survey: Big Sagebrush/Bunchgrass (BSBG). As data were analyzed it appeared that the Big Sagebrush/Bunchgrass community was the same as the Mixed Desert Shrub community, so the two communities were combined to make one. Twenty transects were run in the original BSBG community and 36 transects were run in the original MDS community for a combined 56 transects.

(1) Mixed Desert Shrub (MDS)

The Mixed Desert Shrub vegetation type is a productive and diverse community, though not as productive as a Big Sagebrush/Bunchgrass community. Perennial grasses dominating this site are Sandberg bluegrass (*Poa secunda*) and western wheatgrass (*Agropyron smithii*), with the dominant perennial forbs being Hood phlox (*Phlox hoodii*). Shrubs and sub-shrubs that dominate are: Big sagebrush (*Artemisia tridentata*), birdsfoot sage (*Artemisia pedatfida*), greasewood (*Sarcobatus vermiculatus*), shadscale saltbush (*Atriplex confertifolia*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and Gardner saltbush (*Atriplex gardneri*). The mixed desert shrub map unit occurs sporadically throughout the Big Block Area. Topography is upland rolling hills, drainages and plateaus.

(2) Salt Desert Shrub (SDS)
The Salt Desert Shrub vegetation type is described in Range Cover Types of the United States. The most common perennial grass found here is Sandberg bluegrass (*Poa secunda*). Sub-dominate perennial grasses in the area are tumblegrass (*Schedonnardus paniculatus*), blue grama (*Bouteloua gracilis*) and bottlebrush squirreltail (*Sitantion hystrix*). The succulent most commonly occurring is pricklypear cactus (*Opuntia polyacantha*). The dominant shrub and plant species overall is Gardner saltbush (*Atriplex gardneri*). Sub-dominant shrubs include birdsfoot sage (*Artemisia pedatfida*) and shadscale saltbush (*Atriplex confertifolia*). This map unit is sporadic in locations throughout the Big Block Area. It includes a few barren outcrop shale/clay outcrop (OC) inclusions. Slopes range from zero to thirty percent, but mostly occur in less than ten percent slope.

(3) Barren Outcrop (OC)
This map unit designates barren and nearly barren shale, clay, or bentonite outcrops that occur within the Big Block study area. Minor inclusions (<10 percent) of sparsely vegetated *Atriplex dioeca* and *Suaeda nigra* populations occur but do not provide greater than 1 percent ground cover.

Additional site specific vegetation data and information pertinent to this application can be found in Appendix F.

3.7.2 Environmental Consequences of the Proposed Action Alternative I

Vegetation would be directly affected by approval of the Proposed Action. After mining and recontouring an area, sub- and topsoils would be placed back on the surface. If the castback mining proceeds along in a timely manner, a portion of the biota and microorganisms associated with healthy, living soil would still be alive to help the newly planted seeds reestablish. If topsoil is placed in a stockpile for more than a few months, its ability to support plant life is reduced. The success of the reclamation depends largely on the timeliness and cleanliness of the topsoil replacement process. Also, future topsoil quality and quantity depends on the establishment of vegetation.

The table below, provided by BPM, outlines the acreages of native vegetation by type that would be affected if the Proposed Action was approved. (Note: This table lists a total of 629.1 acres of disturbance, though a higher total acreage was analyzed in this EA). Clearing many acres of land at a time can leave areas open to invasive weed species that can establish quickly and flourish in disturbed areas. Speedy revegetation with native plants would be necessary to prevent a non-native weed invasion. Due to low precipitation in the area (5-9 inches per year) and the shallow, saline soils of the area, revegetation of such areas is often a slow process taking anywhere from two to twenty years or more. Any islands of native vegetation that would be left in the mined area would aid in the spread of native plants throughout the disturbance. Also, if topsoil would be replaced quickly, viable native seeds may still be present to help reestablish themselves in the reclaimed areas.

Even successful reclamation can result in a change from the existing native plant community for decades. Until vegetation on disturbed sites consists of plant communities appropriate to the site, which are resilient, diverse, and once again able to recover from disturbances, they would fail Standards #3 (Upland Vegetation) and #4 (Wildlife) for Healthy Rangelands of Wyoming.

Impacts of the Proposed Action to vegetation would require mitigation (required by both BLM and DEQ-LQD), as per the terms of the A-6 mining and reclamation plan, discussed above under Section 2.1, and any accompanying mitigation measures. According to BPM's proposed reclamation plan, a vegetative community dominated by native shrubs and grasses would be reestablished over time.

Table D8-8. Proposed Affected Acreages by Vegetation Map Unit and Amendment 6 Area.

MAP UNIT	AREAS (in acres)			
	Big Block Area Total Acreage	Total Percent	Big Block Disturbed Acreage	Total Percent
SDS	149.59	13.5 %	120.83	19.2 %
MDS	837.03	75.6 %	481.68	76.6 %
OC	122.48	10.9 %	26.59	4.2%
TOTAL	**1107.1**	**100.0 %**	**629.1**	**100.0 %**

* Note: Access Road and Haul Road Acreages are included

➢ ***Mitigation:*** *Mitigation involves use of approved seed mixtures (Appendix G) and seeding application rates, to reestablish vegetation over time to pre-mine or better conditions. All seed used on public lands will be certified cheatgrass seed and noxious weed seed-free by Wyoming State certified seed laboratory testing and would conform to BLM seed policy IM No. 2006-073; any hay or straw used for check-dam construction or mulching will also be certified cheatgrass and noxious weed seed-free. Some reclaimed areas may be fenced to exclude livestock from grazing too heavily on newly-germinated or established seedlings in these areas. Additional revegetation goals include site stabilization, erosion control, and restoration of visual aesthetics.*

3.7.3 Environmental Consequences of the No Action Alternative II

There would be no additional effect on vegetation under Alternative I, because the proposed A-6 Plan/ROW would not be approved, and no additional surface disturbance would take place.

3.8 Invasive, Non-native Plant Species

3.8.1 Affected Environment

The baseline pre-mine condition indicates a lack of invasive weed species such as cheatgrass, halogeton, salt cedar, and other non-natives, and native plants are the dominant species in the proposed A-6 mining area.

3.8.2 Environmental Consequences of the Proposed Action Alternative I

Invasive and non-native plant species would begin to be present and probably increase with approval of the Proposed Action. If seeding can be completed more quickly after disturbance, invasive non-native plant species establishment would be prevented or reduced. If seeding did not reestablish in a reasonable time frame, annual, invasive and/or non-native weed species could be more likely to spread throughout the disturbed areas. Seeding of topsoil stockpiles, which would be a required mitigation measure for this Plan, would decrease the potential for weeds to spread to and contaminate topsoil. Some weed species that commonly establish in post-mining areas are as follows: cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomeratus*), kochia (*Kochia scoparia*), and Russian thistle (*Salsola kali)*. Halogeton pulls salt to the surface, creating a saline environment few native plants can survive. If cheatgrass comes in, as it frequently does in this general area, it could form a monoculture, outcompeting native species, reducing species diversity, decreasing sagebrush establishment, and creating a volatile fuel source for fires. The use of unfiltered surface water for dust suppression and other activities related to mining has the potential to spread noxious weeds and other undesirable plant species. Gravel and other materials/equipment associated with the proposed action may also be vectors for undesirable plant introduction and spread.

In order to decrease the spread of noxious weeds onto public lands, BPM would inventory all areas and access routes for the presence of weeds. BPM personnel would be trained to identify weeds and would conduct on-going monitoring of weeds. BPM would be responsible for managing all noxious and undesirable invading plant species in the reclaimed areas, including cheat grass, Russian olive, and tamarisk, until revegetation activities would be determined to be successful and the bond would be released for a given area. Mitigation measures are provided below.

The following is a list of Wyoming State Listed Noxious Weeds that would need to be controlled should they begin to grow on the A-6 area lands during mining and/or reclamation (WWPC, 2011). Cheatgrass would also need to be controlled in the proposed project area that would be disturbed under this Plan, should it begin to grow in mined or reclaimed areas.

1) Field bindweed (*Convolvulus arvensis* L.)
2) Canada thistle (*Cirsium arvense* L.)
3) Leafy spurge (*Euphorbia esula L.*)
4) Perennial sowthistle (*Sonchus arvensis L.*)
5) Quackgrass (*Agropyron repens (L.) Beauv.*)
6) Hoary cress (*Cardaria draba & pubescens*)
7) Perennial pepperweed (*Lepidium latifolium L.*)
8) Ox-eye daisy (*Chrysanthemum leucanthemum L.)*
9) Skeletonleaf bursage (*Franseria discolor Nutt.*)
10) Russian knapweed (*Centaurea repens L.*)
11) Yellow toadflax (*Linaria vulgaris L.*)
12) Dalmation toadflax (*Linaria dalmatica (L.) Mill.*)
13) Scotch thistle (*Onopordum acanthium L.*)
14) Musk thistle (*Carduus nutans* L.)
15) Common burdock (*Arctium minus* (Hill) Bernh.)
16) Plumeless thistle (*Carduus acanthoides L.*)
17) Dyers woad (*Isatis tinctoria L.*)
18) Houndstongue (*Cynoglossum officinale L.*)
19) Spotted knapweed (*Centaurea maculosa Lam.*)
20) Diffuse knapweed (*Centaurea diffusa Lam.*)
21) Purple loosestrife (*Lythrum salicaria L.*)
22) Saltcedar (*Tamarix spp.*)
23) Common St. Johnswort (*Hypericum perforatum*)
24) Common Tansy (*Tanacetum vulgare*)
25) Russian olive (*Elaeagnus angustifolia L.*)

Mitigation required:

- ***Weed Control:*** *If noxious or invasive weeds are present, the BLM and/or the Big Horn County Weed and Pest Department will be consulted by the operator/holder for control and eradication methods. A Pesticide Use Proposal (PUP) and written approval from the BLM Authorized Officer for the use of herbicides will be obtained prior to the use of herbicides on public land. BPM will also be required to follow the BLM seed policy IM No. 2006-073 (Appendix H), which would help prevent weed spreading and infestations.*

- ***Weed Control:*** *Weeds will be controlled via use of BLM-approved methods and herbicides, and their management would be the sole responsibility of BPM.*

- ***Weed Control:*** *Where weed infestations are noted on Federal lands associated with this Plan, all vehicle access will be limited to only necessary routes and would be controlled to minimize travel in the infested area until weed removal would be accomplished. Vegetation will be reestablished and weed-free seeds and hay for mulch will be used in the proposed mining area. Cleaning vehicles, equipment, and materials before they enter public land will reduce the spread of invasive, non-native plant species.*

3.8.3 Environmental Consequences of the No Action Alternative II

There would be no new effects as a result of an increase in invasive and non-native species under Alternative I, because the proposed A-6 Plan/ROW would not be approved, and no additional disturbance would occur.

3.9 Wildlife/Migratory Birds/Raptors

3.9.1 Affected Environment

A variety of native wildlife species live in and have been observed within the A-6 study area. Field observations, combined with the information referenced above, enabled evaluations of area use by wildlife. The following sections discuss specific species of concern including game animals, birds, reptiles and amphibians.

Big Game Species

Big game animals which frequent the A-6 Plan/ROW area include **Mule deer** (*Odocoileus hemionus*), **Pronghorn** (*Antilocapra americana*) and **Elk** (*Cervus canadensis*), each of which was observed during field observation surveys. **Moose** (*Alces alces*) may occasionally visit the area, but none were seen. Moose have been sighted on Bear Creek, which flows south from the Big Horn Mountains approximately one mile east of the A-6 Plan/ROW area. Whitetail deer (*Odocoileus verginianus*) and Big Horn sheep (*Ovis canadensis*) are not likely to use this area.

Pronghorn: were frequently observed within the area in late winter, early spring and summer. The A-6 Plan/ROW area is within the Big Horn Pronghorn Antelope Herd Unit (No. 202) and within WGFD hunt area 79. There is no accurate population data for this herd unit or hunt area. The mean number of antelope observed during the study period was 1.5 animal per visit. However, during late winter and spring, the mean number of antelope observed was 3.1 antelope per survey. "Point one" pronghorn must be interesting and somewhat difficult to observe. Both bucks and does were noted, although no fawns were documented. The G&F considers this area yearlong antelope habitat.

Mule Deer: The A-6 Plan/ROW area lies within the North Big Horn Deer Herd Unit (No. 321) and WGFD hunt area 52. This herd unit has an estimated mean herd unit population of 23,250 mule deer (1998-2005) with a population objective of 25,000. The mean number of mule deer seen in the observation area during the study period was less than 1 animal per visit. Observed deer numbers for late winter and spring surveys averaged 1.3 deer per survey.

Elk: The A-6 Plan/ROW area lies within the North Big Horn Elk Herd Unit (No. E321) and WGFD hunt area 40. This herd unit had an estimated average population of 5,012 elk (2000-2004), with a population objective of 4,100. Elk have been noted several times within the observation area, approximately one mile southeast of the permit boundary, although they were never seen within the permit amendment area. Elk use this area predominantly between December and April, when the snow is too deep on the Big Horn Mountains for them to travel and forage well. The area is considered winter range by the G&F. Elk beds were noted in the snow on the mesas and slopes less than one mile east of the permit amendment area during field surveys in January and February. The winter count of Hunt Area 40, during January and February of 2002, was 59 elk.

Raptors/Migratory Bird Species of Concern in Wyoming (including Mountain Plover):

Raptors: Ferruginous hawk (*Buteo regalis*), bald eagle (*Halianaeetus leucocephalus*), Swainson's hawk (*Buteo swainsoni*), and burrowing owl (*Athene cunicularia*) are listed as Level I Migratory Birds of High Federal Interest (MBHFI) species and have been seen in the region, but are not noted on any field surveys. Other raptors documented within the observation area were the Golden eagle (*Aquila chrysaetos*), Red-tail hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). Other raptors found within the survey area include the Northern Harrier (*Circus cyaneus*), Long-Eared Owl (*Asio otus*), Prairie Falcon (*Falco mexicanus*) and American Kestrel (*Falco sparverius*). Merlin (*Falco columbarius*) are also listed as Level II Species but this species has not been seen in the study area, though they most likely occur there.

Golden Eagle Nests: According to BPM, no known golden eagle nests are present within ½ mile of the Amendment. One large raptor nest in the NW¼NE¼ Section 17 T. 54 N., R. 92 W. exists within 1.5 miles of the A-6 Plan boundary. Monitoring of this nest would be conducted during required quarterly wildlife surveys. A golden eagle nest was noted in the SW¼SW¼ Section 26, T. 54 N., R. 92 W., but was not observed to be active during the 2007, 2009 or 2010 field seasons.

BPM stated that "No other raptor nests were observed near the permit Amendment area", and that if others are found in the study area, the USFWS will be consulted to discuss mitigation. BPM was notified of the possibility of a nest in Section 8 on March 16, 2012 via email, however, it was subsequently determined that this nest was listed in error.

Migratory Bird Species of Concern: The list of migratory bird species occurring in the area includes mountain plover (*Charadrius montanus*), sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri*), and sage grouse (*Centrocercus urophasianus*). Sage sparrow and Brewer's sparrow are Level I MBHFI species and have been observed in the A-6 Plan/ROW area. Several ground nesting birds such as sage sparrows, horned larks, and sage grouse were noted in the study area.

No Mountain plover, a USFWS special interest species, have been seen in the Amendment boundary. No nesting sites were seen on or around the observation area.

Sage grouse and mountain plover are recognized as species of special interest and were also observed in the study area. Lark bunting (*Calamospiza melanocorys*), loggerhead shrike (*Lanius ludovicianus*), lark sparrow (*Chondestes grammacus*) and merlin (*Falco columbarius*) are Level II MBHFI species that have been observed in the study area. Western bluebird (*Sialia mexicana*), grasshopper sparrow (*Ammodramus savannarum*), and vesper sparrow (*Pooecetes gramineus*) are listed as Level II MBHFI species, and although not seen in the study area, are known to occur in the region.

Level II Species observed in the study area include Lark bunting (*Calomospiza melanocorys*) and Loggerhead Shrike (*Lanius ludovicianus*). Sage Thrasher (*Oreoscoptes montanus*), Grasshopper Sparrow (*Ammodramus savannarum*), Vesper Sparrow (*Pooecetes gramineus*), Lark Sparrow (*Chondestes grammacus*) and Merlin (*Falco columbarius*) are also listed as Level II Species that have been seen in the region but not in the study area.

Sage Grouse:
Note: The area is not located in a currently designated Sage Grouse Core area (WGFD - version 3). However, two sage grouse leks are located in the general A-6 area. The two leks are illustrated on the map provided below, from the A-6 Plan/ROW application (**Figure 4**). The Block Butte Sage Grouse Lek, approximately 1.1 miles south of the A-6 state permit boundary, and the Dry Bear Creek #1 Sage Grouse Lek, approximately 4 miles north of the A-6 state boundary have been monitored routinely for and by BPM since 2003 during the month of April. No sage grouse were observed at the Block Butte Lek during recent outings, but strutting males were observed on the Dry Bear #1 Lek both times. BPM has begun a new monitoring program that includes ground monitoring of 7 other surrounding leks.

Other Wildlife/Reptiles and Amphibians:
Other wildlife observed, or noted from sign within the observation area for this amendment include bobcat (*Lynx rufus*), badger (*Taxidea taxus*), coyote (*Canis latrans*), fox (*Vulpes vulpes*) cottontail rabbit (*Lepus townsendi*), and jack rabbit. In addition, one blacktail prairie dog (*Cynomys ludovicianus*) was observed in the SW¼ section 21, T.55N. T93W. and noted on the March 9, 2005 observation form. Common reptiles known to occur in the area include sagebrush lizard (*Sceloporus graciosus*), short horned lizard (*Phrynosoma douglassi*), and prairie rattlesnake (*Crotalus viridis*), although none were encountered during these field surveys.

3.9.2 Environmental Consequences of the Proposed Action Alternative I

Approval of the Proposed Action would generally affect wildlife that live near or move through the proposed mining area. It may also affect the flora and fauna that use aquatic environments within and downstream of the proposed mining area. Movement through the area would become difficult as pits appear and disappear in places animals may have used to travel. Larger wildlife species, such as mule deer, pronghorn, and coyotes, would have to adapt and change their movement patterns to avoid the proposed mining area. Large areas of suitable habitat exist on public lands surrounding the mining areas to which game animals can move; big game populations would be affected by fragmentation and disruption from mining activities. The habitat in the immediate and adjacent areas would generally become less suitable for pronghorn and mule deer.

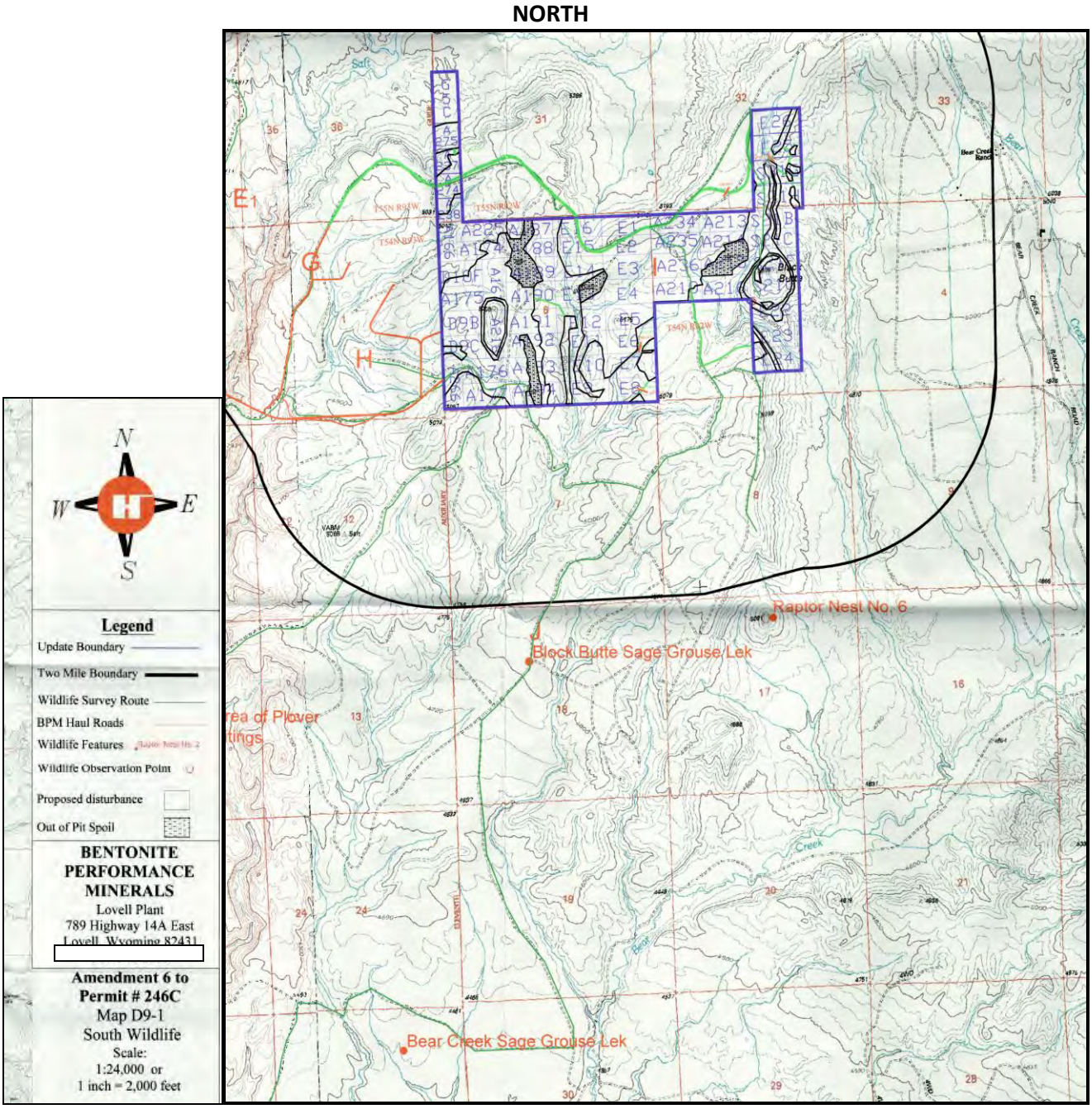


Figure 4. BPM's general topographic map of the A-6 Plan/ROW area and two sage grouse leks located south of the area as labeled.

Smaller animals such as badgers, rabbits, rodents, and reptiles whose home range is much smaller would be directly affected by the mining. Displaced animals would move to a new area, which may already be fully occupied, resulting in stress, extra competition, and probable mortality. An unknown number of these small animals would be lost during mining activities, either directly by machinery, or indirectly through habitat loss; their numbers may not rise to existing levels until the disturbed area was fully reclaimed to pre-mine conditions.

WYOMING GAME AND FISH DEPARTMENT (WGFD) COMMENTS:

Terrestrial Considerations. The WGFD sent two response letters to BPM – the first one dated Feb. 25, 2010 and the second one dated March 17, 2010. The Feb. 25, 2010 response letter from WGFD addressed terrestrial considerations related to potential impacts of the A-6 project, in particular the fact that the Big Block area is located in ***crucial mule deer winter range***, and mentions that there is an occupied sage grouse lek in the NE¼ Section 5, T. 54 N., R. 92 W.

Their letter also states the A-6 area is "located in a sage grouse core area". However, the core area they mentioned has since been amended. The March 17, 2010 letter was much more detailed and a portion of that letter is attached below:

> The Big Block Area is the most important area for wildlife identified in this amendment. It is designated as winter-yearlong and yearlong range for pronghorn, crucial winter-yearlong range for mule deer, and winter range for elk. Herds of elk as large as 200 animals have been observed using this site during winter and early spring. It is within sage-grouse core area as designated by the Governor's Sage-grouse Implementation Team, and the sage-grouse is currently a candidate species under the Endangered Species Act. Maintaining and enhancing sage-grouse core area habitat is a high priority within Wyoming. Four active leks are within 4 miles of the proposed site; the closest lek (within one mile of the eastern most parcels) has had over 100 birds at the lek on several occasions. The site probably provides nesting cover for sage-grouse (although no nests have been documented) and is used by grouse during winter. There is an active golden eagle nest on Black Butte. Mountain plover have been observed during nesting season within ¼ mile of proposed parcels in section 32 (T55, R92). The Game & Fish Department, BLM and private landowner/permittee worked cooperatively to construct pipelines and tanks in this area to provide water to livestock and wildlife. That water delivery system will be affected during mining of this site.
>
> Mining the Big Block Area may have detrimental effects on many wildlife species since it contains the best quality, undisturbed sagebrush-grassland habitats remaining in this vicinity. These parcels should be removed from consideration of mining due to impacts to wildlife, or at the least, we recommend monitoring sage-grouse habitat use and movement in the proposed mining area to identify important habitats for protection. To reduce impacts to grouse, off site mitigation should be done to improve sagebrush habitats away from the Big Block Area.
>
> Reclamation of any sites mined under this amendment should return areas to pre-disturbance conditions. Sagebrush seed should be included where sagebrush currently exists. Top soil should be piled to varied depths to provide deep pockets where sage can become established. Areas seeded with sagebrush should have little other seed (grasses) planted to allow less competition with sage. Forbs should be included in the seed mix for all sites. Temporary irrigation systems should be used for quicker germination and establishment of all vegetation. Haul roads and other access routes should be eliminated upon completion of mining and contoured to pre-existing topography.

This second WGFD response letter indicates that much of the A-6 Plan/ROW area lies within a sage grouse "Core Area" initially delineated with the August 2008 executive order issued by then Governor Freudenthal. Subsequently, however, the entire A-6 Plan/ROW area was removed from core area delineation with the Governor's Amendment and Executive Order of August 18, 2010. Therefore core area stipulations accompanying that Order may not apply to these "A-6" Plan/ROW lands.

<u>Mitigation Proposed by the proponent in their A-6 Plan/ROW</u>:

- ***Areas designated for initial surface disturbing activity from mid-April through mid-June will be surveyed for ground nesting birds prior to excavation***. *Specific ground nesting birds of interest include mountain plover, sage grouse, sage sparrow, and Brewer's sparrow. If nests are found, initial surface disturbing activity will be avoided until juveniles have left the nest.*

- ***If any mining high walls are left unattended for over one year, an inspection for raptor nests on the high wall will be conducted.*** *If raptor nests are found, USFWS and WDEQ (as well as BLM) will be consulted for proposed mitigation.*

- ***Reclamation activities and required bonding, as described in the mine and reclamation plans, will ensure wildlife habitat is restored with respect to herbaceous forage, shrub browse and shrub cover***. *Perennial native plants will be restored to original ground cover, providing forage and soil protection.*

- ***Emphasis will be placed on restoring big sagebrush density and cover***. *Key shrub species for wildlife in the area are big sagebrush, rubber rabbitbrush, shad scale and Gardner saltbush. Big sagebrush is very important for fawn and sage grouse cover, as well as thermal cover for many other species.*

- ***Bentonite Performance Minerals has begun a schedule of wildlife surveys that covers the A-6 Plan/ROW areas.*** *These surveys are conducted eight times during the year during key periods for various species which inhabit the area. In this way, wildlife utilization trends can be monitored. Use of current wildlife observation data will enable adjustment in mining operations to avoid conflicts.*

Proposed or additional wildlife mitigation measures that would be required by BLM should the Proposed Action be approved for the A-6 Plan/ROW area:

- ***Raptors****: BPM will follow spatial and seasonal buffer protocols outlined by the USFWS in their letter dated Feb. 26, 2010. These include conducting at least three surveys during nest-initiation periods from early March through early June and maintaining a disturbance-free zone around active golden eagle nests of at least 0.75 miles during the nesting season (February 1 to August 15). BPM would be required to notify the BLM if any nesting raptors are spotted; the BLM biologist may request that mining activities be halted until the young have fledged.*

- ***Golden Eagle Nest(s):*** *A Golden Eagle nest has recently been documented along a cliff face in Sec. 17, T. 54 N., R. 92 W., about 1.5 miles south of the southernmost disturbance boundary in the A-6 Plan/ROW area. USFWS mitigation for active nests within ½ mile of mining includes a seasonal mitigation measure of no activity between January 15 – July 31 of the year.*

- ***Sage Grouse****: BPM's mitigation efforts will focus on protection of nesting and brood-rearing sage grouse by conducting pre-disturbance ground surveys within immediate areas to be affected, if initial ground disturbing activities occur during nesting or brood-rearing periods (March 15 through July 15). If nests or broods are noted, operations would be voluntarily delayed or temporarily relocated until grouse use was completed or moved. Additional mitigation efforts would focus on enhanced efforts to restore sagebrush during reclamation as described in the Reclamation Plan.*

- ***Sage Grouse****: On Feb. 10, 2012, the BLM Wyoming State Office issued* ***Instruction Memorandum WY-2012-019 entitled "Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate****". Though mining activities regulated on federal surface/federal mineral estate may not be affected by this new sage grouse IM. Mitigation for sage grouse as spelled out in this IM on split estate lands (discretionary actions) may be subject to terms of this IM. As stated in the IM, "…determinations that do not apply the measures located in this policy IM may be necessary where BLM is required to comply with other non-discretionary statutes and regulations (i.e., valid existing rights, oil and gas "drainage", etc.)."*

- *The following narrative was taken from pages 18-19 of the 2012 IM (**pertinent portions to this review are highlighted in bold**):*

  Locatable Mineral Activities:

  - **Notices or Plans of Operation, or modifications thereto, submitted following the issuance of this guidance:** As part of the 15 day completeness review of notices [or modifications thereto] and 30 day completeness review of plans of operations [or modifications thereto], the proposed project area(s) where exploration, development, mining, access and reclamation would take place should be reviewed for overlap of sage-grouse core areas in the corporate GIS database**.** If there is overlap, the BLM AO may notify the operator of ways that they may minimize impacts to core area habitats and request the operator to amend its notice or plan to include such measures. The request to amend the submitted notice or plan of operations must make clear that the operator's compliance is not mandatory and that including such measures is not a requirement for completeness of either the notice or a plan of operations, nor is it a condition of acceptance of the notice or approval of the plan of operations.

- ***OTHER MIGRATORY BIRDS**: **BPM will conduct nest searches in migratory bird habitat including Mountain Plover habitat, prior to, and during ground disturbing activities between April 1st and July 15th.** If nesting migratory birds are found, clearing of new ground for mining would halt until the BLM and the USFWS were consulted for further action. Through this monitoring, no migratory birds would be knowingly harmed prior to or during the mining process. Thus, with BPM implementing such mitigation measures, the A-6 Plan/ROW if approved would not cause "take" of migratory birds, which is prohibited by the Migratory Bird Treaty Act.*

3.9.3 Environmental Consequences of the No Action Alternative

There would be no additional environmental consequences on wildlife/raptors/migratory birds under Alternative I, because the proposed A-6 Plan/ROW would not be approved, due to a potential to cause U&U. Wildlife use of the area would continue at current levels because the additional disturbance and habitat loss would not occur.

3.10 Threatened & Endangered Species/Sensitive Species

3.10.1 Affected Environment

THREATENED AND ENDANGERED SPECIES: The USFWS noted in its response letter to BPM that one formerly federally listed wildlife species, and one plant listed as threatened may occur in the vicinity of the permit update area. These include the ***Bald eagle*** (formerly listed as threatened), as well as the ***Ute's Ladies Tresses (threatened)***. The Bald eagle (*Haliaeetus leucocephalus*) was removed from Federal Listing in July 2007, during the period between these two USFWS responses although it is still protected by other Federal action and considered a Sensitive Species.

The Bald eagle winters in the region and migrates through the A-6 area. Bald eagles were not seen hunting, nesting or roosting within the permit boundary, although they are frequently observed along the Bighorn River, over 10 miles to the east of the Amendment area and along Shell Creek, 12.5 miles south of the amendment area. Bald eagles winter in the region and may pass through during migration, especially along both the Big Horn River corridor (which lies several miles west of these proposed mining areas) and the Shell Creek corridor (which lies several miles south). No bald eagles nests have been found in the vicinity of the A-6 plan area.

The U.S. Fish and Wildlife Service (Service) removed the bald eagle, except in portions of Arizona, from the list of threatened and endangered species under the Endangered Species Act (16 U.S.C 1531 et seq.). However, the protections provided to the bald eagle under the Migratory Bird Treaty Act, 16 U.S.C. 703 (MBTA), and the Bald and Golden Eagle Protection Act, 16 U.S.C. 668 (Eagle Act) remain in place. The term "disturb" under the Eagle Act is defined as: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (72 FR 31332).

Another federally-listed species, specifically the Ute ladies' tresses (*Spiranthes diluvialis*), a threatened white, perennial orchid was also addressed in their response. These orchids are endemic to moist soils near wetland meadows, springs, lakes and perennial streams where it colonizes early successional point bars or sandy edges; it prefers alluvial substrates along riparian edges, gravel bars, old oxbows and moist to wet meadows.

BLM SENSITIVE SPECIES: Several BLM Sensitive species, including the following species: mountain plover, sage sparrow, Brewer's sparrow, sage thrasher, loggerhead shrike, white-tailed prairie dog, sage-grouse, and northern leopard frogs are known to occur in the general area. Sage Grouse (Candidate species) are present in the area and were discussed above.

3.10.2 Environmental Consequences of the Proposed Action Alternative I

THREATENED & ENDANGERED SPECIES No Threatened or Endangered plant or animal species (gray wolf, lynx, grizzly bear, black-footed ferret and Ute ladies'-tresses) or are known to exist in the A-6 area, and therefore said species would not be affected by approval of the Proposed Action. There is a potential for Ute ladies'-tresses to be in the area, although no population has ever been observed in the Bighorn Basin. The proposed mining would not occur in riparian areas, specifically wet floodplains that are commonly inundated, where these plants grow, thus making the potential for impacting these plants extremely low. There would be no effect on any listed or candidate species as a result of approval of the Proposed Action.

BLM SENSITIVE SPECIES: The Proposed Action would temporarily affect wildlife habitat, and may cause fragmentation and wildlife avoidance of larger habitat areas for several BLM Sensitive species as described above. The Proposed Action may temporarily affect mountain plover habitat until reclamation of the mined area would be complete. Full reclamation of area habitat would take periods of one or more decades. Mountain plovers, which were recently proposed to be listed on the Threatened and Endangered Species List, are now not considered proposed, but are still considered to be a BLM Sensitive Species and are protected under the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703.

- ***Mitigation: See Section 3.9.2 above***

Sage Grouse (a Candidate and sensitive species) are known to be present in the area, and its habitat would be negatively affected by road and mining activities as a result of vegetation removal and habitat fragmentation taking place until reclamation was successful. This could lead to future sage grouse declines in local populations. The Proposed Action could further degrade, fragment and disrupt sage grouse habitat causing further declines in local populations. Mitigation measures would help lessen the severity of disruption, but would not fully account for habitat quality and quantity effects until reclamation was successful, which can take up to thirty years or more.

The Proposed Action would temporarily affect wildlife habitat, and may cause fragmentation and wildlife avoidance of larger habitat areas for several BLM Sensitive species, including the following species: mountain plover, sage sparrow, Brewer's sparrow, sage thrasher, loggerhead shrike, white-tailed prairie dog, sage-grouse, and northern leopard frogs. The Proposed Action may impact the watershed, affecting northern leopard frogs if present downstream of the area by increasing sediment or changing the water chemistry. Habitat fragmentation would also take place in the A-6 Plan area.

Haul road traffic would also be markedly increased in the area over time. Additional weeds, disturbance, human activity, changes in water quality, modified hydrologic and sediment regimes, and habitat destruction may have negative impacts on BLM Sensitive species in the area.

- ***Mitigation:*** *See the above narrative (Section 3.9.2) regarding sage grouse mitigation and information from the Reclamation plan.*

The Proposed Action may temporarily affect **mountain plover** habitat until reclamation of the mined area was complete. Full reclamation of area habitat would take periods of one or more decades. Mountain plovers, which were recently proposed to be listed on the Threatened and Endangered Species List, are now not considered proposed, but are still considered to be a BLM Sensitive Species and are protected under the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703.

- ***Mitigation:*** *In conformance with USFWS suggestions, BPM will conduct nest searches in mountain plover habitat prior to, and during ground disturbing activities between April 10th and July 10th. If nesting mountain plovers are found, mining operations may need to halt until BLM and USFWS would be consulted for further action. Through this monitoring, no mountain plovers or migratory birds would be knowingly harmed during the proposed mining process.*

- ***Mitigation:*** *See Section 3.9.2 above*

3.10.3 Environmental Consequences of the No Action Alternative II

There are no known Threatened or Endangered species located in the proposed mining area. Also, BLM Sensitive Species, such as the mountain plover, would not lose any habitat or potential suitable habitat should this Alternative be selected, because no additional surface disturbance would take place.

3.11 Livestock Grazing and Range Management

3.11.1 Affected Environment

Approximately 919 acres of BLM land out of a total of 1,107 acres in the area would be disturbed over the life of the plan. The A-6 Plan area is situated within the West Pasture of the Bear Creek Allotment #01013, which is used in a grazing rotation with two other pastures in the allotment. The grazing schedule for the pasture is as follows:

Year I	**2012**	**Graze cattle from May 10st – June 30th of the year**
Year II	**2013**	**Graze cattle for Sept. 1st – October 30th of the year**
Year III	**2014**	**No grazing for a full year of pasture rest**
(Repeat rotation starting with Year I in 2015)		

Several major range improvement projects exist in the A-6 area including fences and a buried stock water pipeline that conveys water to three stock tanks. These improvement projects are necessary for a successful grazing operation in this area so they will need to be taken into account prior to and during mining in the A-6 area.

3.11.2 Environmental Consequences of the Proposed Action Alternative I

If the Proposed Action was approved, mining activities would directly affect rangelands in the proposed mining areas resulting in a loss of wildlife and livestock forage in the areas mined. BLMs range staff calculated that long term loss of forage and ground cover on about 919 acres of BLM land as proposed, equates to 300 – 500 pounds of forage/acre/year lost during mining activities, until recovery of vegetation takes place on those acres.

Disturbance of the entire acreage at one time would ***equate to approximately 70-80 AUMs per year of grazing value lost; 700-800 AUMs would be lost over a ten year period.*** Should sufficient precipitation take place, reclamation could be successful sooner rather than later, however, should dry or drought conditions persist, final vegetative reestablishment could take longer. If fences, pipelines and tanks are not mitigated, moved or replaced during and after mining, this will directly impact any livestock grazing in the area. Disturbed acres could fail the Wyoming Standards for healthy rangelands numbers 1 (soil and watershed stability), 3 (upland ecological conditions), and 4 (plant and animal habitat) for several years post-mining and reclamation, depending on success of reclamation.

Mitigation:

- Fencing: Reclaimed mine areas are occasionally fenced out of grazing allotments to facilitate reestablishment of vegetation. BPM may install temporary fences around seeded areas that are in locations used heavily by cattle, in order to give seedlings a chance to establish. BPM would generally be responsible for installation, maintenance, and removal of these reclamation fences, with some potential for BLM assistance with these activities.

- **Range Improvements: BPM will maintain and/or move/replace any pasture or allotment boundary fences and BPM will move and replace all water pipelines/stock tanks constructed within the A-6 Plan/ROW area before, during and after mining activities in a timely fashion so as not to impact the livestock operator in the Bear Creek allotment and A-6 Plan/ROW area.**

- Reclamation: BPM would be responsible for successful reseeding (see Appendix G for seed mix) and weed management, and would be held accountable for the reseeding by WDEQ-LQD and the BLM until an acceptable vegetative community has established.

3.11.3 Environmental Consequences of the No Action Alternative II

There would be no effect on livestock, grazing, or range because the proposed A-6 Plan/ROW would not be approved. Cattle grazing in the area would not decrease and the forage would not change to post-mining vegetation species, as no additional surface disturbance would take place.

3.12 Socioeconomics

3.12.1 Affected Environment

The Proposed Action area is located in Big Horn County, Wyoming. The closest community is the town of Lovell, WY, located several miles west of the proposed A-6 Plan area. In July 2009, Lovell's population was 2,325 people, and the estimated median annual income was about $42,000. (Source: http://www.city-data.com/city/Lovell-Wyoming.html). Data from the State of Wyoming Economic Analysis Division (WEAD) indicate that Mining* accounted for 16% of the jobs, and 15% of the personal income in Big Horn County. This statistic indicates that employment in the mining sector is higher-paying than the county average.

In 2009, mining employment provided an average wage per job of $34,290.00 (WEAD, 2011). The recession affecting the U.S. economy in 2009 severely reduced the mining workforce, as can be seen in these numbers, though mining activity has begun to increase since the beginning of 2010. In 2009, approximately 589 people were employed directly by the mining industry in the county according to the Wyoming Economic Analysis Division and their website at http://eadiv.state.wy.us. BPM has approximately 80 employees working at the Lovell mine and mill (*Source: BPM personnel, personal communication March 20, 2012*) and employs 70-80 contractors to mine and haul the clay, including GK Construction of Cowley, WY, and MK Weedin Construction of Lewiston, MT. Various consultants and service companies are also used in permitting, reclamation, etc. These contractors also provide heavy equipment and labor to strip and salvage soil and overburden, expose, mine and haul the clay, and conduct reclamation and seeding.

Other land uses in the A-6 Plan/ROW area include occasional recreational purposes, such as hunting and off-highway vehicles, as well as for other values such as wildlife viewing. The Bighorn Basin has an active tourism industry from people visiting Yellowstone National Park and the Bighorn Canyon Recreation Area, among other attractions. The scenery along the way to these areas adds to the enjoyment of both visitors and local residents. Livestock grazing has been, and continues to be, a major resource-use activity on BLM-administered public lands in the Cody Field Office and around the proposed mining areas analyzed in this EA. Grazing has occurred in the proposed mining area for over 100 years.

***Mining:** *The Mining sector comprises establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. The term mining is used in the broad sense to include quarrying, well operations, beneficiating (e.g. crushing, screening, washing, and flotation), and other preparation customarily performed at the mine site, or as a part of mining activity. The sector distinguishes two basic activities: mine operation and mining support activities. Operation includes establishments operating mines, quarries, or oil and gas wells on their own account or for others on a contract or fee basis. Support activities include establishments that perform exploration and/or other mining services on a contract or fee basis.*

3.12.2 Environmental Consequences of the Proposed Action Alternative I

Under the Proposed Action, the proposed A-6 Plan/ROW would be approved as described in this document, and additional bentonite mining would be able to proceed for the next 23 years in the area. Approval of the A-6 Plan would provide increased employment stability to BPM employees and contractors, depending on levels of mining and types of clay needed in any given year, but the impact would be positive relative to the local and regional economy.

There would be some trade-off in the form of a reduction in AUMs available for livestock grazing where mining took place, until reclamation is successful, thus livestock owners would be affected by approval of the Proposed Action, which would also temporarily affect some recreational activities in the area such as hunting. The proposed disturbance would not be visible from any paved roads relative to viewshed impacts. New disturbance from A-6 mining would disturb native wildlife habitat, which would affect hunting and wildlife watching opportunities until the reclaimed land is restored to suitable wildlife habitat again post-mine.

3.12.3 Environmental Consequences of the No Action Alternative II

There would be a direct affect to BPM and its employees if the No Action alternative was selected and the A-6 Plan/ROW not approved, as BPM would not have access to the additional bentonite resources from the area, and employment numbers would be directly affected to some extent. Some workers could lose their jobs at some level. The supply of bentonite to the mill would be significantly reduced, which could affect bentonite prices at some level. No impact to livestock grazing or recreational activities would occur as a result of choosing this alternative.

3.13 Residual Impacts

3.13.1 Alternative I: Proposed Action

The following are potential residual impacts that could occur as a result of the Proposed Action (approval of the A-6 Plan/ROW):

1) Though recontouring and reseeding of the mined land would follow mining, the landscape would not look exactly as it did prior to mining. Topography would vary somewhat, reclaimed road beds may be present, drainages would be altered, and vegetation types would be modified.

2) Reseeding would be required as part of the Proposed Action, but seeded species may not all reestablish. Residual effects on vegetation would occur until native species reestablish. Soil characteristics would also residually change. The mined area could take decades after reclamation efforts to achieve vegetative production and species diversity comparable to pre-mine conditions. It may take longer than 10 years to get bond release based on current methods, and pre-mine vegetative diversity and productivity may not be achievable as long as 30 to 50 years or more after initial disturbance. Also, the disturbed area could be affected by various weed

species – some of which cannot be eradicated from an area once they establish and could be present in the reseeded areas for many years, i.e., cheatgrass. Changes in vegetation would also affect surface water, soil stability and health, wildlife habitat quality and livestock grazing.

3) The Proposed Action would involve the removal and then replacement of topsoil on the mined areas. This handling of topsoil would cause residual effects, as the biota within the soil and the soil's structure and chemistry would be modified during the process. Also, some of the soil would be lost to erosion during the proposed mining process. It would take decades before the soils would function as they did before the area was mined and support self-sustaining vegetation. Changes in topsoil function and quality would have a residual effect on vegetation, surface water and related resources, wildlife habitat and grazing.

4) The Proposed Action could cause residual effects to wildlife populations, including those of local migratory birds and BLM Sensitive Species. If seeded species do not reestablish, wildlife may not be able to use the area as they did prior to mining. Habitat fragmentation is most likely the largest potential residual effect, and could continue to occur throughout the general area.

5) The Proposed Action may have residual effects on the amount of permitted livestock grazing if vegetation does not reestablish after reclamation. Invasive weed species could also overtake and displace desirable forage species. If this happens, the number of AUMs in the allotments included in the proposed mining would likely be reduced for years until desirable vegetation reestablishes. This situation could also result in a failure of range land health standards #1, 3, and 4 (listed below from the following website:

http://www.blm.gov/wy/st/en/programs/grazing/standards_and_guidelines/standards.html).

Standard #1: Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff. This Means That: The hydrologic cycle will be supported by providing for water capture, storage, and sustained release. Adequate energy flow and nutrient cycling through the system will be achieved as optimal plant growth occurs. Plant communities are highly varied within Wyoming. Indicators May Include But Are Not Limited To:

- Water infiltration rates
- Soil compaction
- Erosion (rills, gullies, pedestals, capping)
- Soil micro-organisms
- Vegetative cover (gully bottoms and slopes)
- Bare ground and litter

Standard #3: Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance. This Means That:
In order to maintain desirable conditions and/or recover from disturbance within acceptable timeframes, plant communities must have the components present to support the nutrient cycle and adequate energy flow. Plants depend on nutrients in the soil and energy derived from sunlight. Nutrients stored in the soil are used over and over by plants, animals, and microorganisms. The amount of nutrients available and the speed with which they cycle among plants, animals, and the soil are fundamental components of rangeland health. The amount, timing, and distribution of energy captured through photosynthesis are fundamental to the function of rangeland ecosystems. Indicators May Include But Are Not Limited To:

- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bare ground and litter
- Erosion (rills, gullies, pedestals, capping)
- Water infiltration rates

Standard #4: Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened, endangered, species of special concern, or sensitive species will be maintained or enhanced. This Means That: The management of Wyoming rangelands will achieve or maintain adequate habitat conditions that support diverse plant and animal species. These may include listed threatened or endangered species (U.S. Fish and Wildlife-designated), species of special concern (BLM-designated), and other sensitive species (State of Wyoming- designated). The intent of this standard is to allow the listed species to recover and be delisted. Indicators May Include But Are Not Limited To:

- Noxious weeds
- Species diversity
- Age class distribution
- All indicators associated with the upland and riparian standards
- Population trends
- Habitat fragmentation

6) The Proposed Action would not result in any unavoidable residual impacts to cultural resources, unless such resources were located during mining or road construction and *not* reported to the BLM authorized officer. The Cultural Resource Stipulations provided would mitigate this residual impact. Improvement of haul roads could facilitate access to and within the project area, thereby increasing the potential for additional unauthorized surface collection and looting.

7) Removal of the bentonite resource under the Proposed Action would constitute an unavoidable long term, post-mining, irreversible and irretrievable (residual) impact on the locateable bentonite resource, but the economic gains would offset this potential impact.

3.13.2 Alternative II: No Action

There would be no residual impacts under the No Action Alternative, as the proposed mining and road disturbance would not be approved; because no additional surface disturbance would take place.

3.14 Cumulative Impacts Analysis

This Environmental Assessment has attempted to combine the results of internal scoping, describing the Affected Environment, determining the Environmental Consequences, BPM-proposed and BLM-required Stipulations, Mitigation and Monitoring Measures, as well as a Cumulative Effects Analysis (CEA), as per CEQ guidelines. The geographic area analyzed for this CEA includes a relatively large area that spans approximately 3 miles radially in each direction around the A-6 Plan area (see Maps 3, 4, and 5 below).

Cumulative impacts are discussed in the final Cody Resource Management Plan (RMP), Environmental Impact Statement (EIS), and Record of Decision (ROD), (all 1990). Typical activities are described in that document and are incorporated by reference into this environmental analysis. Cumulative impacts are those that would result from the incremental impacts of the Proposed Action or Alternative I, 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 (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. These reasonably foreseeable future actions refer to future action projections, or estimates, of what is likely to take place when a given Proposed Action is implemented. They are not part of the Proposed Action, but are projections being made so that future impacts, cumulative and otherwise, can be estimated as required by NEPA.

Using the CEQ (1997) report as a guide, several principles of CEA are applicable to this analysis and Proposed Action. In particular, item #6 states "*Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects. Repeated actions may cause effects to build up through simple addition (more and more of the same type of effect), and the same or different actions may produce effects that interact to produce cumulative effects greater than the sum of the effects*".

CEQ (1997) lists 8 examples of cumulative effects:

(1) Time crowding effects	(Frequent and repetitive effects on an environmental system);
(2) Time lags	(Delayed effects);
(3) Space crowding effects	(High spatial density of effects on an environmental system);
(4) Cross-boundary effects	(Effects occur away from the source);
(5) Fragmentation	(Change in a landscape pattern);
(6) Compounding effects	(Effects arising from multiple sources or pathways);
(7) Indirect effects	(Secondary effects); and
(8) Triggers and thresholds	(Fundamental chances in system behavior or structure).

It also lists 4 types of cumulative effects:

(1) **Type 1 Single Action-Additive**: Repeated "additive" effects from a single proposed Project;
(2) **Type 2 Single Action-Interactive**: Stressors from a single source that interact with receiving biota to have an interactive (non-linear) effect;
(3) **Type 3 Multiple Actions-Additive**: Effects arising from multiple sources (projects, point sources or general effects associated with development) that affect environmental resources additively;
(4) **Type 4 Multiple Actions-Interactive**: Effects arising from multiple sources that affect environmental resources in an interactive (i.e., countervailing or synergistic) fashion.

Cumulative effects from the Proposed Action are herein classified as Type 1 effects (single-action additive) as well as Type 3 effects (multiple actions-additive) as per CEQ (1997). This type of effect is the result of repeated "additive" effects from a single proposed project(s).

PAST, PRESENT, REASONABLY FORESEEABLE FUTURE ACTIONS, AND INCREMENTAL EFFECTS

Past, present and reasonably foreseeable future actions in the general Cumulative Effects Analysis Area, are bentonite mining, livestock grazing and oil and gas drilling. Therefore, these three major activities are discussed below as the primary land uses under analysis. The area also sustains recreational activities such as hunting, off-highway vehicle use, and other activities, but these land uses are not considered among the primary surface-disturbing land uses, and therefore, are not discussed below.

The general analysis area selected for the Cumulative Effects Analysis ("CEA area") includes an area of approximately 9 miles in diameter, 63.6 square miles, or 40,704 acres being ~3 miles out radially from the center of the A-6 area (Maps 3, 4, and 5). This approach of generally delineating a CEA area has been accepted by the BLM field office management for the past 4 years as part of BLM's cumulative effects analyses. CEA area delineation may in the future, be conducted on more of a watershed-approach, or on analysis based on sage grouse habitat areas, however, at this time, the approach described above is being used and accepted.

Past Actions

BENTONITE MINING: Since the 1960's, there have been several companies mining bentonite in the Cody Field Office, and within the A-6 Plan/ROW and CEA area, including BPM, M-I Swaco, American Colloid Company (ACC) and Wyo-Ben, Inc.. Approximately 21,000 acres have been directly affected by bentonite mining in the Cody Field Office since it began in the 1960s. Approximately 13,020 acres (62%) of the 21,000 acres have been reclaimed and reseeded, leaving the balance (7,980 acres or 38%), as either active mining areas, areas that have been mined but pending reclamation, or as areas proposed for new mining. About 16% of all areas that have been disturbed by bentonite mining have been released from bond in the field office. Reclamation success has not kept pace with mining disturbance. Within the A-6 Plan/ROW and CEA area, approximately 320 acres of the total 40,704 acres (0.8%) have been previously disturbed by bentonite mining, including road construction.

As of 2010, BPM has disturbed a total of 2,439.0 bonded acres in the Bighorn Basin since about 1974, according to their 2010/2011 Annual Report. Of that total, 1724.3 acres (71%) have been seeded/reclaimed. Also, of that total, 321.0 acres (13.2%) have been released from bond by the State, indicating vegetation has been satisfactorily reestablished on those acres.

LIVESTOCK GRAZING: Livestock grazing has been, and continues to be, a major resource-use activity on BLM-administered public lands in the Cody Field Office. Grazing has occurred for over 100 years by cattle and sheep. It is difficult to quantify the actual direct and indirect impact that livestock grazing has had on the landscape, because grazing occurred prior to BLM quantifying pre-grazing conditions. Improper grazing practices in general can have long-term effects on vegetation, including reduced species diversity, altered species composition, altered vegetative structure, altered abiotic processes (e.g., mean fire return interval), loss of topsoil, and increased invasibility of sagebrush communities.

In the 1980's and 1990's, management of livestock grazing was changed in many allotments including use of rotational grazing strategies, reductions in authorized use, and utilization limits for key plant species were implemented. These management changes have provided for adequate plant recovery time and leave ample residual vegetation following livestock grazing for watershed protection and wildlife habitat needs. Reclaimed areas can be impacted by livestock grazing if livestock are not fenced out of such areas. The effects of grazing can change from year to year depending upon how heavily the vegetation is grazed in relation to that year's vegetative forage produced. Annual forage produced varies depending on precipitation, and effects from previous years of grazing.

OIL AND GAS WELLS: Approximately thirteen (13) oil and gas wells have been drilled within the larger A-6 CEA area; according to the Wyoming Oil and Gas Conservation Commission, all of these have since been plugged and abandoned as non-producing wells.

Present Actions

BENTONITE MINING: As of 2010-2011, BPM has disturbed a total of 2,439 bonded acres in the Bighorn Basin since about 1974, of which 1,724 acres have been reclaimed/reseeded (71%). Also, of that total, 321.0 acres (13.2%) have since been released from bond. Approximately 625.0 acres +/- (25.6%) are currently considered in "active mining or reclamation" status.

In the larger A-6 CEA area, BPM and other companies have disturbed approximately 800 acres of land or 2% of the land within the CEA area. BPM has reclaimed approximately one third of this land or 0.7% of the land within the CEA area, and only a very small portion of that has been released from bond.

The proposed A-6 Plan/ROW would, over 23 years, add up to another 1,107.0 acres of new mining-related disturbance (of which ~873 acres are situated on public land), to the total area disturbed by BPM, (a total of 3546 acres; adding 31% of the additional total disturbed area). BPM's total disturbance since 1974 of 2439 acres comprises roughly 12-14% of all bentonite-related disturbance in the Bighorn Basin. The A-6 plan proposing an additional 873 acres of disturbance over 23 years, would increase that percentage to approximately 16-18% of the total bentonite-related disturbance in the basin, should it be approved.

LIVESTOCK GRAZING: Within the larger A-6 CEA area analyzed in this EA (Maps 3, 4, and 5), are several active grazing allotments. The A-6 Plan area is located within the West Pasture of the Bear Creek Allotment #01013. Since reclamation of the mine areas occurs concurrently with mining, some AUMs are restored for grazing use, however as new land is disturbed, those AUMs are temporarily lost. The present kind and number of livestock and the number of days/seasons they graze are expected to continue. The effects of grazing can change from year to year depending upon how heavily the vegetation is grazed in relation to that year's vegetative forage produced. Annual forage produced varies depending on precipitation, and effects from previous years of grazing.

OIL AND GAS WELLS: No new well applications are pending or known as of the date of this EA.

Reasonably Foreseeable Future Actions

BENTONITE MINING: Sodium-bentonite deposits in Wyoming make up about 70% of the world's known supply, suggesting that bentonite mining will continue well into the future in Wyoming and the Bighorn Basin. It is currently economical to remove up to 50 to 80 feet of overburden to extract the bentonite. The BLM estimates another 9,000 to 10,000 acres of bentonite mining related disturbances will be proposed by bentonite mining companies in the Cody Field Office area in the reasonably foreseeable future.

A total of approximately 21,000 acres (approximate) have been disturbed by bentonite mining in the Bighorn Basin over time. About 10-20% of this total, (2,100-4,200 acres), are projected for additional disturbance in the foreseeable future. This projection results in a total of up to 25,200 acres of land disturbed over time by bentonite mining.

In addition to the A-6 Plan/ROW area, BPM plans to submit applications to allow mining of approximately 150 additional acres, in an "Amendment-7" area, partially located south of the A-6 Plan/ROW area. Two different bentonite companies, Wyo-Ben, Inc., and M-I Swaco, mine or have proposed to mine, large areas (>500 acres) to the south of the proposed A-6 amendment. The exact areas or acreage totals proposed to be mined under A-6 and A-7 are not yet known.

Reasonably foreseeable future actions in this area, in addition to the Proposed Action analyzed under this EA, include potential additional vegetative disturbances, including bentonite, and livestock grazing. The amount of acres that could be additionally disturbed in the future varies depending on changing market needs and prices for bentonite clay, and/or aggregate. An estimate of an additional 2,000-3,000 acres of bentonite mining disturbance in the general analysis area, above the 677 additional acres proposed for mining under this EA, over the next 10-20 years is reasonable.

LIVESTOCK GRAZING: The type and number of livestock and the number of days/seasons they graze is expected to continue in the future.

OIL AND GAS WELLS: No new well applications are anticipated in the general A-6 areas as of the date of this Environmental Assessment.

Incremental Effect of each Alternative

Alternative I – Proposed Action (with required Stipulations, Mitigation and Monitoring Measures)

A-6 Plan of Operations CEA Area - Incremental Impact of the Proposed Action

The BLM Cody Field Office staff conducted a general cumulative effects analysis (CEA) for the Proposed Action under this EA, using GIS overlays and field inspections. The general analysis area selected for the CEA includes an area roughly 40,704 acres, or 3 miles radially out from the central area of the Proposed Action (Maps 3, 4, and 5). Within this CEA area, approximately 400 acres have already been disturbed by bentonite mining (~1% of the total CEA area); and approximately another ~1500 acres are planned for new mining (another 3.7% of the total area) over the next 15-23 years.

The Proposed Action incrementally adds 1,107 acres of new mining disturbance within the analysis area, or 2.7% of the total CEA area. Several maps were generated using ArcMap9 GIS software, to overlay existing and known projected land uses, known wildlife/T&E/BLM Sensitive species habitats and nesting sites, and general vegetation communities, along with past, current and proposed bentonite mining and other land uses. These maps are provided below as CEA Maps 3, 4 and 5.

Generally about 16% of the amount of land mined for bentonite in the entire field office has been released from bond since bentonite mining began in the 1960's. Approximately 84% of the land disturbed by bentonite mining is either (1) "reclaimed" but not released from bond because it doesn't yet meet reclamation bond release

standards; (2) in active mining status, or (3) in proposed mining status. The bentonite companies continue to post larger reclamation bonds each year in order to continue to mine, which is all that is required by the regulations. The BLM and the WDEQ will not release bonds until land reclamation meets, pre-mine or better conditions (~90% of original perennial cover is sometimes used as a reclamation standard for lands disturbed under the 3809 regulations).

Effects of Mining on Livestock Grazing/Range Management

Until the land is reclaimed, bentonite mining incrementally reduces the amount of vegetation, wildlife habitat, and livestock forage. This can incrementally affect ranching families economically. In the area of the Proposed Action, bentonite mining has encroached on some ranch operations, in some cases increasing problems with use of existing range improvements, costing extra time and money to maintain range improvements, reducing the number of livestock that the land can support, and gathering up livestock for various reasons that are associated with mining activities (i.e., gates left open, fences down, cattle guards filled with dirt from haul trucks, cattle traveling long distances on haul roads and into unauthorized areas, etc.).

Presently in this CEA there are approximately ~400 acres disturbed by mining, equating to some financial and operational losses to the permittees that graze livestock within the CEA area. With the addition of ~1,500 more acres of planned bentonite mining (1,107 acres from the proposed A-6 mining), approximately 4.7% of the CEA area would be disturbed by bentonite mining within the next 23 years. Past, present, and future actions may cause more allotments to fail Rangeland Standard #4, and others.

Effects of Mining on Wildlife

Native wildlife habitat is either lost directly, or diminished in quality through fragmentation as a result of mining, until post-mine reclamation is successful. Species such as sage grouse and mountain plover are most affected by these incremental mining actions, and have been listed as BLM Sensitive species which now require conservation actions to stop further decline or possible placement on the Threatened and Endangered species list, especially in the case of sage grouse. The incremental effect of the Proposed Action, in addition to past and present disturbances, may further fragment and reduce population size and connectivity.

Effects of Mining on Soil, Water, Riparian-Wetland Areas, and Aquatic Habitats

Surface disturbance due to mining and access/haul roads can affect local hydrology, sediment regimes, and water chemistry, which can in turn cause impacts to water, riparian-wetland areas, aquatic habitats and the species that use them. Disturbance of the soil profile would to some extent affect biological and physical viability. If not successfully reclaimed in a reasonable time frame, soil and water-related impacts can incrementally accrue within and downstream/upstream of the CEA boundary.

Cumulative Effects Analysis Summary

Under the Proposed Action, the incremental amount of new disturbance per year by BPM would be about 48.1 acres, anticipated over the 23-year life of the mine. The Proposed Action(s) would add a total of 1,107 acres of new mining disturbance within the CEA area over 23 years, representing about 2.7% of the total CEA area. This type of mining typically takes place concurrently with reclamation, during use of the castback method of material handling.

Based on the affected environment, and on known environmental consequences of the Proposed Action; the CEA indicates that the incremental effects of the Proposed Action, coupled with other existing and planned land uses on wildlife habitats/species, vegetation, and soils, can be mitigated or reduced over time, by implementing the Stipulations, Mitigation and Monitoring measures that would be required by BPM, BLM and WDEQ as outlined in the Mine and Reclamation Plans, should these be approved by the regulatory agencies.

NOTE: This statement assumes reasonable and proper on-the-ground implementation of sound mining and reclamation practices by Bentonite Performance Minerals. Biannual compliance inspections conducted jointly with BPM, WDEQ-LQD and BLM would help to ensure compliance with these measures, as well as provide corrective actions should they ever be necessary in order to prevent problems, or unnecessary or undue degradation taking place on the public lands.

This statement and summary is applicable to those lands regulated under the Surface Management regulations (43 CFR 3809) and the Regulations under 43 CFR 2800 that govern rights-of-way under the Federal Land Management Policy Act (FLPMA).

Alternative II – No Action Alternative

Alternative II would not add to the incremental effects that already exist in the area because the proposed bentonite mining would not take place, and thus, no additional surface disturbance would take place.

4.0 List of Preparers:

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Jack Mononi	Rangeland Management and Vegetation
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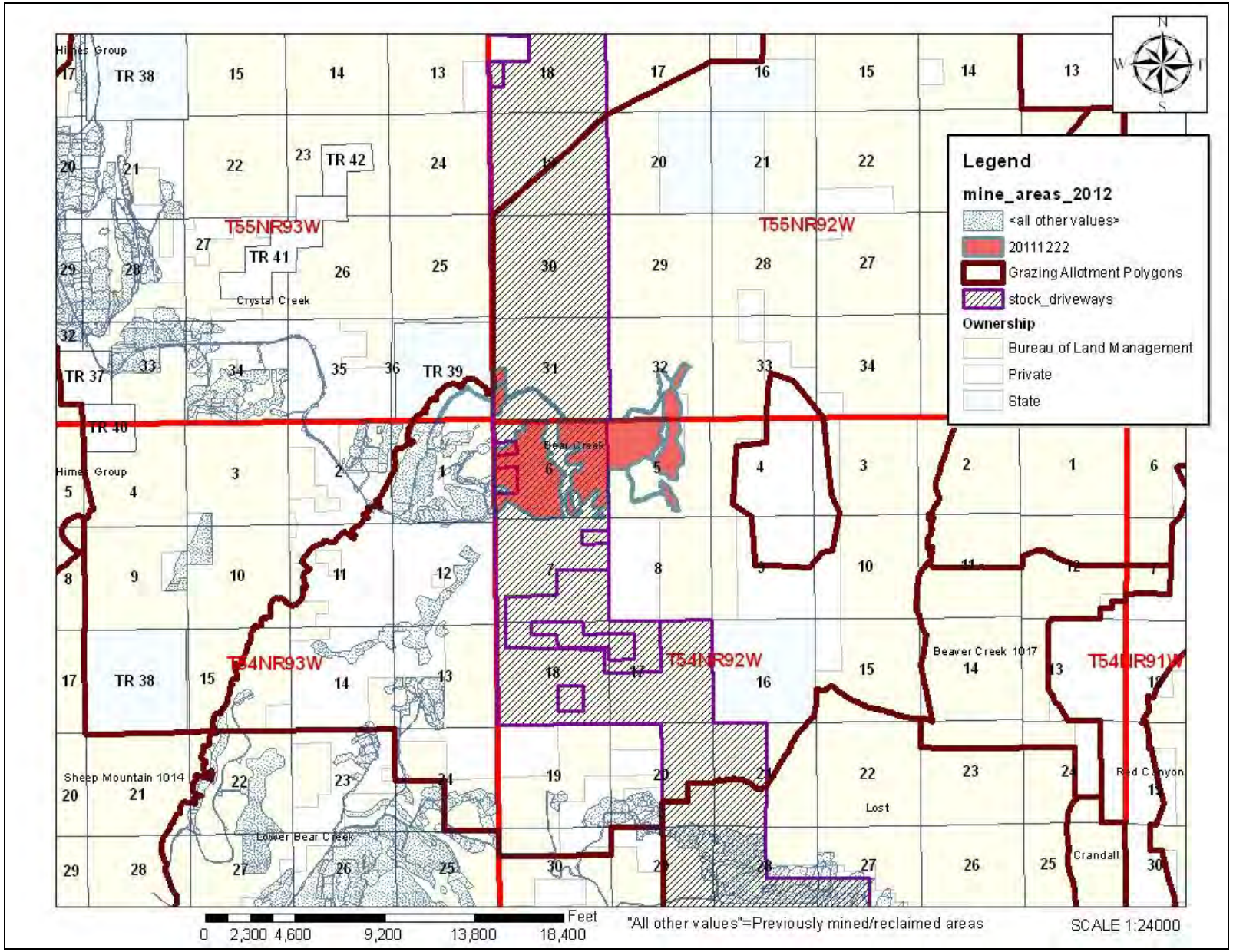
Ann Perkins	NEPA Coordination/Editing

Consultation (Agencies)

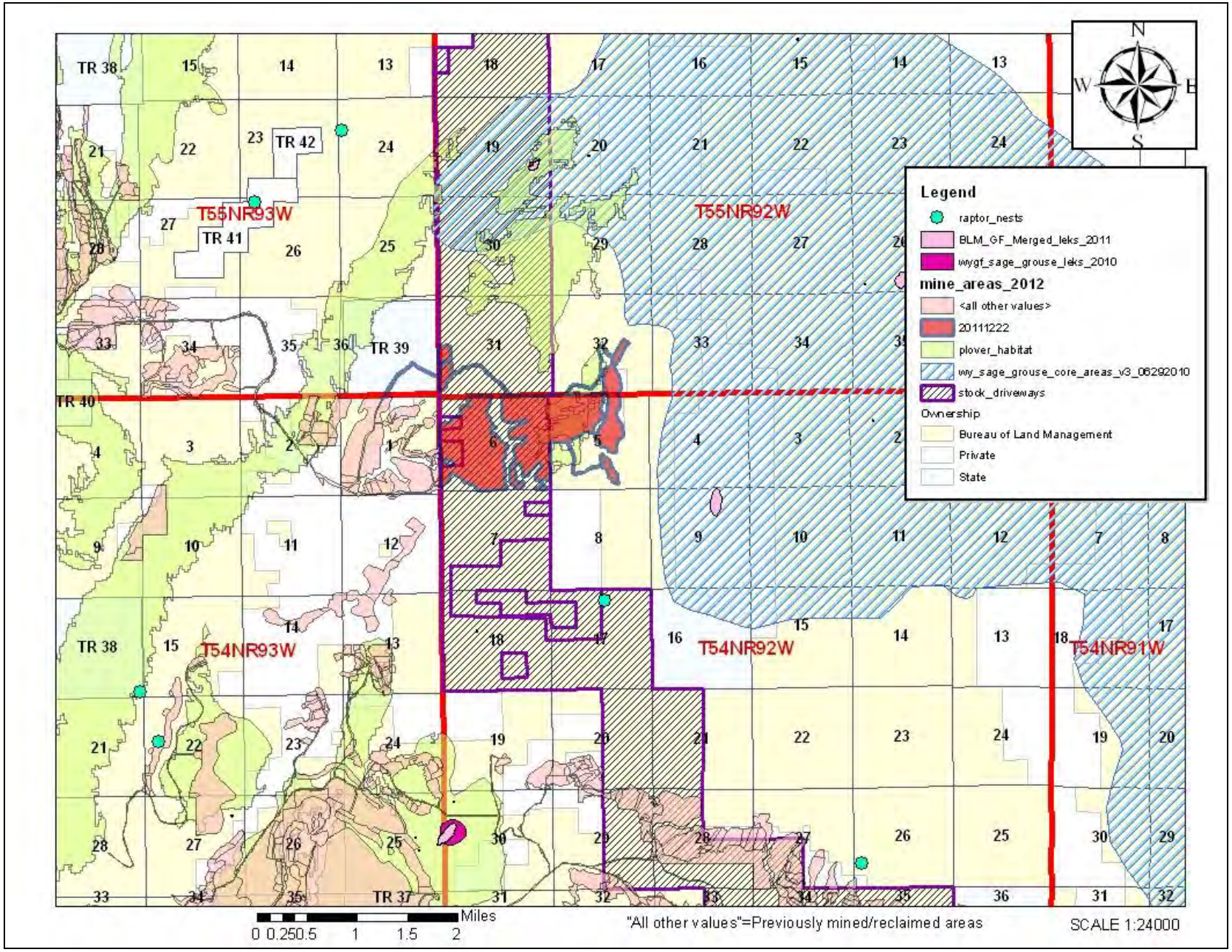
Wyoming Department of Environmental Quality – Land Quality Division
Wyoming State Historic Preservation Office (SHPO)
U.S. Fish and Wildlife Service
Wyoming Game and Fish Department
United States Army Corp of Engineers



Map 3. Land uses (existing and proposed) within and around the A-6 Plan cumulative effects analysis area

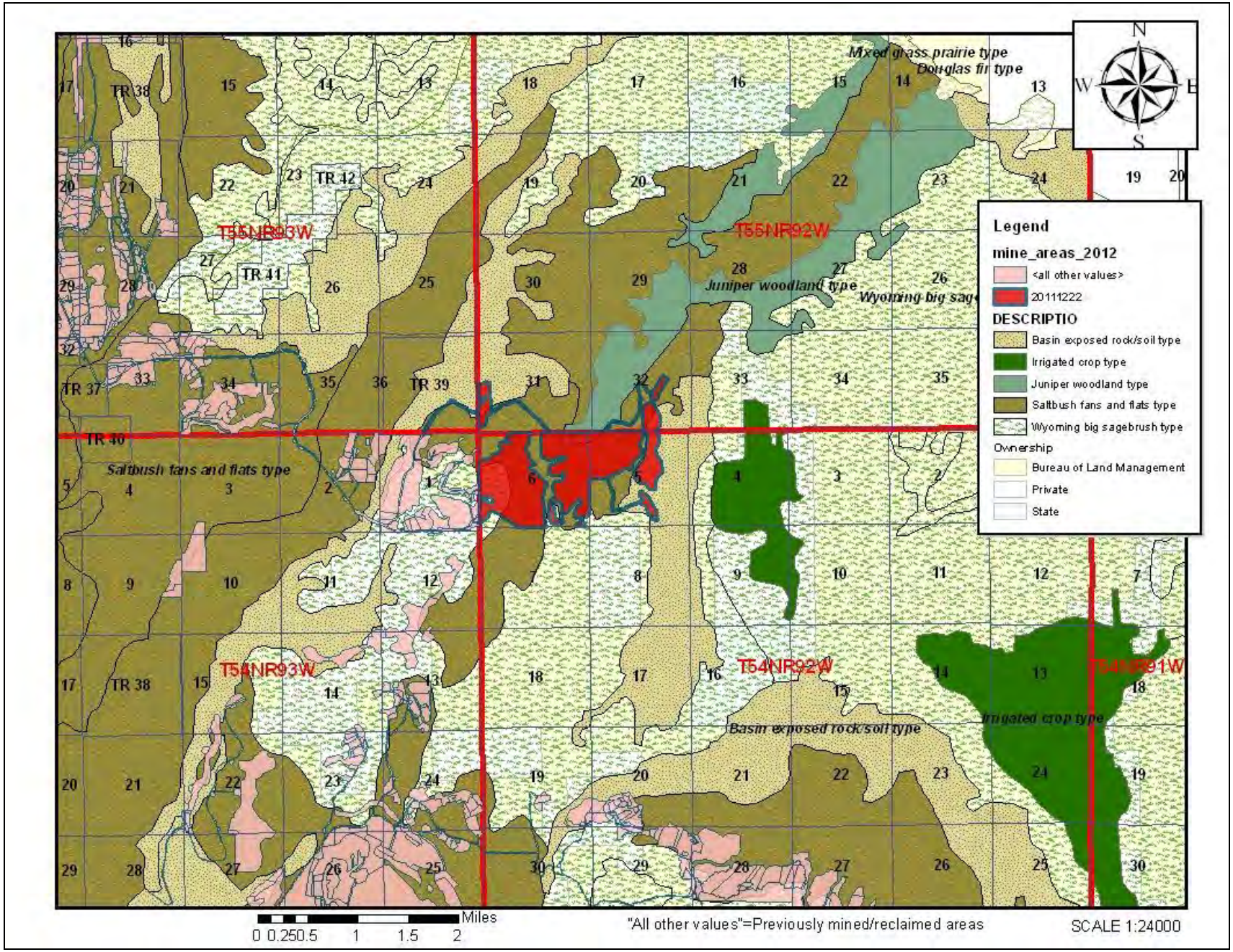
Livestock grazing and bentonite mining (past, present and reasonably foreseeable future) were analyzed; lands shaded in red represent the A-6 Plan/ROW area.

No warranty is made by the BLM for use of this data for purposes not intended by the BLM



Map 4. General nest sites, Mountain plover Habitat, and sage-grouse Core Areas (v.3) - A-6 Plan cumulative effects analysis area

No warranty is made by the BLM for use of this data for purposes not intended by the BLM



Map 5. Vegetation Types within the A-6 Plan/ROW cumulative effects analysis area

No warranty is made by the BLM for use of this data for purposes not intended by the BLM

5.0 References

BLM, 2012. Instruction Memorandum No. WYW-2012-019, Expires 9/30/2013, "Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate"

NOAA National Climatic Data Center (NCDC), State of the Climate: Drought for June 2005, published online July 2005, retrieved on February 2, 2011 from http://www.ncdc.noaa.gov/sotc/drought/2005/6.

Wyoming Department of Environmental Quality – Air Quality Division. Wyoming's Long Term Strategy for Visibility Protection 2003 Review Report. May 29, 2003: Appendix G.

Wyoming Economic Analysis Division (WEAD), 2012, Economic data and information at http://eadiv.state.wy.us.

Wyoming Weed and Pest Council (WWPC). Wyoming Weed and Pest Control Act Designated List, retrieved online on February 2, 2011 from *http://www.wyoweed.org/statelist.html*.

Wyoming Department of Administration and Information Economic Analysis Division, 2009, A Socioeconomic Profile: Big Horn County, Wyoming; Headwaters Economics, Economic Profile System February 13, 2009. at http://eadiv.state.wy.us/wef/eps.html.

BLM GIS and other data sources, 2007-2012 including the latest Sage Grouse core area boundary delineation (version 3 – Wyoming Game and Fish Department, 2012)

6.0 APPENDICES

Appendix A. RMP Maintenance Action regarding Mountain Plover IM-2007-018

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

TAKE PRIDE IN AMERICA

In Reply Refer To:
6840 (930) P

April 17, 2007

Instruction Memorandum No. WY-2007-018
Expires: 9/30/08

To: Field Managers

From: Associate State Director

Subject: *Resource Management Plan (RMP) Maintenance Action:* Incorporation of the Bureau of Land Management's (BLM) Programmatic Biological Evaluation (BE) for the Mountain Plover (*Charadrius montanus*) and the United States Fish and Wildlife Service (FWS) Inter-agency Coordination Memorandum into Field Office (FO) Resource Management Plans (RMPs) by Maintenance Action

The attached document transmits the FWS inter-agency coordination memorandum based on a review of potential activities and conservation measures described under all current Wyoming BLM RMPs (except the Snake River RMP) and the Wyoming statewide Programmatic mountain plover BE, and the potential effects of these activities on the mountain plover in accordance with BLM's 6840 manual. The FWS reviewed all of BLM's activity specific determinations and was in agreement with our proactive analysis and proactive conservation measures, which should serve to better protect this species from further decline.

The Wyoming BLM Statewide Programmatic BE for the mountain plover and the inter-agency coordination memorandum covering the FWS review can be found on the on the internet at www.blm.gov/wy/st/en/programs/Wildlife/mtn-plover.html.

The preliminary determination is that this action is an RMP *Maintenance Action* as defined in 43 CFR 1610.5-4. All Wyoming BLM FOs should review their existing RMPs, the programmatic BE, and the FWS inter-agency coordination memorandum. If you agree with this determination, please maintain the official hard copy of your RMP within 30 days of the date of this Instruction Memorandum (IM). Please also maintain the web-based copy of your RMP during the same timeframe. If you believe this action may require an RMP amendment, please contact Ken Peacock, Wyoming State Office, at (307) 775-6329.

If you have further questions regarding this IM, please contact Jeff Carroll at (307) 775-6090.

/s/Donald A. Simpson

2 Attachments:
1. Fish and Wildlife Service Memorandum (ES-61411/W.02/WY07FA0290) (24 pp.)
2. BLM Wyoming Programmatic Biological Evaluation of the Mountain Plover (9 March 2007) (110 pp.)

Appendix B. Specific Mine and Reclamation Plan Information for the A-6 Plan of Operations

MINE PLAN A-6 BIG BLOCK AREA

Material Management - Mining/Backfilling/Recontouring:

Initial Stripping/Salvage/Spoil Pile Handling:
Disturbance areas are surveyed in prior to any disturbance. Economical mining depths are determined by stripping ratios and equipment cost. BPM then mines the bentonite using progressively cast-back multiple pit series, frequently involving blasting. First, topsoil and subsoil from pit and stockpile areas is scraped and salvaged, generally using scrapers, then stockpiled adjacent to the pit series. Next, dozers are used to rip the overburden (and interburden between clay layers) in lifts, and rubber-tired scrapers or other equipment move it away from the clay bed, to the designated stockpile area. The overburden stockpile on adjacent land is referred to as an "out of pit spoil pile" or OOPS. Spoil/overburden from the initial pit is placed onto the area where the topsoil and subsoil have been removed.

BPM (and its contractors GK Construction of Cowley, Wyoming) generally use rubber-tired scrapers to salvage topsoil and subsoil. Topsoil and subsoil will be separately and selectively salvaged. If backfilled and re-graded lands are available, BPM will seek to direct haul and redistribute the salvaged topsoil and subsoil in their pre-mining vertical arrangement. If re-graded lands are not available the material will be stockpiled separately adjacent to the area where the topsoil or subsoil will be used during reclamation. The final pit in a pit series will have subsoil and topsoil material from the initial pit and subsequent pits placed on top of regraded spoil. This material will be blended into the surrounding native lands with the intent of disturbing as little of the unmined land as possible.

The predominant spoil being stripped in the A-6 area is mudstone/shale. The use of scrapers and utilization of an out of pit spoil pile for initial pits (as described above) is necessary to alleviate any stability problems given the generally high overburden swell and limited thickness of the seam(s) being mined. In some pits where the lower spoil is too hard for dozers to rip, BPM uses blasting to loosen the rock. A truck-shovel operation or dozers are then used to remove blasted material out of the pit. Scraper material is always placed on top of dozer or truck spoil. If the spoil is not directly backfilled (such as in the initial pit sequence), it is stockpiled on lands stripped of subsoil and topsoil. A containment berm would prevent runoff from stockpiles contaminating native soils and minimize material loss. Temporary overburden stockpiles would not be allowed to block intermittent or perennial stream channels.

Next, the bentonite bed is then cleaned, ripped and mined using various equipment including dozers, front end loaders, scrapers and haul trucks. Sometimes the bentonite is stockpiled near the pit series for field drying, other times it is hauled directly to the mill for processing. Once the bentonite is removed from the first pit, overburden from the next open pit of the sequence is "cast back" into the first pit. Thus, reclamation begins to take place concurrently with mining, resulting in smaller amounts of open un-reclaimed disturbance overall. After backfilling the pit, it is recontoured, covered with subsoil, then topsoil, and then finally, seeded by the BPM. This process repeats itself until the end of the pit sequence is reached.

Sufficient volumes of topsoil and suitable cover material must be preserved to cover the final sequence recontouring of a mine series. BPM would salvage and stockpile these all suitable reclamation materials from the first cuts of a mine series, to be used as cover for the final cuts. All topsoil and subsoil would be salvaged and stored using Best Management Practices (BMPs) to preserve biological integrity. In all cases, permanent out-of-pit spoil piles and mine backfill slopes would be contoured to slopes not exceeding 4(h):1(v), and that conform to surrounding topography.

It is anticipated that mining of all pits and reclamation of associated disturbances would be completed through seeding within **23 years** of commencement. Reclamation success ultimately leading to bond release by WDEQ, along with BLM

consensus, could possibly take up to fifteen years or longer, depending on many factors. Companies are eligible for bond release five years after reclamation is complete.

More information on proposed Out-of-Pit-Spoil Piles (OOPS piles)

Four OOPS piles are planned for the A-6 Plan. Three are located in the "Big Block Area" in Section 6, T. 54 N., R. 92 W., and the fourth one is proposed in Section 5. Below is a list of the out-of-pit spoil pile volumes proposed:

- Out-of-Pit Spoil Pile 1 – 1,000,000 cyds
- Out-of-Pit Spoil Pile 2 – 260,000 cyds
- Out-of-Pit Spoil Pile 3 – 250,000 cyds
- Out-of-Pit Spoil Pile 4 – 1,000,000 cyds

WDEQ/LQD NonCoal Rules and Regulations (R&R), Chapter 3, Section 2 (c)(iv)(B)(II) requires that spoil not be deposited on slopes exceeding 20°. Based on analysis of pre-mine topography the steepest slopes appear to be located within the footprint of OOPS Pile #1 and #3 at approximately 18° or 3(h):1(v). OOPS piles would not be terraced, and will be built with 4(h):1(v) (25%) or shallower slopes. A maximum slope of 3(h):1(v) (33%) may be used for blending purposes. The stability analysis for the Elk Haul Road in the Amendment 5 Mine Plan demonstrates stability characteristics for similar slopes in the area with the worst case scenarios as the slopes were greater than 20%. This analysis should adequately demonstrate stability for the OOPS pile in A-6 as the geology and soils are similar and the slopes appear to be less than 20%.

Generally, spoil hauled to an OOPS pile would be derived from the first few cuts within a pit series until sufficient space is available to proceed with traditional cast-back mining, and hauled to the individual piles using a combination of scrapers and haul trucks. Spoil placed by truck would be re-graded with rubber tired dozers. Compaction of fill material would be achieved through wheeled vehicular traffic. Each pile would be rough contoured using dozers, with final grading being done with a combination of graders and scrapers. Final reclamation of the piles would follow procedures outlined in section B of the Reclamation Plan provided with the application.

OOPS Pile 1 would be located in the NW¼ Section 6, T. 54 N., R. 92 W., (Claims A187, A188, A189, and A190), have a maximum height of 50 feet, an areal extent of 20.97 ac., and a total volume of 1,000,000 cubic yards. This pile would be located along a drainage divide, and surrounded by mining on three sides. The graded pile would be blended into surrounding reclamation. The eastern side of the pile would tie into the valley of a native drainage, where the maximum valley slope is approximately 3(h):1(v) (33%). Along this OOPS pile face, BPM would ensure the regraded slope gradient is equal to or less than the maximum valley slope.

OOPS Pile 2 would be located in the SW¼ Section 6, T. 54N., R. 92 W., (Claims A192, A193, and A194), have a maximum height of 25 feet, an areal extent of 11.08 ac., and a total volume of 260,000 cubic yards. This pile would be located along a ridge between two pit series, and is surrounded by mining on all but the southern edge. This pile would cap the existing ridge with a nominal amount of material and blend into the surrounding reclamation.

OOPS Pile 3 would be located in the NE¼ Section 6, T. 54 N., R. 92 W., (Claims E3, E13, and E14), have a maximum height of 40 feet, an areal extent of 6.91 ac., and a total volume of 250,000 cubic yards. This pile would be located along a drainage divide between two small un-delineated drainages and be surrounded by mining on two sides. The plan calls for raising the elevation of the divide, and blending the pile into reclamation on the south and east. On the north, the pile would tie into the valley of a native drainage, where the maximum valley slope is approximately 4(h):1(v). Along this OOPS pile face, BPM would ensure the regrade slope gradient is equal to or less than the maximum valley slope.

OOPS Pile 4 would be located in the NW¼ Section 5, T. 54 N., R. 92 W., (Claims A214 and A215), have a maximum height of 50 feet, an areal extent of 15.82 ac., and a total volume of 1,000,000 cubic yards. This pile would be located on a flat area, with mining on the north and western sides of the pile. Reclamation here would ultimately match the height of the pile. The eastern slope would tail off toward a native drainage, with a generally gradual slope.

Recontouring: After backfilling, the area would be recontoured to match as much as possible, the original topographic contours. Recontoured overburden would then be prepared to receive the salvaged subsoil and topsoil. Once the sub and topsoils are spread and prepared, the disturbed area would be seeded as per the terms of the approved reclamation plan.

Haul Road Design Haul road side slopes within the A-6 area would generally be 3:1 or flatter, to facilitate revegetation. Any steeper side slopes would require prior WDEQ/LQD approval. (BLM approval would also be required prior, where applicable). BPM would build embankment slopes for culvert crossings at a 2:1 slope. BPM would construct ditches adjacent and parallel to the roadway shoulder. Ditches would collect runoff from the roadway, and from adjacent upstream areas, and direct it into surrounding drainages for downstream movement. Turnouts would be constructed where required based on sight distances as per BLM Manual 9113. BPM utilizes road base composed predominately of gravel to resist water erosion and reduce dust from passing vehicles; as well as ditch turnouts, wherever possible, which convey water off the road into adjacent drainages.

Hydrologic Diversions, Culverts, Turnouts, Impoundments: Culverts are designed to accommodate the BLM Manual 9113 for road design. Road crossings are designed to pass flow from a 10 year/24 hour storm without developing any static head. Culverts would be placed on the stream grade, and rock armoring would be placed around the culvert outlet and inlet to prevent excessive erosion. Embankment slopes from the roadway would be built at a 2:1 slope. Water backed up above each road crossing during larger events would not enter any mined area, topsoil stockpile area, or overburden placement area.

Ditch turnouts would be built often to promote adequate drainage. During monitoring, special attention would be paid to small drainages that cross any of the roadways. Indications of accelerated erosion or head-cutting would necessitate installation of rip rap to slow water flows and reduce the sediment loading downstream.

BPM would construct temporary water impoundments, as defined in LQD Noncoal Rules and Regulations Chapter 1, Section 2, for use as storm water collection and sedimentation control during mining operations. Temporary impoundments would include using pits for sedimentation control where necessary. Any small sumps needed would have a capacity of less than one-half to one-acre in size. Water collected in temporary impoundments may also be used for dust suppression during mining operations and on access and haul roads (once appropriately permitted through the Wyoming State Engineer's Office). There will be no permanent post-mining impoundments constructed as part of this Amendment.

Temporary hydrologic diversions and culverts would comply with WYDEQ-LQD Noncoal rules, Chapter 3, Section 2(e)(ii)(F) to allow passage of peak runoff from a 2 year, 6 hour precipitation event in a non-erosive manner. Permanent diversions would comply with WDEQ-LQD Noncoal rules, Chapter 3, Section 2(e)(iv), in that they would have sufficient capacity for peak runoff from a 100 year, 6 hour precipitation event. If necessary, sediment control fabric fences would be installed at discharge points into natural channels. These structures would be moved periodically to accommodate active mining.

RECLAMATION PLAN: A-6 AMENDMENT

Drainage restoration: All backfilling, grading and contouring operations would replace existing drainage patterns. No permanent water impoundments would be created with this Amendment. Restored drainage patterns would prevent excessive erosion or stream and watershed instability. This includes sinuosity, slope and channel hydraulic geometry. Drainages would be restored to erosion resistant contours with stream bank and channel geometry that is as stable as pre-mine conditions. Generic concave stream channels would be reconstructed for minor channels and swales within small watersheds. Larger channels, and topography would generally be constructed with rubber tired scrapers and dozers. Through the use of this equipment, channels would be constructed with large concave or trapezoidal bottoms that average between 10 and 12 feet in width.

Reclaimed channels would also be built with similar sinuosity and stream gradient as the original. Erosion resistant material such as large rock and boulders would be placed in the channel, on stream banks, and in areas of changing gradients or obvious areas of potential accelerated erosion when available. Channel density (linear feet of channel/square foot of watershed) would be restored as well post-mining.

Where undisturbed channels enter restored channels transition zones would be constructed. Transition zones will encompass a minimum of 50 linear feet above and below where the channels join. Velocity and flow control structures such as rip rap, straw bales or waddles, and sediment bars may be constructed within the transition zones. Contouring will be done in a manner that the constructed channels match channel geometry and bank slope of the natural channel. At some locations, grade control structures may be constructed using angular rock, proper footing and keys. If gradients are too steep and resources are not available to construct properly designed grade control structures then the channel may be constructed with more meanders and a higher sinuosity to reduce velocities and erosive forces. In addition, rock and boulder rip-rap may be placed into the outside of bends to prevent accelerated channel erosion during high flow events. These reclamation efforts would restore the mined area to stable channel characteristics, and similar water and sediment discharge patterns.

Wetland restoration: No jurisdictional wetlands would be disturbed by the proposed operations. One small reservoir would be disturbed, and reclaimed.

Replacement of Topsoil, Subsoil, Suitable Material, and Rock: BPM would use scrapers to replace all spoil cover material (clean overburden, suitable overburden, subsoil, and topsoil) during reclamation efforts. Timing of replacement is dependent on the operation's location within the pit series. For example, as mining progresses through a pit series, cover material would be direct hauled to a previously mined out, backfilled and contoured pit. Redistributed cover would be graded, but always be left in a roughened condition to protect it from wind and water erosion. All surfaces in final cover would be ripped along the contour with a ripping depth not to exceed two feet, to prevent contamination from underlying material.

Whether the area was barren or vegetated pre-mine, BPM would cover contoured overburden and any bentonitic spoil with **a minimum of two (2) feet** of clean or chemically suitable material, to include topsoil and/or subsoil. If opportunities arise during mining to salvage additional suitable cover material (e.g., subsoil and chemically suitable overburden) beyond what is required to meet revegetation commitments, the material would be salvaged and spread over lands that were naturally barren. Chemically suitable material would be used as partial or complete cover in areas that will be revegetated, postmine.

Dependent on conditions present (e.g. topsoil availability) and the need to meet postmine revegetation requirements, subsoil may be used as a base for topsoil or used as a topsoil substitute where topsoil availability is limited. Topsoil would be spread at a minimum depth of four inches, concentrating on areas most conducive to harvesting moisture (e.g., low spots, swales, and north and east facing slopes). Where shortages of topsoil exist, BPM may elect to create mosaic patterns within the reclamation whereby there are pockets of topsoil respread surrounded by a final cover composed entirely of subsoil and/or suitable material.

In addition to ensuring a minimum of two feet of final cover on reclaimed surfaces, BPM may utilize native rock as a reclamation component. Rock can create micro-topography that may ultimately establish wind breaks, reduce erosion potential or create conditions that are more favorable to some shrub species. Surface rock may also be stacked to create wildlife habitat.

Postmine Sediment and Erosion Control: During reclamation sediment control will be provided by using a combination of Best Management Practices (BMP's) and ASCM's. Following final contouring and topsoiling of a reclaimed area it will be ripped along the contour, which will serve to reduce any compaction present as well as create furrows that will minimize runoff potential. In addition, BPM may elect to utilize weed-free mulch to assist in reduction of runoff potential and increase moisture retention. For reclaimed drainage channels straw bale check dams would be placed within the postmine drainage to serve as energy dissipaters/sediment filters. *Straw bales used on federal lands must be*

certified weed-free. One double set of dams would be placed at the lower boundary of the disturbance, with further check dams installed up-drainage if conditions warrant. These check dams will remain in the drainage until revegetation has been established. If through time erosional features, such as head cuts, develop within a reclaimed channel BPM will implement one of several remediation measures, depending on the conditions present. *These mitigation measures include, but are not limited to: (1) armoring problematic channel reach with rock, (2) installation of rock check dams to reduce channel gradient, or (3) construction of a drop structure(s) using rock or gabion baskets that are keyed into the channel bed and banks.*

Haul Road Restoration: Haul roads will be restored to pre-mine topography and vegetation conditions. This will include the removal of fills, restoration and backfill of cuts, removal of culverts, and the reconstruction and restoration of channels. If a road was present before mining operations, and upgraded for mining purposes, the road will be replaced back to its original state.

Reclamation Schedule: Reclamation would begin within two years, and be completed within four years of the date the land was first affected, except in cases where field drying of clay is occurring, whereby reclamation would be initiated within three years, and be completed within five years of the date the land was affected. If this cannot take place, a variance request may be submitted to WDEQ under the provisions of W.S.§ 35-11-601(a). Variance requests will specify the alternate reclamation schedule and explain reasons for the adjustment. BPM understands that the WDEQ/LQD will decide whether Variance request will be accepted or denied. In no instance will cessation of operations exceed five years without reclamation.

Seeding: BPM would prepare the seedbed with either a pitter or a spring-tooth chisel plow. The seed box is mounted on the chisel plow or pitter, and set to release seed behind one of the implements. These techniques prepare the soil for seed, create a micro-topography advantageous to trapping soil and nutrients and improve the probability of seed germination and establishment. All seeding will be on the topographic contour unless safety considerations take precedence or perpendicular to the prevailing wind direction on very flat lands.

All permanent seeding will occur from October to November of each year or as long as the topsoil remains not frozen. Generally fall seeding allows maximum moisture retention and utilization of winter and spring precipitation.

BPM would use certified weed-free seed (as per BLM policy) and standard agricultural practices to minimize introduction of noxious weeds. BPM will consult with appropriate county and state agencies when other weed control methods, for example spraying, are appropriate to control localized weed infestations on stockpiles or revegetated lands. BPM would continue these practices until the reclaimed lands are fully released from the reclamation performance bond. Bentonite Performance Minerals would seed subsoil and topsoil stockpiles with seed mix number 1 described below. In addition, BPM would seed haul road cut and fill slopes using broadcast methods if they are 3:1, or flatter with a mixture comprised of only the perennial grasses listed in seed mix number 1. BPM does not propose irrigation of any reclaimed or revegetated A- 6 lands.

Expected post-mining grazing practices Chapter 3, Section 2 (d)(viii) requires a mutual agreement among the LQD Administrator, permittee, and the land owner or land managing agency which determines when the revegetated land is ready for the initial episode of domestic cattle grazing. A detailed grazing management plan is not required, but BPM will submit the following information (in duplicate) to the LQD District Office as far in advance of the expected grazing date as possible:

- A quality map showing the reclamation units and their tracking designation, i.e. the designation used in Annual Reports.
- The date that the reclamation units were seeded with the approved permanent seed mixture.
- The type of protection previously afforded the reclamation unit in relation to Chapter 3, Section 2 (d)(viii).
- The number of acres in each reclamation unit and the total acreage across all units in each specific request.
- Documentation that the surface owner or land managing agency agrees with the request for initial grazing.

- Other information which documents and confirms the acceptability of the request, eg. BPM's observation of the vigor and self-renewing capacity of the reclamation units.

FOR PROPOSED A-6 RECLAMATION SEED MIX (See Appendix G)

Appendix C – Climate and Air Quality Data/Information

As per data submitted by BPM, the A-6 POO area lies within an 8-10 inch precipitation zone, and a 23-25 inch evapotranspiration zone. The median annual temperature of the area is approximately 44° F, with winter temperatures commonly dipping below zero, and high summer temperatures in excess of 100° F.

CLIMATE: Climate of the area is typical of cold desert regions of the inter-mountain west. The A-6 Plan of Operations area falls under normal conditions, in a 5 to 9 inch precipitation zone. However, the entire Bighorn Basin has been experiencing a severe drought since 1999 with precipitation rates generally much lower than average (NCDC, 2011). Outside of drought conditions, climate in this area was typical of cold desert regions of the inter-mountain west, with long, cold winters; hot, dry summers and moderate to high winds.

Average maximum temperatures for the Alkali area are during the months of June, July and August as expected, and average minimum temperatures are during the months of December, January and February. Between 1897 and 2010, the mean average annual high temperature in the area was 59.0°F, and the mean average annual low temperature is 30.1°F (See Table 6 below). Average total precipitation for the area is 6.66 inches/year with most of this precipitation falling during the months of May and June. This area has average annual precipitation of 5 to 9 inches, approximately 80% of which falls between April and October. The remainder falls during the months of December through February in the form of snow and/or rain. The growing season for cool season species is approximately April 15 to June 30.

The following table provides a summary of climatic data for the Greybull, Wyoming area from 2001 to 2009 as provided by BPM:

LOVELL AREA CLIMATE AVERAGES (Source: BPM data and records)

Climate data for the Lovell area was provided by the National Climate Data Center of the National Oceanic and Atmospheric Administration. The COOP ID of the Lovell weather station is 485770.

D4.1.1 Precipitation totals for each month

Year / Month	2001	2002	2003	2004	2005	2006	2007	2008	2009
January	0.04	0.18	0.29	0.09	0.14	0.01	0.08	0.52	0.29
February	0.16	0.05	0.35	0.11	0.17	0.01	0.44	0	0.1
March	0.06	0.31	0.42	0.02	0.43	0.57	0.66	0.18	0.02
April	0.68	1.33	0.44	0.26	2.73	0.18	1	0.15	0.2
May	0.24	0.57	0.65	0.26	2.33	0.92	1.39	2.58	0.16
June	2.31	0.72	0.81	0.54	0.75	0.25	0	0.09	2.29
July	0	0.25	0.06	1.74	0.14	0.11	0.38	0.06	0.45
August	0.06	0.01	0.06	0.16	0.46	0.02	0.21	0	0.26
September	1.18	0.29	0.06	0.65	0.51	0.42	0.14	1.59	0
October	0.41	0.44	0.34	0.51	0.62	1.13	1.97	0.46	0.44
November	0.28	0.66	0.07	0	0.23	0.03	0.17	0.35	0
December	0.32	0.05	0.25	0.16	0.07	0.16	0.16	0.39	0
TOTALS	5.74	4.86	3.80	4.50	8.58	3.81	6.60	6.37	4.21

D4.1.2 Average High Temperature for Each Month

Year / Month	2001	2002	2003	2004	2005	2006	2007	2008	2009
January	31.32	31.19	37.03	24.68	28.55	43.52	29.84	27.87	32.1
February	28.25	36.75	32.07	40.24	41.96	38	33.43	38.14	40.75
March	49.06	37.77	43.48	55.29	50.48	49.97	54.97	46.55	45.58
April	58.4	55.57	63.57	62.13	57.47	62.47	55.37	54.17	55.27
May	71.9	65.84	66.87	66.35	63.32	71.42	70.48	62.97	67.97
June	77.63	79.53	74.7	73.93	75.7	81.93	-	75.03	71.7
July	88.35	90.55	91.87	83.58	88.35	91.1	90.87	87.06	83.65
August	88.55	81.13	89.13	80.55	81.68	84.94	85.32	85.1	80.55
September	76.2	72.9	71.63	71.27	72.57	69.57	74.73	69.07	-
October	58.74	51.9	65.9	58.52	61.26	55.26	59	57.68	48.29
November	49.6	43.07	38.9	47	45.93	47.1	47.7	49.43	-
December	33.23	28.74	38.61	38.58	29.23	34.23	29.39	26.74	-

D4.1.3 Average Low Temperature for Each Month

Year / Month	2001	2002	2003	2004	2005	2006	2007	2008	2009
January	4.45	9.74	15.23	0.68	8.06	19.48	5.32	4.19	9.13
February	5.82	11.54	11.79	16.24	13.68	11.82	15.21	15.48	15.57
March	23.84	13.68	20.81	26.55	24.19	21.16	27.1	21.65	18.81
April	32.67	29.47	32.7	33.83	32.23	34.33	33.33	26.4	28.77
May	43.9	37.68	41.23	40.16	40.94	42.06	42.55	41.03	39.45
June	51.03	51.23	49.37	47.5	49.47	51.3	-	47.43	48.07
July	59.55	58.13	58.1	54.87	56.16	58.45	60.97	54.19	52.68
August	54.32	49.23	57.42	49.29	51.13	50.81	53.35	52.16	49.48
September	45.83	42.93	40.57	43.17	42.47	42	43.13	39.97	-
October	31.87	27.77	33.52	34.77	32.81	31.61	33.71	31.71	27.32
November	22.83	18.63	15.47	21.9	22.43	22.03	22.5	26.9	-
December	8.94	8.61	14.84	14.58	8.32	11.97	9.32	4.9	-

D4.1.4 Average Temperature for Each Month

Year / Month	2001	2002	2003	2004	2005	2006	2007	2008	2009
January	17.89	20.47	26.13	12.68	18.31	31.5	17.58	16.03	20.61
February	17.04	24.14	21.93	28.24	27.82	24.91	24.32	26.81	28.16
March	36.45	25.73	32.15	40.92	37.34	35.56	41.03	34.1	32.19
April	45.53	42.52	48.13	47.98	44.85	48.4	44.35	40.28	42.02
May	57.9	51.76	54.05	53.26	52.13	56.74	56.52	52	53.71
June	64.33	65.38	62.03	60.72	62.58	66.62	-	61.23	59.88
July	73.95	74.34	74.98	69.23	72.26	74.77	75.92	70.63	68.16
August	71.44	65.18	73.27	64.92	66.4	67.87	69.34	68.63	65.02
September	61.02	57.92	56.1	57.22	57.52	55.78	58.93	54.52	-
October	45.31	39.84	49.71	46.65	47.03	43.44	46.35	44.69	37.8
November	36.22	30.85	27.18	34.45	34.18	34.57	35.1	38.17	-
December	21.08	18.68	26.73	26.58	18.77	23.1	19.35	15.82	-

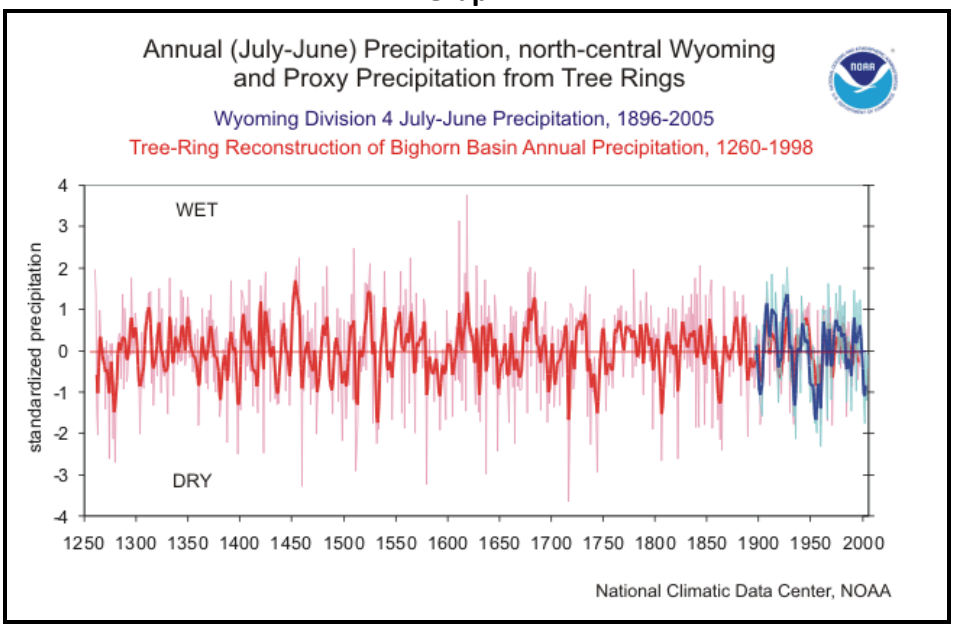
D4.1.5 Average Wind Speed and Direction for Each Month (1971-2000)

January	February	March	April	May	June	July	August	September	October	November	December
3.7	5.6	7.5	9.4	9.5	8.6	8.0	7.2	7.2	6.6	4.9	4.7
NW	NW	NW	NW	NW	NNW	WNW	ESE	NNW	ESE	ESE	ESE

A National Climatic Data Center (NCDC) is located in Lovell, Wyoming. Graph 1 below shows the average annual (July-June) precipitation, 1896-2005, for Wyoming Division 4 (5-year annual values in light blue, 5-year weighted average in dark blue). *"Several severe multi-year drought events can be seen in this record: around 1900; the mid-1930s Dust Bowl; the 1950s; and the last six years (1999-2005), all of which have been below the long-term average."* Also shown on Graph 1 below is a 739-year tree-ring reconstruction (1260-1998) of Bighorn Basin annual precipitation (annual values in light red; 5-year smoothed values in dark red).

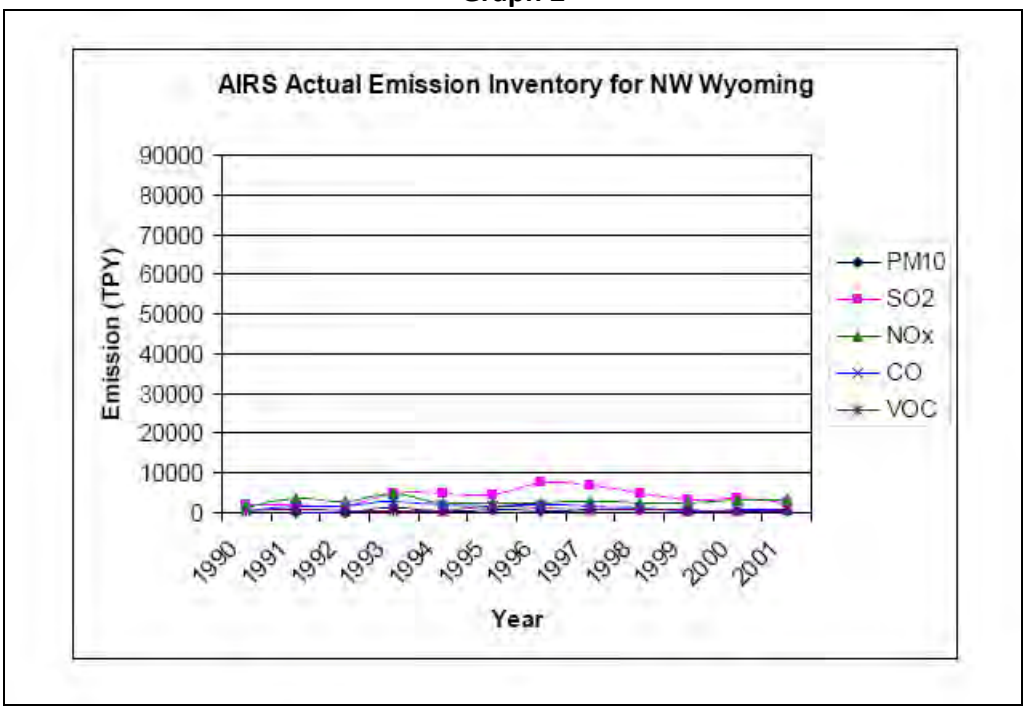
As per NCDC: "…*this reconstruction is based on four long tree-ring chronologies (one Douglas-fir, three limber pine) from the Bighorn Basin, and was calibrated on an instrumental precipitation record (1907-1996) averaged from five long-term weather stations in the Bighorn Basin, four of which are within Wyoming Division 4: Buffalo Bill Dam, WY; Lovell, WY; Powell Field Station, WY; Worland, WY; and Bridger, MT. The reconstruction was calibrated on a 13-month "annual" period (June-June), but it correlates well with the Wyoming Division 4 annual (July-June) precipitation." "Over their common period (1896-1996) the correlation is 0.602, indicating a high degree of shared variance. The precipitation units shown are standardized for comparison; negative values indicate below-average precipitation, and positive values indicate above-average precipitation."*

Graph 1



AIR QUALITY: Graph 2 below (1990-2001) is provided in Appendix G, Emissions Data Assessment of the WDEQ Air Quality Division report entitled "2003 Review Report on Wyoming Long Term Strategy for Visibility Protection in Class I Areas". This report provides some general baseline data on air quality in northwest Wyoming. Emissions shown on the graph are particulate matter 10 (PM10), sulfur dioxide, carbon dioxide, nitrogen oxides, and volatile organic compounds. Most of these emissions are due to industry and the use of vehicles and equipment. PM10 is particulate matter with an aerodynamic diameter of up to 10 micrometers (about 1/7 the diameter of a single human hair). Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural and forest burning, and operation of fireplaces and woodstoves. Emission levels in northwest Wyoming are much lower than levels in highly developed and industrialized areas.

Graph 2



Appendix D – Hydrological and Wetlands/Riparian Data

The following information was provided by BPM and their consultant in the Plan application. The goal of BPM is to mine the A-6 area, while minimizing impacts to the physical and biological landscape.

Table D6-1 Watershed Parameters at the Amendment 6 Area of the 246 C Permit, Bentonite Performance Minerals Lovell, WY.

Watershed Name	Watershed				Main Stem Channel			Overland Flow		
	Area (ac.)	Length (ft)	Elevation Change (ft)	Slope (%)	Length (ft)	Elevation Change (ft)	Slope (%)	Length (ft)	Elevation Change (ft)	Slope %
Big Block Area										
A'	1,352	15,547	790	5.08%	18,624	640	3.44%	3,420	150	4.39%
A1	201	5,658	430	7.60%	4,367	310	7.10%	2,190	120	5.48%
A2	180	7,840	530	6.76%	6,526	380	5.82%	3,420	150	4.39%
B'	305	5,592	470	8.40%	6,722	360	5.36%	1,065	110	10.33%
B'-1	118	3,504	340	9.70%	2,938	120	4.08%	2,169	220	10.14%
B'-2	61	3,786	340	8.98%	3,673	240	6.53%	811	100	12.33%
C'	1,182	10,259	600	5.85%	12,388	400	3.23%	1,582	200	12.64%
C1	437	8,382	490	5.85%	7,733	300	3.88%	1,582	190	12.01%
C2	162	5,404	290	5.37%	4,631	160	3.45%	2,029	130	6.41%
D'	181	6,558	490	7.47%	7,562	400	5.29%	855	90	10.53%

Table D-6.2 Stream morphology parameters for Amendment 6 to Permit 246C, Bentonite Performance Minerals, Lovell WY.

Watershed Name	Total Main Stream Length (ft) †	Mean Channel Gradient	Total Sinuosity	Flow Type	Length of Stream Planned for Disturbance‡	Sinuosity of Stream Planned for Disturbance	Type of Channel Disturbance
Big Block Area							
A'	18,624	3.4%	1.30	ephemeral	-	-	-
A1	4,367	7.1%	1.32	ephemeral	2,286	1.13	Mining
A2	6,526	5.8%	1.21	ephemeral	30	1.00	Road Crossing
B'-1	2,938	4.1%	1.27	ephemeral	695	1.10	Mining
B'-2	3,673	6.5%	1.18	ephemeral	1,790	1.14	Mining
C'	12,388	3.2%	1.24	ephemeral	-	-	-
C1	7,733	3.9%	1.21	ephemeral	8,800	1.15	Mining
C2	4,631	3.5%	1.31	ephemeral	60	1.00	Road Crossing
D'	7,562	5.3%	1.24	ephemeral	-	-	-

† Measured from 2000 aerial photos and USGS topo maps to highest point on the stream to lowest point on permit
‡ GPS Surveys of the stream (Main Channel and Other Significant Channels) within the mine plan disturbance area
ƒ Refer to Map D6-1 and D6-2 for stream segment locations

Appendix E – Soils Data and Information (Site Specific)

A-6 Amendment Areas; Soil Series and Map Unit Descriptions

Descriptions for soil series and their associated soil map units found on the proposed pit areas within the A-6 Amendment area are given below

The BPM A-6 Project Area in Big Horn County is within a "mesic" soil temperature regime (mean annual air temperature about 48 to 52 degrees F.) and a "typic-aridic" soil moisture regime (mean annual precipitation about 5 to 9 inches). The average frost-free period is about 110 to 140 days.

The permit area is characterized primarily by the presence of three very shallow to shallow soils (**Persayo, lithic**, very gravelly loam – Map Units 10, 11, and 13; **Persayo Variant, lithic**, very gravelly loam – Map Unit 15; and **Chipeta** gravelly clay – Map Units 11 and 14), one shallow to moderately deep, saline/alkaline soil (**Mudray** shaly loam – Map Unit 8), one moderately deep soil (**Saddle** gravelly loam – Map Unit 9), and two moderately deep to deep soils (**Apron Variant** very gravelly sandy clay loam – Map Unit 12, and **Larim Variant** very gravelly loam – Map Unit 17).

There are also several bedrock types mapped in the project area including **Badlands** (BL); **Shale - Bentonite Outcrops** (SBO); and **Badlands – Shale – Bentonite Outcrops complex** (BL-SHO). **Pre-Law Disturbed Land** (PL), **Disturbed Land** (DL), and **Intermittent Pond** (IP) were also delineated in the Project Area.
Several of the soils mapped on the project area have names followed by "Variant" or "lithic". Both of these name attachments are defined and described in the soil series and map unit descriptions. The NRCS soil survey of Big Horn County is incomplete and unpublished, and until this year has been inactive for at least 10 to 15 years. As such, many of the site-specific soils do not have established soil names which would be more likely if the survey had been ongoing for a few years or was in the correlation process.

LIST OF SOIL MAP UNITS
BPM LOVELL, WY – AMENDMENT 6, INCLUDING UPDATE LANDS

Map Unit No.	Map Unit Name
8	Mudray shaly loam, 2 to 12% slopes
9	Saddle gravelly loam, 2 to 18% slopes
10	Persayo, lithic, very gravelly loam, 2 to 6% slopes
11	Persayo, lithic – Chipeta – Rock Outcrop complex, 3 to 50% slopes
12	Apron Variant very gravelly sandy clay loam, 2 to 30% slopes
13	Persayo, lithic, very gravelly loam, 6 to 30% slopes
14	Chipeta gravelly clay, 2 to 30% slopes
15	Persayo Variant, lithic, very gravelly loam, 2 to 35% slopes
17	Larim Variant very gravelly loam, 2 to 30% slopes
DL	Disturbed Land
PL	Pre-Law Disturbed Land
IP	Intermittent Pond
BL	Badlands
SBO	Shale – Bentonite Outcrops
BL-SBO	Badlands – Shale – Bentonite Outcrops complex

TABLE D7- A6-2

MAP UNIT SUMMARY, SOIL SUITABILITY, AND SALVAGE DEPTH RECOMMENDATION
BPM LOVELL MINE – AMENDMENT 6 PERMIT, INCLUDING UPDATE LANDS

Map Unit Symbol	Map Unit Name	Soil Sample/ Description Number[1]	Total Soil Depth (In.)	Total Salvage Depth (Avg. In.)	Topsoil/ Subsoil (In./In.)	Limitations to Deeper Salvage
8	Mudray shaly loam, 2 to 12% slopes	BPM15, **B26**, **B27**, **B28**, **B40**, **B50**, **B53**, **B54**, **B55**	3 to 38"	3"	3"/0"	very high sodicity (SAR) and/or salinity (EC) below 3"
9	Saddle gravelly loam, 2 to 18% slopes	BPM166, **B29**, **B43**	22 to 32"	20"	10"/10"	hard shale bedrock
10	Persayo, lithic, very gravelly loam, 2 to 6% slopes	**B41**, **B47***	4 to 18"	9"	5"/4"	soil all suitable to hard bedrock contact, salvage all soil to bedrock
11	Persayo, lithic – Chipeta – Rock Outcrop complex, 3 to 50% slopes	Persayo: **B49** Chipeta: **B46**	P: 6 to 16" C: 6 to 13"	P: 8" C: 8", RO: 0	P and C: 4"/4" RO = 0	P & C: soil all suitable to hard bedrock RO: no soil
12, 12AC	Apron Variant very gravelly sandy clay loam, 2 to 30% slopes	BPM200, **B39**, **B51**, **B52**, **B56**	20 to 40+	24"	12"/12"	high number of coarse fragments
13	Persayo, lithic, very gravelly loam, 6 to 30% slopes	**B44**	4 to 18"	9"	5"/4"	soil all suitable to hard bedrock contact, salvage all soil to to bedrock
14	Chipeta gravelly clay, 2 to 30%	**B48**	4 to 15"	4"	4"/0"	soil all suitable to hard bedrock contact
15	Persayo Variant, lithic, very gravelly loam, 2 to 35% slopes	**B45**	4 to 15"	8"	4"/4"	soil all suitable to hard bedrock contact
17	Larim Variant very gravelly loam, 2 to 30% slopes	BPM154, **B42**	20 to 40+	24"	12"/12"	possible high sodicity (SAR) & high coarse fragment content below 24"
DL	Disturbed Land	--	0	0	0	no soil
PL	Pre-Law Disturbed Land	--	0	0	0	no soil
IP	Intermittent Pond	--	0	0	0	no soil
BL	Badlands	--	0	0	0	no soil
SBO	Shale – Bentonite Outcrops	--	0	0	0	no soil
BL-SBO	Badlands – Shale – Bentonite Outcrops complex	--	0	0	0	no soil

1. Sample site numbers in **bold** are from the Amendment 6 Area. The other sample sites (the "BPM" numbers) are from the adjacent and nearby Amendment 5 Area. All of these sample sites have received a complete soil profile description and soil samples were collected by major horizon and subhorizon for subsequent laboratory analysis. Sample sites from the 2004 and 2008 Update Areas were not listed because they were collected a few miles away.

* Lostwells soil inclusion in Map Unit 10

3.1 Map Unit 8: Mudray shaly loam, 2 to 12% slopes

Mudray shaly loam (Map Unit 8) was originally set up during the large Bear Creek survey based on 12 soil observations, and was subsequently mapped, described, and sampled on the BPM 2004 Amendment, BPM 2008 Amendment, and BPM Amendment 5 projects. Mudray shaly loam is typically a shallow to moderately deep, moderately well drained, highly saline and/or alkaline soil generally located in small to medium size delineations scattered across the project area. Vegetation is typically dominated by Gardner saltbush (Atriplex gardneri). The Mudray soil has been previously mapped in the project area by BLM for the unpublished Big Horn County Soil Survey (BLM, 2001).

Mudray shallow phase (10 to 20" to shale) comprises approximately 60 percent of Map Unit 8, with the moderately deep phase (20 to 40" to shale) comprising approximately 30 percent of the map unit. Mudray, very shallow (less than 10" to shale bedrock), comprises the remaining 10 percent of the map unit.

Typically, Mudray has a 2 to 3 inch surface layer with light brown shaly loam to sandy loam texture. The underlying natric horizon is a brown clay about 10 to 12 inches thick. The "C" horizon substratum is a brown to reddish brown clay loam, sandy clay loam, or clay and extends to shale bedrock at a depth ranging from about 8 to 40 inches, with an average depth of 20.1 inches in the project area. The previous average depth to shale bedrock for Mudray was 20.5 inches based on samples from the BPM 2004 and 2008 Amendment areas, as well from the BPM Amendment 5 area.

Mudray shaly loam has very slow permeability and low available water capacity. Effective rooting depth extends to the shale bedrock. Runoff is slow to medium and the erosion hazard is moderate. Mudray is typically calcareous throughout the soil profile due to recharge of the surface but are leached a few inches in some pedons. The Range Site for Mudray is "Saline Upland". Map Unit 8 is used mainly for grazing and wildlife habitat.

Mudray is classified as a "Clayey, smectitic, mesic, shallow Typic Natrargid". Mudray is an established soil series of limited extent in basin areas of central and northwestern Wyoming. The NRCS official soil series description for Mudray, dated February 1997, is on file at BPM.

3.2 Map Unit 9: Saddle very gravelly loam, 2 to 18% slopes

Saddle gravelly loam (Map Unit 9) is of limited extent in the project area and is mapped only as scattered small areas throughout the survey area. Because the individual soil delineations are generally small in size, Saddle comprises nearly all of the map unit composition. There are a few small included areas of Saddle, shallow phase (<20" to bedrock). Vegetation is typically diverse with mixed grasses, big sagebrush, some Gardner saltbush, and prickly pear cactus. Saddle is a moderately deep (20 to 40 inches to bedrock), well drained, fine-loamy, Typic Haplargid with nonsaline and nonsodic surface and subsoil layers. The "C" horizon substratum below 22 inches can have high salinity and high sodicity.

Typically, Saddle has a 3-inch, light yellowish brown surface layer with gravelly loam texture. The underlying "Bt" argillic horizon subsoil is a brown loam to sandy clay loam and extends to a depth of about 8 to 14 inches. There is a "Bk" calcic horizon beneath the argillic, and it has very pale brown loam to sandy loam texture. The underlying "Bkn" or "C" horizon extends to an average depth of about 26 inches, and is a brown to dark grayish brown clay loam with high salts and sodium in many profiles.

Saddle gravelly loam has moderate permeability and moderate available water capacity. Effective rooting depth extends to bedrock. Surface runoff is slow to medium, and the erosion hazard is moderate. Saddle is either calcareous throughout the profile or is leached of carbonates up to about 14 inches in some pedons. The Range Site for Saddle is "Loamy". Map Unit 9 is used mainly for grazing and wildlife habitat.
Saddle is classified as a "Fine-loamy, mixed, mesic Typic Haplargid". Saddle is an established soil series of moderate extent in the basin areas of central and northern Wyoming. The most recent NRCS official soil series description for Saddle, dated July 1985, is on file at BPM.

3.3 Map Unit 10: Persayo, lithic, very gravelly loam, 2 to 6% slopes

Persayo, lithic, very gravelly loam (Map Unit 10) is located in scattered delineations throughout the project area. Map Unit 10 in the project area is 60 percent Persayo "very shallow" (3 to 9" to shale), and 40% Persayo "shallow" (10 to 19" to shale). Minor soil inclusions in Map Unit 10 are Chipeta gravelly clay, and Persayo Variant (Variant = "skeletal", with >35% coarse fragments in the main part of soil profile). Vegetation in the map unit includes mixed grasses, big sagebrush, some Gardner saltbush, and prickly pear cactus.

Persayo, lithic, very gravelly loam is a very shallow to shallow, well-drained soil forming in thin residuum from either clay shale or hard shale. As such, the phase modifier "lithic" (denoting a hard rock contact, as opposed to a soft rock contact) has been added to the Persayo name in Map Unit 10.

In terms of soil classification, the addition of "lithic" could result in a different soil series name, but at this time there are no soil series in the area in a "typic-aridic" soil moisture regime with this classification (Loamy, mixed, calcareous, mesic, Lithic Torriorthent). Therefore, Persayo, lithic, was used as the soil name for this soil in the project area.

On the A-6 Area, Persayo, lithic, can range in depth from 4 to 18 inches to the shale contact. Persayo, lithic, typically has a 2 inch, pale brown surface layer with gravelly loam texture. There is a brown, 3 to 5 inch subsoil layer, with an underlying "C" horizon substratum layer with clay loam to clay texture. Depth to the hard shale contact averages about 12.4 inches based on the thirteen Persayo, lithic, soil observations in Map Unit 10.
Persayo, lithic, very gravelly loam has moderate to moderately slow permeability, and the available water capacity is low. Effective rooting depth extends to the bedrock contact ranging in depth from 4 to 18 inches in the project area. Runoff is medium to rapid. The soil is typically calcareous throughout the profile, but can be noncalcareous in some horizons of some pedons. Texture is typically gravelly loam in the surface layer, and clay loam, loam, silty clay loam, or clay in the underlying material. The Range Site for Persayo, lithic, is "Saline Upland". Map Unit 10 is used mainly for grazing and wildlife habitat.

Persayo, lithic, is classified as a "Loamy, mixed, calcareous, mesic, Lithic Torriorthent", and is an established soil series mapped in Wyoming and western Colorado as well as in other Rocky Mountain states. The Natural Resources Conservation Service (NRCS) official soil series description for Persayo, dated February 1997, is on file at BPM. However, as stated above, Persayo, lithic, is different from Persayo in that the bedrock contact is generally hard shale rather than weathered, soft shale.

3.4 Map Unit 11: Persayo, lithic - Chipeta - Rock Outcrop complex, 3 to 50% slopes

Map Unit 11 is a soil complex (composed of two or more soils) containing the very shallow to shallow Persayo (lithic) and Chipeta soils, as well as Rock Outcrop. Delineations of Map Unit 11 are scattered throughout the project area. Map Unit 11 was originally set up during the large Bear Creek survey based on 14 and 5 soil observations, respectively, and was then identified and mapped on subsequent soil surveys including the BPM 2004 Amendment, the BPM 2005 Amendment 5, the BPM 2008 Amendment, and now the BPM A-6 soil survey.

Persayo, lithic, comprises approximately 50 percent of the map unit, with Chipeta about 25 percent and Rock outcrop about 15 percent. Persayo Variant (Variant = "skeletal" with >35 percent coarse fragments), lithic, comprises about 10 percent of the map unit, and Persayo (nonlithic) about 5 percent. Persayo, lithic, was previously described in Map Unit 10 and does not vary in Map Unit 11, and therefore general information about Persayo, lithic, will not be repeated here. Likewise, Chipeta clay is described in Map Unit 14 and does not vary in Map Unit 11, and therefore general information about Chipeta will not be repeated here. Both Persayo, lithic, sampled pedon **B49,** and Chipeta clay, sampled pedon **B46**, will be described in the following subsections.

3.5 Map Unit 12 and 12AC: Apron Variant very gravelly sandy clay loam, 2 to 30% slopes

Apron Variant very gravelly sandy loam (Map Unit 12) was originally set up during the large Bear Creek survey based on many soil observations, and was subsequently mapped, described, and sampled on the BPM 2004 Amendment, BPM 2005 Amendment 5, and BPM 2008 Amendment projects, and now the BPM A-6 soil survey. Apron Variant is mapped in the narrow, upland drainages which are scattered across the southern project area, and on the gently sloping gravelly plain in the northern part of the project area. Apron Variant is a moderately deep to deep, well drained, moderately coarse textured soil generally with >35% coarse fragments in the profile. Vegetation includes mixed grasses, big sagebrush, Gardner saltbush, and rabbitbrush.

Included in mapping are small areas with Rock Outcrop along drainage sidewalls, some Riverwash in drainage channels, and some areas of shallow soils. Inclusions comprise about 25 percent of the map unit. Although there is evidence in all of the channels that water has at some time flowed, all of the channels were dry during the fieldwork in 2009.

Typically, Apron Variant has a 3 inch surface layer with light yellowish brown very gravelly sandy clay loam, loam, or sandy loam texture. There is a "BC" or weak “Bw” transitional layer with yellowish brown gravelly clay loam texture to about 12 inches in depth. The underlying "C" horizon substratum is a light yellowish brown to yellowish brown gravelly sandy clay loam, loam, or sandy loam to a depth ranging to or exceeding 40 inches.

Apron Variant very gravelly sandy loam has moderate permeability and high available water capacity. Effective rooting depth extends throughout the soil profile. Runoff is medium and the erosion hazard is moderate. Apron Variant is typically calcareous throughout the profile, but may be leached to 12 inches in some pedons. The Range Site for Apron Variant is "Loamy" with some areas of "Overflow". The map unit is used mainly for grazing and wildlife habitat.

3.6 Map Unit 13: Persayo, lithic, very gravelly loam, 6 to 30% slopes

Persayo, lithic, very gravelly loam (Map Unit 13) is the same soil as in Map Unit 10 except the slope class is 6 to 30% slopes, as opposed to 2 to 6% slopes for Map Unit 10. The soil is located in scattered delineations throughout the project area. Map Unit 13 in the project area is 60 percent Persayo "very shallow" (3 to 9" to shale), and 40% Persayo "shallow" (10 to 19" to shale). Minor 25 soil inclusions in Map Unit 10 are Chipeta gravelly clay, and Persayo Variant (Variant = "skeletal", with >35% coarse fragments in the main part of soil profile). Vegetation in the map unit includes mixed grasses, big sagebrush, some Gardner saltbush, and prickly pear cactus. All other information is similar for Persayo, lithic, in both map units and will not be repeated. Persayo, lithic, was described and sampled in Map Unit 13 at one representative site, **B44**, and its profile description follows below.

3.7 Map Unit 14: Chipeta gravelly clay, 2 to 30% slopes

Chipeta is a very shallow to shallow, well-drained soil developing in thin residuum and slopewash alluvium from weathered shale. Vegetation is a mix of big sagebrush, mixed grasses, and Gardner saltbush. Chipeta clay (Map Unit 14) was originally set up during the large Bear Creek survey based on 21 soil observations, and was then identified and mapped on the BPM 2004 Amendment, BPM 2005 Amendment 5, the BPM 2008 Amendment, and now on the BPM A-6 survey area.

Chipeta was described and sampled at one representative site, **B46**, within Map Unit 11, and at one additional site, **B48**, in Map Unit 14. For Chipeta in Map Units 11 and 14, the range of depth to weathered shale is 4 to 15 inches, with an average depth of about 8 inches. Typically, Chipeta has a 2 to 3 inch surface layer with light brownish gray gravelly clay texture. The underlying "C" horizon substratum is grayish brown clay to an average depth to weathered shale of about 8 inches. The soil has moderate to strong salinity and typically slight to moderate sodicity.

Chipeta in Map Unit 14 can have a heavy clay surface texture which often displays a cracking pattern even though it is not classified as a Vertisol. The heavy clay surface texture, with somewhat sparse vegetation, allows for easy identification and delineation of this map unit. Typically, Chipeta has a thin, 2-inch surface layer with light brownish gray gravelly clay texture. The underlying "C" horizon substratum is a grayish brown clay. Weathered shale is encountered at an average depth of about 8.5 inches, and ranges from 4 to 15 inches. The soil can have moderate to strong salinity in some pedons.

Chipeta gravelly clay has slow permeability and low available water capacity. Effective rooting depth extends to the shale bedrock. Runoff is medium to very high, and the erosion hazard is moderate. Chipeta is typically calcareous throughout the soil profile but is leached a few inches in some pedons. The Range Site for Chipeta is "Saline Upland." The map unit is used mainly for grazing and wildlife habitat.

3.8 Map Unit 15: Persayo Variant, lithic, very gravelly loam, 2 to 35% slopes

Persayo Variant, lithic (Map Unit 15) is very similar to Persayo, lithic, (previously described in Map Unit 10) except the soil profile has >35% coarse fragments as opposed to <35% coarse fragments for Persayo, lithic. Small delineations of Map Unit 15 are scattered throughout the project area. Persayo Variant, lithic, is dominantly a very shallow soil with a depth range of 3 to 11 inches. Average soil depth to the hard shale contact is 8 inches.

Persayo Variant, lithic (Map Unit 15), was fully described and sampled at one previous representative site, **B23**, located on the BPM 2008 Amendment project area, and now at site **B45** located on the A-6 survey area. The soil is classified as "Loamy-skeletal, mixed, calcareous, mesic, Lithic Torriorthent". There are no regional soil series with this classification, and therefore, the "Variant" name was added to Persayo for use in the survey area. As such, Persayo Variant, lithic, is considered a "local" name for use in this survey.

3.9 Map Unit 17: Larim Variant very gravelly loam, 2 to 30% slopes

Larim Variant very gravelly loam (Map Unit 17) was originally set up during the large Bear creek survey based on 22 soil observations, and was subsequently mapped, described, and sampled on the BPM 2004 Amendment, BPM 2005 Amendment 5, the BPM 2008 Amendment, and now on the A-6 soil survey.

Larim Variant is mapped on several medium size delineations primarily on hills and often occupies a slightly higher elevation than the rest of the project area. Larim Variant is a moderately deep to deep, well-drained soil developing in mixed alluvium (old mountain "outwash") generated during the late Pleistocene.

This material is probably old slopewash alluvium or glacial outwash from the foothills and Big Horn Mountains to the east. The origin of this medium-textured (soil fines fraction), very gravelly parent material is controversial, and has been discussed in previous geologic publications. In an article entitled "Quaternary Geology of the Western Five Springs Area, Bighorn Basin, Wyoming", Richard Birdseye describes "late-glacial, early-interglacial alluvial fan/braided stream sequences" which cap old pediments throughout the area and are considered at least 600,000 years old based on age-dating of the volcanic "North Kane Ash". He goes on to describe apparent debris flows which have transported and deposited boulders as large as six feet in diameter up to two kilometers from the base of the Big Horn Mountains (Birdseye, 1983). Some of these large, reddish granite boulders are found scattered across hills and upper side slopes in the project area.

Larim Variant occupies most of the map unit, with soil depth ranging from moderately deep (20 to 40 inches to shale) to deep (>40 inches to shale). Vegetation includes mixed grasses, big sagebrush, and occasional Gardner saltbush. Larim Variant is considered a Variant to the Larim series based on a "typic-aridic" soil moisture regime (5 to 9" annual precipitation), rather than "ustic-aridic" (10 to 14" annual precipitation), and a loamy-skeletal texture class (>35% coarse fragments).

Typically, Larim Variant has a 3-inch surface layer with yellowish brown very gravelly loam texture. The underlying "Btk" argillic and calcic horizon extends to a depth of about 24 inches and has light gray to light yellowish brown, gravelly to very gravelly, clay loam texture. The underlying "C" horizon substratum is a light yellowish brown very gravelly clay loam, sandy clay loam, or sandy loam to a depth of 40 inches or more. Larim Variant very gravelly loam has slow permeability and moderate available water capacity. Effective rooting depth is about 24 inches. Runoff is moderate and the erosion hazard is moderate. Larim Variant is typically strongly calcareous throughout the profile. The Range Site for Larim Variant is "Coarse Upland".

Larim Variant occupies most of the map unit, with soil depth ranging from moderately deep (20 to 40 inches to shale) to deep (>40 inches to shale). Vegetation includes mixed grasses, big sagebrush, and occasional Gardner saltbush. Larim Variant is considered a Variant to the Larim series based on a "typic-aridic" soil moisture regime (5 to 9" annual precipitation), rather than "ustic-aridic" (10 to 14" annual precipitation), and a loamy-skeletal texture class (>35% coarse fragments).

3.10 Map Unit DL: Disturbed Land

Disturbed Land (Map Unit DL) delineations are current roads or areas presently in mining-related disturbance and not yet reclaimed. Topsoil has previously been salvaged from these areas and no additional soil is available.

3.11 Map Unit PL: Pre-Law Disturbed Land

A few old, pre-law disturbance pits and overburden piles are scattered across the survey area. These areas have been mapped as Map Unit PL (Pre-Law Disturbed Land). These areas have no soil available for salvage and have not been reclaimed. Any previous soil was mixed in with the shale overburden when the pits were dug, and therefore native soil is no longer available for salvage.

3.12 Map Unit IP: Intermittent Pond

A few small areas are mapped as Intermittent Pond (Map Unit IP). These are previously constructed small water ponds that only hold water intermittently in the spring and early summer and after large thunderstorms. No soil is available for salvage from Map Unit IP.

3.13 Map Unit BL: Badlands Badlands are areas largely of exposed, eroded shale which have almost no vegetation and soil resources. They are typically on steep slopes and have a severe erosion hazard. Badlands are very obvious in the landscape, and have been mapped as Map Unit BL (Badlands). No soil resources are available for salvage from Badlands.

3.14 Map Unit SBO: Shale-Bentonite Outcrops

Shale-Bentonite Outcrops (Map Unit SBO) are areas of exposed shale and bentonite which are scattered throughout the project area. These are gently sloping to sloping areas interspersed with other map unit delineations containing native soils. Map Unit SBO generally does not have suitable soil available for salvage, although a few small spots may have a few inches of suitable soil for salvage if necessary. A representative site, **B31**, located within a delineation of Map Unit SBO, was previously described and sampled as part of the BPM 2008 Amendment project.

3.15 Map Unit BL-SBO: Badlands-Shale-Bentonite Outcrops

Badlands-Shale-Bentonite Outcrops (Map Unit BL-SBO) are a combination of Map Units BL (Badlands) and SBO (Shale-Bentonite Outcrops) mapped in areas where the two map units are difficult to separate at the 1”=400’ base map scale. As with Map Units BL and SBO, Map Unit BL-SBO has no soil available for salvage.

Appendix F – Vegetation Data and Information (Site Specific)

Shell Valley Consulting Associates, Inc. (SVC), of Shell, Wyoming completed vegetation baseline inventories for the study area associated with the A-6 Application. The A-6 Big Block Area was inventoried in the summer of 2006. Inventories included delineation of vegetation community map units, photographic records representing vegetation map units within the study area, and transect data describing individual plant species and life-form cover, total vegetation cover, total cover (litter, rock and vegetation) and shrub density.

Vegetation types for A-6 Big Block Area were delineated into the following three different map units: Salt Desert Shrub (SDS), Mixed Desert Shrub (MDS), and Barren Outcrop (OC). Topography varies from dissected badland drainages and escarpments to relatively gentle upland hills and benches. Slopes range from 0 to 45 percent. Aspects are primarily southerly.

When the field work began there was another map unit to survey: Big Sagebrush/ Bunchgrass (BSBG). As the data was analyzed it appeared that the Big Sagebrush/Bunchgrass community was the same as the Mixed Desert Shrub community, so the two communities were combined to make one. Twenty transects were run in the original BSBG community and 36 transects were run in the original MDS community for a combined 56 transects. On the vegetation map D8-1 the transect locations appear with both MDS and BSBG labels to correspond with the field data sheets.

The **Mixed Desert Shrub (MDS)** vegetation type is a rangeland cover type that has been developed by plant ecologists at Shell Valley Consulting. MDS is more productive and has more diversity than a Salt Desert Shrub community, though not as productive as a Big Sagebrush/Bunchgrass community. Productivity is not the only difference. There is more diversity than a Salt Desert Shrub community. The perennial grasses that dominated this site are sandberg bluegrass (*Poa secunda*) and western wheatgrass (*Agropyron smithii*). The perennial forb that is dominate is Hood phlox (*Phlox arnde*). The shrubs and sub-shrubs that are dominate are: big sagebrush (*Artemisia tridentata*), birdsfoot sage (*Artemisia pedatfida*), greasewood (*Sarcobatus vermiculatus*), shadscale saltbush (*Atriplex confertifolia*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and gardner saltbush (*Atriplex arnderi*). The mixed desert shrub map unit occurs sporadically throughout the Big Block Area. Topography is upland rolling hills, drainages and plateaus. This map unit does boarder some barren outcrop shale/clay outcrops. Slopes vary from flat to 45 percent. Figures D8.1 through D8.3 illustrate representative aspects and vegetation cover of this map unit.

Salt Desert Shrub (SDS) map unit is defined as a rangeland cover type, and described in Range Cover Types of the United States (Shifelt 1994). The perennial grass that appears the most in the study is sandberg bluegrass (*Poa secunda*). Sub-dominate perennial grasses that occur are tumblegrass (*Schedonnardus paniculatus*), blue grama (*Bouteloua gracilis*) and bottlebrush squirreltail (*Sitantion hystrix*). The succulent most commonly occurring is pricklypear cactus (*Opuntia polyacantha*). The dominate shrub and plant species overall is Gardner saltbush (*Atriplex arnderi*). Sub-dominate shrubs that occur are birdsfoot sage (*Artemisia pedatfida*) and shadscale saltbush (*Atriplex confertifolia*). This map unit is sporadic in locations throughout the Big Block Area. It includes a few barren outcrop shale/clay outcrop (OC) inclusions. Slopes range from zero to thirty percent, but mostly occur in less than ten percent slope. Data sheet number thirty-nine is not being used due to too many hits were recorded during the field survey.

This map unit designates barren and nearly barren shale, clay, or bentonite outcrops that occur within the Big Block study area. Minor inclusions (<10 percent) of sparsely vegetated *Atriplex dioeca* and *Suaeda nigra* populations occur but do not provide greater than 1 percent ground. This map unit was not sampled because of sparse vegetation cover. The vegetation found in the area is typical of basins and foothills in the intermountain west (Knight 1994, Shifeld 1994).

Bentonite Performance Minerals plans on using an extended reference area for comparison during bond release. This may include portions of the permit area not mined, as well as the reference area used during this study.

Species List by Vegetation Map Unit

	VEGETATION MAP UNIT	
	MDS	SDS
ANNUAL GRASS		
Bromus japonicus	X	
Bromus tectorum	X	X
PERENNIAL GRASS and GRASS-LIKE		
Agropyron smithii	X	X
Agropyron spicatum	X	X
Oryzopsis hymenoides	X	X
Poa secunda	X	X
Sitanion hystrix	X	X
Sporobolus airoides	X	X
Sporobolus cryptandrus	X	
Stipa comata	X	X
ANNUAL/BIENNIAL FORB		
Allium textile	X	X
Atriplex dioica	X	X
Descurainia pinnata	X	X
Draba spp	X	
Halogeton glomeratus	X	X
Kochia scoparia	X	X
Lappula redowski	X	
Lepidium densiflorum	X	
Machaeranthera canescens		X
Machaeranthera tanacetifolia	X	
Malacothrix sonchoides	X	
Plantago patagonica	X	
PERENNIAL FORB		
Antennaria spp	X	X
Eriogonum spp	X	X
Lomatium foeniculaceum		X
Opuntia polyacantha	X	X
Penstemon spp	X	
Phlox hoodii	X	X
Platyschkurhia integrifolia	X	X
Sphaeralcea coccinea	X	X

Species List--Continued	VEGETATION MAP UNIT	
	MDS	SDS
SUB SHRUB		
Artemisia nova	X	
Artemisia spinescens	X	X
Atriplex gardneri	X	X
Gutierrezia sarothrae	X	X
SHRUB		
Artemisia pedatifida	X	X
Artemisia tridentata	X	X
Atriplex canescens	X	
Atriplex confertifolia	X	X
Ceratoides lanata	X	
Chrysothamnus nauseosus	X	
Chrysothamnus viscidiflorus	X	X
Sarcobatus vermiculatus	X	X
TOTAL SPECIES NUMBERS	40	29

Appendix G. Stipulations, Mitigation and Monitoring Measures for Proposed Action Alternative I

STIPULATIONS

Required stipulations that would be applied to any approval of the Proposed Action (Alternative I) are presented below. These were also discussed above in Chapter 3. The best mitigation for the project/site has been included in the Proposed Action and described above. (Note: The Authorized Officer as referred to below is the Field Manager of the BLM Cody Field Office)

CULTURAL RESOURCES PROTECTION STIPULATIONS

Cultural Resources, Standard Stipulation: The operator/holder of this authorization (Bentonite Performance Minerals) shall immediately bring any objects or resources of cultural value discovered as a result of operations under this authorization to the attention of the authorized officer. The operator/holder shall suspend all activities in the vicinity of such a discovery until notified to proceed by the authorized officer.

Cultural Resources, Standard Stipulation The operator/holder (Bentonite Performance Minerals) is responsible for informing all persons associated with this project that they may be subject to prosecution for knowingly damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or site. If archaeological, historical, Native American, or vertebrate fossil materials are discovered, the operator/holder is to suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations are not to resume until written authorization to proceed is issued by the Authorized Officer (AO).

The Authorized Officer will evaluate, or will have evaluated, such discoveries not later than five working days after being notified, and will determine what action shall be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse effects to significant cultural or paleontological resources will be made by the authorized officer after consulting with the holder (BPM).

The operator/holder (Bentonite Performance Minerals) is responsible for the cost of any investigations necessary for the evaluation, and any mitigation measures required by the Authorized Officer. The AO will provide technical and procedural guidelines for the conduct of evaluation and mitigation. Upon verification from the AO that the required evaluation and/or mitigation has been completed, the operator will be allowed to resume operations.

Cultural Resources Mining Stipulations (compatible with the current 43 CFR 3809 regulations)
The operator/holder (Bentonite Performance Minerals) is responsible for informing all persons associated with this project that they may be subject to prosecution for knowingly disturbing, altering, injuring, excavating, removing or destroying any historical or archaeological site, structure, building, or object on Federal lands.

The operator/holder (Bentonite Performance Minerals) shall immediately bring to the attention of the Authorized Officer any cultural resources that might be altered or destroyed on Federal lands by his/her operations. If archaeological, historical, or Native American resources are discovered, the operator is to suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Any such discovery shall be left intact until the operator is told to proceed by the Authorized Officer.

The Authorized Officer shall evaluate the discoveries brought to his/her attention, take action to protect or remove the resource, and allow operations to proceed within 10 working days after notification to the Authorized Officer of such discovery. The decision as to the appropriate measures to mitigate adverse effects to cultural or paleontological resources shall be made by the Authorized Officer after consulting with the operator/holder.

Before a Plan of Operations is approved, the operator/holder is responsible for the cost of any investigations necessary, and any mitigation measures required by the Authorized Officer. The Authorized Officer would provide technical and procedural guidelines for the conduct of the required evaluation and mitigation. After the Plan of Operations is approved, or where a Plan of Operations is not involved, the Federal Government (BLM) shall have the responsibility and bear the cost of investigations and salvage of any cultural (and paleontological) values discovered by the operator.

Human Remains

If human remains are discovered or suspected the operator (BPM) shall suspend operations immediately, physically guard the area, and notify BLM immediately.

Special Stipulations

None for this project.

PALEONTOLOGICAL RESOURCES STIPULATIONS

Paleontological Resources Stipulations:

1. Collecting: The project Operator (BPM) is responsible for informing all persons associated with this project including employees, contractors and subcontractors under their direction that they shall be subject to prosecution for damaging, altering, excavating or removing any vertebrate fossils or other scientifically significant paleontological resources from the project area. Collection of vertebrate fossils (bones, teeth, turtle shells) or other scientifically significant paleontological resources is prohibited without a permit. Unlawful removal, damage, or vandalism of paleontological resources will be prosecuted by federal law enforcement personnel.

2. **Discovery:** If vertebrate or other scientifically significant paleontological resources (fossils) are discovered on BLM-administered land during operations, the Operator (BPM) shall suspend operations that could disturb the materials, stabilize and protect the site, and immediately contact the BLM Cody Field Office Manager (Authorized Officer). The Authorized Officer would arrange for evaluation of the find within an agreed timeframe and determine the need for any mitigation actions that may be necessary. Any mitigation would be developed in consultation with the Operator (BPM), who may be responsible for the cost of site evaluation and mitigation of project effects to the site. If the Operator (BPM) can avoid disturbing a discovered site, there is no need to suspend operations; however, the discovery shall be immediately brought to the attention of the Authorized Officer.

3. **Avoidance:** All vertebrate or scientifically significant paleontological resources found as a result of the project/action will be avoided during operations. Avoidance in this case means "No action or disturbance within a distance of at least 50 feet of the outer edge of the paleontological locality".

MITIGATION AND MONITORING MEASURES

As described in 43 CFR 1508.20**,** "Mitigation" includes:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

© Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

Air Quality

- **Mitigation**: To control fugitive dust generated by haul trucks, all project roads will be kept watered by using a truck equipped with a spray bar or other BLM approved method. Chemical dust suppression agents may also be employed, along with exercising the most efficient use of equipment to conduct mining. If blasting would be necessary, BPM will notify the BLM in advance, and fly rock and other particles will be kept to a minimum.

Water Quality and Riparian-Wetland Area Management

- **Mitigation - Wetlands:** If the proposed mining will result in the placement of fill or dredge material in a pond, wet meadow, stream channel, or any other water feature, BPM will coordinate with the U.S. Army Corps of Engineers (COE) to determine if the feature is a "jurisdictional" wetland or a "Water of the U.S." and whether a Clean Water Act (CWA) Section 404 Permit is needed. BPM will obtain any required authorization from the U.S. Army Corps of Engineers (COE) prior to disturbing any jurisdictional wetland or Water of the United States. BPM will also maintain and comply with their WDEQ-WQD Storm Water Discharge Permit (SWDP) and associated Storm Water Pollution Prevention Plan (SWPPP), per Section 401 of the CWA. According to Federal and State law, activities that result in surface disturbance in excess of 1-acre, require a SWDP and a SWPPP. BPM will coordinate with the BLM prior to disturbing non-jurisdictional wetlands and/or riparian areas to reduce/avoid impacts.

- **Mitigation-Hydrology:** Modification of the hydrology of riparian and wetland areas, including jurisdictional wetlands and Waters of the United States, will be avoided whenever possible. Where hydrology is modified, through drainage will be required to be reestablished during final reclamation. Channel design for both temporary and permanent diversions will match pre-mine channel gradients and cross-sectional shapes and dimensions. In order to control sediment and runoff under the Proposed Action, fabric fences or certified weed-free straw bale check dams will be installed at discharge points into natural channels. Berms will be installed around pits and haul roads.

- **Mitigation-Reclamation:** During reclamation, BPM will restore the vegetation and soils as described above. Erosion prevention measures outlined in the Mine Plan and Hydrology sections will be implemented to ensure that sediment associated with proposed Amendment disturbances will not impact or accumulate in the other two wetlands or any other adjacent or downstream riparian areas or wetlands.

- **Mitigation-Hydrology:** If future mine plan modifications indicate that wetland or water course disturbances other than those indicated will be necessary, all disturbance will be contingent on jurisdictional determinations made by the U.S. Army Corp of Engineers.

- **Mitigation-Spring Monitoring:** BPM will monitor the adjudicated spring located south of the Amendment 6 boundary in T54N R92W NWSW Section 5. They will begin monitoring in the spring prior to, during, and after mining concludes, to document any impacts.

- **Mitigation-Sediment Control:** Larger ephemeral channels (those having drainage basins greater than 5 acres) will be temporarily directed by BPM around open pits during active mining stages and straw bale sediment barriers would be utilized as sedimentation control measures.

- **Mitigation-Sediment Control:** Ditches will be constructed upslope of active pits and dump areas to divert runoff around the operation and back to native and/or reclaimed areas. By diverting native land runoff around the operation, surface water erosion within disturbed areas and reduction in runoff quantity should be minimized. Ditches would be constructed on contour to minimize erosion potential.

- **Mitigation-Sediment Control:** In some circumstances, riprap, energy dissipaters (i.e., straw bales, wattles, and rock checks) and buried grade control structures, will be installed where necessary, depending on conditions. Precipitation that falls on disturbed areas would generally be contained within active pit areas. Through the use of berms and grading, runoff from the disturbed areas would drain to specific locations, where small sumps will be constructed. Water contained in these sumps will not be discharged, rather allowed to evaporate. If

conditions exist where it is not practical to divert and store runoff from disturbed areas, Alternate Sediment Control Measures (ASCM's), such as check dams, will be utilized to treat runoff before being discharged on to native or reclaimed lands.

- **Mitigation-Sediment Control:** To preserve water quality, all sediment control measures constructed during the mining phase (i.e., check dams, silt fence, sumps, water bars, etc.) will be left in place until the vegetation becomes adequately established. Once established all sediment control measures will be removed with the possible exception of sumps, which may be left for livestock and wildlife watering purposes assuming landowner consent is obtained.

Reclamation Seed Mix

- **Mitigation-Seed Mix**: The amount of seed applied to public land would be calculated on a Pure Live Seed (PLS) basis. Pounds of PLS equals the pounds of seed wanted divided by the pure live seed ratio of the seed lot being used; the result will always be more than the pounds of pure live seed wanted. PLS determinations must be made for each lot of seed being used in a specific mix.

- **Mitigation-Seed Mix:** Seed will be stored properly to preserve its viability and will be used within three months of the most recent viability test. Seed that has been stored longer than three months beyond the last viability test will be tested for viability again and the bulk pounds/acre rates will be adjusted to reflect any new PLS values before being applied to public land. All seed applied on BLM administered public lands must comply with the current BLM seed policy outlined in IM-2006-073 (see Appendix C). Also per IM-2006-073, *Copies of the seed lab test results, including purity and germination (viability) rate, must be forwarded to the appropriate BLM office prior to seed application. If the seed does not meet the BLM and State/Federal standard for noxious weed seed content or other crop seed allowances, it shall not be applied to public land.*

- **Mitigation-Seed Mix:** Seed will be planted in the fall or early winter (occasionally in early spring) as soon as possible after topsoiling. **All seed will be certified to be cheatgrass and noxious weed-free**. If BPM decides to try mulching, they must first contact the BLM for proper mulching techniques on Federal land and approval. Use of all species depends on seed availability in the year of seeding; changes to the seed mix are acceptable with prior authorization from the BLM.

Reclamation Seed Mix: **Within 3-5 years following the mining of bentonite, the A-6 Plan pits will be recontoured, deep ripped, and seeded using the following PLS (pure live seed) mix:**

Note: These seed mixes when finalized will also include, at BLM's request:
Bluebunch wheatgrass, Russian Wildrye, Canadian Wildrye, Basin Big Sagebrush

Table RP-1 – Preferred Seed Mixes

Seed Mix 1 – Standard Seed Mix

Primary			Alternate	
Life Form	Species	Rate in PLS lbs/ac	Life Form	Species
Grasses	Indian Ricegrass	1.0	Grasses	Western Wheatgrass
	Bottlebrush Squirreltail	1.0		Slender Wheatgrass
	Bluebunch Wheatgrass	1.5		Sand Dropseed
	Sandberg Bluegrass	0.5		Basin Wildrye
	Alkali Sacaton	0.5		
	Canada Wildrye	1.0		
	Russian Wildrye	1.5		
	Thickspike Wheatgrass	1.5		
Forbs	Rocky Mtn Bee Plant	0.5	Forbs	Scarlet Globemallow
	Lewis Blue Flax	0.5		Western Yarrow
	Annual Wild Sunflower	1.0		Evening Primrose
Shrubs	Shadscale	2.0	Shrubs	*Wyoming Big Sagebrush
	Gardner Saltbush	4.0		*Basin Big Sagebrush
	Rubber Rabbitbrush	1.0		Winterfat
	Big Sagebrush*	0.5		
	Four-wing Saltbush	2.0		
Total		20.0		

Seed Mix 2 – Shrub Seed Mix

Life Form	Species	Rate in PLS lbs/ac
Grasses	Bluebunch Wheatgrass	2.0
	Russian Wildrye	1.0
	Bottlebrush Squirreltail	2.0
	Sandberg Bluegrass	0.5
Forbs	Rocky Mountain Bee Plant	0.5
	Western Yarrow	0.5
	Lewis Blue Flax	0.5
Shrubs	Shadscale	2.0
	Four-Wing Saltbush	2.0
	Winterfat	1.0
	Big Sagebrush	1.0
	Black Sagebrush	0.5
	Fringed Sagebrush	0.5
Total		14.0

Mitigation-Sage Brush: Wyoming big sagebrush (*Artemisia tridentata sp. wyomingensis*) would be planted in targeted areas of greater moisture potential (i.e. drainages and depressions) and higher quality soil; basin wildrye (*Elymus cinereus*) would be broadcast onto swales and reconstructed drainages, and other low-lying areas.

Reclamation and Visual Aesthetics

- **Reclamation**: Reclamation will be concurrent with mining as much as possible. After mining, disturbed areas under this Plan will be contoured to blend in with the adjacent surroundings and reseeded to support similar vegetation. Proper topsoil and subsoil salvage will be essential to ensure successful reclamation. Use of mine pit areas for bentonite drying will be kept to a minimum so that mine pits can be backfilled, recontoured and reseeded in a timely manner. Unnecessary and undue degradation of native soils and vegetation will not be allowed to occur as a result of bentonite mining under this Plan/ROW. Within 3-5 years following completion of mining, disturbed areas will be recontoured to match the surrounding topography, reestablish drainages, and minimize erosion. The entire disturbed area with the exception of the main haul roads will be topsoiled and seeded using the seed mixes provided previously in this document. If long-term (more than 6 months) topsoil stockpiling is necessary, they will be seeded with an approved seed mix in the fall or spring following placement.

- **Reclamation** Mitigation will include use of approved seed mixtures (Appendix G) and seeding application rates, to help reestablish vegetation over time to pre-mine or better conditions. All seed used on public lands would be certified to be cheatgrass seed and noxious weed seed-free by Wyoming State certified seed laboratory testing and would conform to BLM seed policy IM No. 2006-073; any hay or straw used for check-dam construction or mulching would also be certified to be cheatgrass and noxious weed seed-free. Some reclaimed areas may need to be fenced to exclude livestock from grazing too heavily on newly-germinated or established seedlings in these areas. Additional revegetation goals include site stabilization, erosion control, and restoration of visual aesthetics.

- **Reclamation:** All disturbed lands will be revegetated unless initially barren, and would have a cover that is equal to or greater than its native counterpart. Due to the rather significant swell of the spoil material and the relatively limited thickness of the bentonite seams, there is sufficient material available to ensure that a condition of Approximate Original Contour (AOC) can be achieved. As such, slope, aspect and reclaimed basin size should mimic pre-mine conditions.

- **Reclamation:** Drainage channels would be reconstructed at a density equal to or greater than what existed pre-mine. Reclaimed channels would have a gradient and sinuosity that mimics pre-mine conditions. Many of the pre-mine channels are narrow and confined, with incision ranging from three to 15 feet. Channel reconstruction will primarily be performed using scrapers and, thus, have a bottom width of 10 to 12 feet depending on the equipment size utilized. Channel banks will be shaped to have a slope of 3(h):1(v) or less. Reclaimed channels will have sufficient capacity to convey flows from the 100-year event, but are not anticipated to be stable during an event of this magnitude; a condition that is similar to what exists naturally.

- **Reclamation:** Placement of sediment bars and other discharge control items will reduce runoff velocities and increase meandering. Where possible the transition zone will be established on a rock outcrop. Riprap and/or grade control structures will be installed along the transition zone if erosion problems develop.

- **Mitigation-Overburden**: BPM will replace salvaged native cap/cover material wherever possible, and replace all overburden in the tiered manner, as it was originally found. Measures outlined in the Mining Plan and Reclamation Plan describe mining and reclamation in areas in high Sodium Adsorption Ratio (SAR) and low Acid Base Potential (ABP) overburden. These measures include placing of these materials below the cap material when possible, and avoiding mixing the overburden of high SAR and low ABP with better quality overburden.

- **Mitigation-Topsoil**: (As per BLM requirements), BPM will use live-spreading of topsoil whenever possible and stockpile topsoil for as short of a time as possible before re-spreading it. BPM will also seed its topsoil stockpiles

to prevent weed growth, reduce erosion, and maintain the soil's biological integrity. Associated disturbance relative to proposed mining will be kept to a minimum in order to prevent unnecessary and undue disturbance of native soil profiles. The areas will be seeded in a timely manner to promote speedy plant growth and further reduce erosion.

- **Livestock Grazing Management**

- **Mitigation-Fencing**: BPM will work with the BLM-CYFO to upkeep the allotment boundary fence between the Himes Group and Crystal Creek grazing allotments. A temporary fence or fence realignment will be constructed along the allotment boundary where the proposed mining would disturb the existing fence. A cattleguard or gated bypass will be used along the southeastern haul road where it would pass through the allotment boundary fence.

- **Mitigation-Fencing**: Reclaimed mine areas are occasionally fenced out of grazing allotments to facilitate reestablishment of vegetation. BPM may install temporary fences around seeded areas that are in locations used heavily by cattle, in order to give seedlings a chance to establish. BPM would generally be responsible for installation, maintenance, and removal of these reclamation fences, with some potential for BLM assistance with these activities.

- **Mitigation-Range Improvements/Water Pipelines**: **BPM would maintain and/or replace any pasture or allotment boundary fences, and maintain/move/replace the existing water pipelines/stock tanks located in the A-6 Plan/ROW area before, during and after mining activities.**

- **Mitigation-Reclamation**: BPM would be responsible for successful reseeding (see Appendix G for seed mix) and weed management, and would be held accountable for the reseeding by WDEQ-LQD and the BLM until an acceptable vegetative community has established.

Sensitive Wildlife Species and Migratory Birds

- **Migratory Bird Protection**: In conformance with the USFWS and BLM suggestions to not cause "take" on protected species under the Migratory Bird Treaty Act, which is illegal, BPM will conduct nest searches for migratory birds between April 10th and July 15th. Mining will stop if nesting migratory birds are detected until the migratory birds have fledged and can leave the nesting area. Nest searches will also be conducted for nesting mountain plover in nesting habitat prior to and during ground disturbing activities between April 10th and July 15th. Mountain plover are migratory birds and a BLM Sensitive Species, and are very rare and in need of conservation. If nesting mountain plovers are found, mining operations will halt until the chicks have fledged and are able to leave the nesting area. Prairie dog towns will be avoided. Proper management of water within the mined areas, i. e., coordination with USACE, WDEQ-WQD, and BLM, would help reduce potential impacts to northern leopard frogs present downstream.

- **Sage Grouse**: On Feb. 10, 2012, the BLM Wyoming State Office issued **Instruction Memorandum WY-2012-019 entitled "Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate**". Though mining activities regulated on federal surface/federal mineral estate may not be affected by this new sage grouse IM. Mitigation for sage grouse as spelled out in this IM on split estate lands (discretionary actions) may be subject to terms of this IM. As stated in the IM, "…determinations that do not apply the measures located in this policy IM may be necessary where BLM is required to comply with other non-discretionary statutes and regulations (i.e., valid existing rights, oil and gas "drainage", etc.)."

- The following narrative was taken from pages 18-19 of the 2012 IM (**pertinent portions to this review are highlighted in bold**):

Locatable Mineral Activities:

- **Notices or Plans of Operation, or modifications thereto, submitted following the issuance of this guidance:** As part of the 15 day completeness review of notices [or modifications thereto] and 30 day completeness review of plans of operations [or modifications thereto], the proposed project area(s) where exploration, development, mining, access and reclamation would take place should be reviewed for overlap of sage-grouse core areas in the corporate GIS database**. If there is overlap, the BLM AO may notify the operator of ways that they may minimize impacts to core area habitats and request the operator to amend its notice or plan to include such measures. The request to amend the submitted notice or plan of operations must make clear that the operator's compliance is not mandatory and that including such measures is not a requirement for completeness of either the notice or a plan of operations, nor is it a condition of acceptance of the notice or approval of the plan of operations.**

- **OTHER MIGRATORY BIRDS**: **BPM would conduct nest searches in migratory bird habitat including Mountain Plover habitat, prior to, and during ground disturbing activities between April 1st and July 15th.** If nesting migratory birds would be found, clearing of new ground for mining would halt until the BLM and the USFWS were consulted for further action. Through this monitoring, no migratory birds would be knowingly harmed during the mining process. Thus, with BPM implementing such mitigation measures, this Plan would not cause "take" of migratory birds, which is prohibited by the Migratory Bird Treaty Act.

- **Mitigation:** In conformance with USFWS suggestions, BPM would conduct nest searches in mountain plover habitat prior to, and during ground disturbing activities between April 10th and July 10th. If nesting mountain plovers are found, mining operations may need to halt until BLM and USFWS would be consulted for further action. Through this monitoring, no mountain plovers or migratory birds would be knowingly harmed during the proposed mining process.

Raptor Nesting Sites

- **Raptors:** In conformance with the USFWS consultation and BLM suggestions to not "take" protected species under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, on the ground surveys will be conducted prior to any surface disturbing activities to ensure that no active raptor nests would be disturbed. BPM personnel agree to mitigate potential impacts to raptors and raptor nesting sites by monitoring any nearby raptor nests in the spring of the year to determine species and activity status. The BLM and the USFWS will be notified if nest sites are discovered during mining activities; any active nest site will be evaluated for appropriate mitigation measures and buffer distance based on circumstances including: raptor species, nesting stage, activity, topography, and disturbance type. Generally, the Cody Field Office RMP states a ¾ mile buffer (or closer visual horizon) seasonal restriction, which could be applied depending on circumstances, from February 1st through July 31st for raptors and three zones of buffer restrictions for bald eagles. Results of monitoring will be reported and provided to the BLM and the USFWS.

- **Raptors**: BPM would follow spatial and seasonal buffer protocols outlined by the USFWS in their letter dated Feb. 26, 2010. These include conducting at least three surveys during nest-initiation periods from early March through early June and maintaining a disturbance-free zone around active golden eagle nests of at least 0.75 miles during the nesting season (February 1 to August 15). BPM would be required to notify the BLM if any nesting raptors are spotted; the BLM biologist may request that mining activities be halted until the young have fledged.

- **Golden Eagle Nest(s):** A Golden Eagle nest has recently been documented along a cliff face in Sec. 17, T. 54 N., R. 92 W., about 1.5 miles south of the southernmost disturbance boundary in the A-6 area. USFWS mitigation for active nests within ½ mile of mining include a seasonal mitigation measure of no activity between January 15 – July 31 of the year.

Noxious or Invasive Weeds

- BPM will be responsible for preventing and managing all noxious and undesirable invading plant species in the disturbed areas including, but not limited to cheatgrass, Russian olive, and tamarisk, until the revegetation activities have been determined to be successful, and the bond has been released for a given area. If noxious or invasive weeds are encountered, the BLM and the Big Horn County Weed and Pest Department will be consulted by the operator for control and eradication methods. Written approval of the Pesticide Use Proposal submitted by BPM Inc., from the BLM Authorized Officer must be obtained prior to usage of herbicides on public land. Newly arriving equipment will be cleaned free of plant material off site prior to arriving to the A-6 Plan area. Certified noxious weed-free and cheatgrass-free seed will be used to seed the area during reclamation (per current BLM Seed Policy, IM-2006-073, attached).

- **Weed Control**: If noxious or invasive weeds are present, the BLM and/or the Big Horn County Weed and Pest Department will be consulted by the operator/holder for control and eradication methods. A Pesticide Use Proposal (PUP) and written approval from the BLM Authorized Officer for the use of herbicides will be obtained prior to the use of herbicides on public land. BPM will also be required to follow the BLM seed policy IM No. 2006-073 (Appendix H), which would help prevent weed spreading and infestations.

- **Weed Control**: Weeds will be controlled via use of BLM-approved methods and herbicides, and their management will be the sole responsibility of BPM.

- **Weed Control**: Where weed infestations are noted on Federal lands associated with this Plan, all vehicle access will be limited to only necessary routes and controlled to minimize travel in the infested area until weed removal would be accomplished. Vegetation will be reestablished and weed-free seeds and hay for mulch would be used in the A-6 Plan/ROW area. Cleaning vehicles, equipment, and materials before they enter public land will help reduce the spread of invasive, non-native plant species.

Roads

- **Haul Road Construction and Culverts:** All haul roads will be constructed using standard engineering practices and meet BLM Manual Section 9113 requirements. Exceptions to this must be approved in writing by the BLM Authorized Officer. Standard construction practices include crowning and ditching of roads to allow the water to be shed from the road surface rather than concentrating and developing ruts. Ditch turnouts will be constructed at regular intervals to expedite drainage, and alleviate potential for increased erosion or gully formation. Culverts with the capacity to pass the predicted peak flow from the 10-year storm or greater will be installed at each stream crossing. Should erosion problems develop at the outlet, riprap or a similar form of energy dissipation will be installed. All of these construction and drainage control measures should minimize the potential for water quality degradation as a result of road construction.

Appendix H. BLM seed policy in IM-2006-073

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
January 20, 2006

In Reply Refer To:
1745 (220) P

EMS TRANSMISSION 01/27/2006
Instruction Memorandum No. 2006-073
Expires: 09/30/2007

To: All Field Officials

From: Director

Subject: Weed-Free Seed Use on Lands Administered by the Bureau of Land Management

Program Area: All programs which place seed, or approve the placement of seed on public lands.
Purpose: This Instruction Memorandum (IM) describes Bureau of Land Management (BLM) policy for the quality of seed purchased by BLM for use on public lands.

Background: The BLM Manual Section 1745 (1992) establishes policy and guidance for transplantation, augmentation, and reestablishment of habitat on public land utilizing native, and when necessary, introduced plant species. This action will comply with all Federal and State regulations, restrictions, and requirements governing the release and distribution of non-native exotic plants, including weed seeds.

BLM's Partners Against Weeds – An Action Plan for the Bureau of Land Management, January 1996, outlines BLM's plan to prevent and control the spread of noxious and invasive weeds on BLM lands. In addition, the 1999 Executive Order No. 13112 on Invasive Species states that each Federal agency shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the United States.

The BLM obtains/purchases native or introduced plant seed, from seed producers and collectors for stabilization, rehabilitation, or restoration of public land. Prior to BLM accepting seed from any source, all seed must be tested for noxious weed seed at official state seed analysis labs. Noxious weed seed is not allowed in certified seed according to individual State's Department of Agriculture seed law and the Federal Seed Act. It has been acceptable for the seed lot (excluding species on the State and Federal noxious weed seed list) to contain from 0.5 percent to 2.0 percent of other "weed" seed depending on the State. "Other weed seed" is defined as any non-noxious weed seed, such as cheatgrass (downy brome) or Russian thistle, in the State(s) of concern. When purchased, all seed must also be of certified quality or source-identified.

Policy/Action: All Field Offices are required to use seed on public lands that contain no noxious weed seed and meets certified seed quality. All seed to be applied on public land must have a valid seed test, within one year of the acceptance date, from a seed analysis lab by a registered seed analyst (Association of Official Seed Analysts). The seed lab results shall show no more than 0.5 percent by weight of other weed seeds; and the seed lot shall contain no noxious, prohibited, or restricted weed seeds according to State seed laws in the respective State(s). The seed procured for use on public land will meet the Federal Seed Act criteria. Seed may contain up to 2.0 percent of "other crop seed" by weight which includes the seed of other agronomic crops and native plants; however, a lower percent of other crop seed is recommended. Copies of the seed lab test results, including purity and germination (viability) rate, must be forwarded to the appropriate BLM office prior to seed application. If the seed does not meet the BLM and State/Federal standard for noxious weed seed content or other crop seed allowances, it shall not be applied to public land. All seed test results must be retained in the seeding project file.

The BLM State contracts for seed may be more restrictive with "other weed seeds" of concern as deemed necessary.

All donated seed or seed used for "mitigation or restoration" by contractors per a reclamation plan must meet BLM's noxious weed seed policy prior to use on public lands.

An exemption will be allowed for small reclamation projects, less than 20 acres or not to exceed 200 pounds of seed, which have an approved BLM reclamation or rehabilitation plan or permit. The seed will be accepted if accompanied by an official seed analysis report that provides documentation to show no noxious weed seed per State(s) weed law and no more than 0.5% other weed seeds. For this exception, any one of three seed test documents will be accepted:

1. A certified "blue" tag or tags.
2. An independent seed lab test.
3. A seed lab analysis supplied by a vendor either by seed lot or by seed mix.

Straw or mulches applied as part of seeding, stabilization, rehabilitation, or restoration projects on public lands must be certified to be weed seed-free.

Timeframe: Effective immediately.
Budget Impact: Approximately 80% of the seed used on public lands is purchased during a National Seed Buy (three times a year average) via a national seed contract. Under this contract, the seed must be tested prior to acceptance and payment. Therefore, there will be no new costs associated with the National Seed Buy. For offices and programs not currently testing their seed for noxious weeds or are approving project proponents to apply seed on public land without first testing for noxious weeds there will be a slight increase in the cost of seeding treatments. A typical seed test costs between $120-220 per lot for purity, germination, and noxious weed seed analysis.
Manual/Handbook Sections Affected: None.
Coordination: Coordination for this IM has been with WO-200, WO-220, WO-230, WO-270, WO-310, ID-930, BC-660.
Contact: If you have any questions on policy, please contact Jack Hamby, National ES&R Program Lead, at (202) 452-7747 or via email at Jack_Hamby@blm.gov. Questions pertaining to seed test, viability, seed lot tags, or weed seeds should be directed to Scott M. Lambert, National Seed Coordinator, Idaho State Office, at (208) 373-3894 or by e-mail Scott_Lambert@blm.gov.

Signed by:
Lawrence E. Benna
Acting, Director

Authenticated by:
Robert M. Williams
Policy and Records Group,WO-560
_____

Appendix I. BLM Sage Grouse IM-2012-019

(applicable portions provided here)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82009-1828

IN REPLY REFER TO:
6840 (930) P

February 10, 2012

EMS TRANSMISSION: 02/15/2012
Instruction Memorandum No. WY-2012-019
Expires: 9/30/2013

To: District Managers and Deputy State Directors

From: State Director

Subject: Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate

Program Area: All programs

Purpose: This Instruction Memorandum (IM) provides guidance to Bureau of Land Management Wyoming (BLM WY) Field Offices (FOs) regarding management consideration of Greater Sage-Grouse habitats for proposed activities until resource management planning updates are completed. This guidance is in place of direction provided in Washington Office (WO) IM No. 2012-043 concerning interim management policies and procedures for Greater Sage-Grouse. Specifically, this IM addresses all BLM WY programs and provides all necessary interim program direction consistent with WO IM No. 2012-043. Where planning efforts to update and incorporate this guidance are not yet completed, the BLM WY State Office will conduct periodic review of the implementation of measures and directives contained in this IM to determine their applicability and effectiveness and make changes as necessary. This IM replaces IM No. WY-2010-012 and IM No.WY-2010-013 (USDI BLM 2010a, USDI BLM 2010b). This IM also acknowledges that Wyoming BLM will be meeting the intent of WO IM-No. 2012-044, BLM National Greater Sage Grouse Land Use Planning Strategy.

Policy Statement 4: Project Locations and Analyses

BLM WY regularly conducts wildlife habitat evaluations in response to applications and proposed activities in coordination with an interdisciplinary team. Evaluations involve a review of baseline data from office-based sources including, but not limited to, aerial photography, satellite imagery and sage-grouse demographic data which may refer to activities which pose potential threats to sage-grouse habitat. Evaluations typically include field visits to identify where impacts can be reduced by protecting seasonal habitats, especially leks, nesting, early brood-rearing, and WCAs. During these habitat evaluations, other vegetation communities not generally used by sage-grouse can be identified as potential sites in which to relocate certain projects with proposed surface disturbance or disruptive activity. In order to claim that the overall relocation results in having no substantive impacts on sage-grouse, the "patch" of non-habitat would need to be quite large and activities would have to be further than 0.6mi from the edge of suitable habitat. This same principle would apply in the case of timing restrictions/limitations. In any case, relocation into least sensitive habitats or vegetation types would still be appropriate. Sage-grouse habitat indicators that may be useful to consider when identifying conservation measures may include existing disturbance, habitat availability, patch size, currently approved or proposed fragmentation of existing habitats, patch connectivity, patch dynamics (*i.e.,* seral stages of vegetation), habitat edge characteristics and corridors potentially used for seasonal migration. The interdisciplinary team will consider and weigh potential impacts on other resources, such as cultural resources, soils and water to determine siting within the least environmentally sensitive area. In all cases, direct, indirect and cumulative impacts of proposed action on sage-grouse, other wildlife and all other impacted resources must be described regardless of distance from the project or whether inside or outside sage-grouse core areas.

Locatable Mineral Activities:
Existing Notices and Approved Plans of Operations under 43 CFR 3809: For projects that overlap core areas, operators may be requested to submit modifications to the accepted notice or approved plan of operations so that the operations minimally impact core area habitats. The AO may convey to the operator suggested conservation measures, based upon the notice or plan level operations and the geographic area of those operations [also called the project area which is defined in CFR 3809.5]. These suggested conservation measures include measures that support the overall goals and objectives of the core population area strategy, though measures listed for evaluation in Policy Statement 2 of this IM may not be reasonable or applicable to the BLM's determination of whether the proposed operations will cause unnecessary or undue degradation under 43 CFR 3809.5. The request containing the suggested conservation measures must make clear that the operator's compliance is not mandatory.

Notices or Plans of Operation, or modifications thereto, submitted following the issuance of this guidance: As part of the 15 day completeness review of notices [or modifications thereto] and 30 day completeness review of plans of operations [or modifications thereto], the proposed project area(s) where exploration, development, mining, access and reclamation would take place should be reviewed for overlap of sage-grouse core areas in the corporate GIS database. If there is overlap, the BLM AO may notify the operator of ways that they may minimize impacts to core area habitats and request the operator to amend its notice or plan to include such measures. The request to amend the submitted notice or plan of operations must make clear that the operator's

compliance is not mandatory and that including such measures is not a requirement for completeness of either the notice or a plan of operations, nor is it a condition of acceptance of the notice or approval of the plan of operations.

Timeframe: Effective immediately.

Budget Impact: There may be a significant effect on budgets.

Background:

In March 2010, the FWS published its finding on the petition for the Greater Sage-Grouse to be listed as Threatened or Endangered. The finding was that the species is "warranted, but precluded." The inadequacy of regulatory mechanisms was identified as one of the major factors in the FWS's finding on Greater Sage-Grouse. The FWS has identified the principal regulatory mechanism for the BLM as protective measures embedded in land use plans. The BLM is identifying sage-grouse conservation measures for consideration through the planning process, with a target decision date of September 2014. The goal of the overall planning effort is to conserve and manage habitats necessary to sustain Greater Sage-Grouse populations and reduce the likelihood of listing under the Endangered Species Act.

In July 2011, the BLM announced the National Greater Sage-Grouse Planning Strategy which provides a framework for establishing adequate regulatory mechanisms (conservation measures) in applicable BLM LUPs throughout the range of the Greater Sage-Grouse. BLM WY will be working to incorporate the Wyoming Core Strategy into LUPs throughout the State and this IM will assist in preserving decision space that may be needed in the selection of potential alternatives.

Manual or Handbook Sections Affected: No manual or handbook sections are affected.

Coordination: This IM was coordinated among the BLM Washington D.C. Directorate, WY BLM Field Offices, other BLM State Offices, the Wyoming Office of Governor Mead and the Wyoming Game and Fish Department.

Contacts: Chris Keefe, Wildlife Biologist, 307-775-6101, and Buddy Green, Deputy State Director for Resources Policy and Management, 307-775-6113.

Signed By:	Authenticated By:
Donald A. Simpson	Sherry Dixon
State Director	Secretary

9 Attachments:

1 – Wyoming Sage-Grouse Definitions (4 pp)
2 – Seasonal Sage-grouse Habitat Component Descriptions (2 pp)
3 – Wyoming Core Areas Map ver. 3 (1 p)
4 – Coordination with Wyoming Game and Fish - Diagram (1 p)
5 – DDCT Process Manual (31 pp)
6 – Wyoming Game and Fish Department Protocols for Treating Sagebrush to be Consistent with Wyoming Executive Order 2011-5; Greater Sage-Grouse Core Area Protection (5 pp)
7 – BLM Wyoming Sage-Grouse Fluid Mineral Lease Screen (1 p)
8 – Management of Livestock Grazing in Sage-Grouse Habitats on Lands Administered by the Bureau of Land Management in Wyoming (4 pp)
9 – References (3 pp)

Distribution

Director (230), Room 204, LS	1 (w/o atchs)
CF	1(w/atchs)