

Appendix P

Locatable Mineral Resources

Reasonable Foreseeable Development Scenario

Introduction

Purpose

The purpose of this Reasonable Foreseeable Development scenario (RFD) is to provide a model that anticipates the level and type of future locatable minerals activity in the HiLine planning area and serve as a basis for cumulative impacts analysis. The RFD first describes the main legal framework of mineral development, the Mining Law of 1872. Next is a discussion of the steps involved in developing a mineral deposit. The current activity levels are briefly addressed. Future trends and assumptions affecting mineral activity are then addressed, followed by predictions and identification of anticipated mineral exploration and development. The RFD is based on the current management situation. The Future Activity section describes variations in the RFD by alternative.

Scope

The RFD is based on the known or inferred mineral resource capabilities of the lands involved, and applies conditions and assumptions discussed under Future Trends and Assumptions. Changes in available geologic data and/or economic conditions would alter the RFD, and some deviation is to be expected over time.

The mineral development discussed within this RFD includes only locatable minerals as described in Chapter 2, and the development scenario is limited in scope to the planning area. The mineral commodities that could see future activity are gold, silver and bentonite. Although there is some minor activity regarding rare earths, gems, and diamonds, the RFD will pay special attention to hardrock and bentonite mining since the activity coincides with large amounts of BLM land ownership.

The types of lands analyzed in this RFD are restricted to only federal surface and federal minerals administered by the BLM. Activities on private, state, or Forest Service lands are considered when BLM lands or minerals are nearby and may be involved or affected.

Within the HiLine planning area, the BLM manages about 2.4 million acres of BLM land and 3.8 million acres of federal mineral estate. The acres of BLM-administered surface and mineral estate by county (within the planning area) are shown in Table P.1.

Table P.1									
BLM-Administered Surface and Mineral Estate by County (Acres)									
	<i>Blaine</i>	<i>Chouteau</i>	<i>Glacier</i>	<i>Hill</i>	<i>Liberty</i>	<i>Phillips</i>	<i>Toole</i>	<i>Valley</i>	<i>Total</i>
Mineral Estate	612,101	158,014	6,181	122,732	54,404	1,465,009	116,180	1,229,261	3,763,882
BLM Surface	300,019	45,230	1,060	14,558	7,620	1,030,895	27,368	1,014,518	2,441,268

Resource Area

The areas with the highest levels of mineral development potential for hardrock mineral occurrences are the alkalic igneous intrusive centers in the planning area, mainly the Little Rocky Mountains and Sweet Grass Hills. Diverse types of significant epithermal gold mineralization occur at these intrusive centers. The mineralization took place during the late stages of igneous activity during the Tertiary period and is hosted stockworks or fracture sets. The latter are mostly localized by intraformation solution breccias in the upper Madison, near the porphyry contacts. In these mineral

systems, gold occurs as auriferous pyrite, sylvanite, or in native form. Mineralization is accompanied by varying amounts of silver, base metal and tellurides, with quartz, fluorite, carbonate and barite (Giles 1982).

Bentonite is one of the principal commodities of the HiLine and is composed of clay minerals from the montmorillonite group. Deposits of bentonite are generally created from metamorphism of volcanic ash deposited in a marine environment. The geologic formation that contains the most noted bentonite deposits in the planning area is the Bearpaw Shale of the Montana Group. Although bentonite does occur in other formations, it is this formation that is considered to have the necessary thickness and physical properties to contain commercial deposits.

The Mining Law

The 1872 Mining Law (as amended) governs locatable minerals and other mineral activity in the HiLine planning area. The BLM must approve any Plan of Operations or review any Notice on all public land. Except for areas withdrawn or otherwise segregated from mineral location, all BLM-administered mineral estate remains open for prospecting and development of locatable minerals. Development is subject to the regulations contained in 43 CFR 3809.

History

The General Mining Law of 1872 (17 Stat. 91) is the authorizing act for mineral exploration and development in the planning area. The origin of the Mining Law can be traced to the 16th century, and reflects close ties to English and Spanish traditions.

Early American colonial charters contained outright grants of mineral land to settlers; however, these grants were accompanied by certain permanent reservations of precious metals to the sovereign. This formed the basis for the early traditions and customs regarding mineral rights for the colonies in the eastern part of United States until early 1800s.

In 1849, there was no formal mining law in the United States. Congress passed several leasing or sales acts of limited duration for gold, silver, lead, and iron. These acts were administered by the War Department. In 1849, when the California gold rush began, miners were technically in mineral trespass when they located claims on the public domain. The gold rush brought into conflict the two mining traditions. In 1860, the silver strike in the Comstock Lode in Nevada started a second mining rush to the West, opening up further conflict between the two mining traditions. As eastern interests were financing the Comstock Lode and California Mother Lode, the question of security of title and tenure became a major political issue in Congress.

From 1865 to 1885, congressional policy for the public lands focused on encouraging westward migration of people to settle and develop the West. In furthering this policy a series of statutes was passed including various homestead acts, agricultural entry laws, soldier compensation acts, and several acts designed to emphasize mineral exploration and development.

On July 26, 1866, the first mining law was passed as the Lode of 1866 (14 Stat. 251). This act provided for the entry and location of lode claims, assessment work and patents for lode claims.

The Placer Act was passed on July 9, 1870. It provided for the entry and location of placer claims on non-agricultural land, for location by legal description, and patent.

These two acts were consolidated, with amendments, into the General Mining Law of May 10, 1872. This statute is the basis for appropriation of mineral resources from the public domain today.

Principles

The Mining Law consists of five basic elements: discovery of a valuable mineral, location of mining claims, recordation of claims, maintenance – performance of annual requirements on claims, and patenting of the mineral (possibly surface) estate to the claimant.

Discovery

There is no federal statutory definition of what constitutes a valuable mineral deposit, but several judicial and administrative rulings or declarations on the subject have been made. In 1894 in the case of *Castle v. Womble*, the Department of the Interior established the “prudent person rule.” This rule states:

“... where minerals have been found and the evidence is of such a character that a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a reasonable prospect of success in developing a valuable mine, the requirements of the statutes have been met.”

This definition was approved by the United States Supreme Court in 1905.

In the 1968 case of *U.S. v. Coleman*, the Supreme Court approved the marketability test as a complement to the prudent person rule. This test requires a showing of marketability to confirm that a mineral could be mined, removed, and marketed at a profit. In other words, the marketability test takes into account economics, requiring the claimant to show that there is a reasonable prospect of selling material from a claim or a group of claims. It is not necessary that the material has been sold or is selling at a profit, but that there is a reasonable likelihood that it could be sold at a profit.

Some minerals, such as bentonite, can be classified as either locatable (uncommon variety) or salable (common variety), depending on the characteristics of the deposit. In 1969, *McClarty v. Secretary of the Interior* (408 F.2d 907, 908) set the following standards to distinguish locatable minerals from salable minerals:

1. the mineral deposit in question must have unique property;
2. the unique property must give the deposit a distinct and special value;
3. if the special value is for uses to which ordinary varieties of the mineral are put, the deposit must have some distinct and special value for such use; and
4. the distinct and special value must be reflected by the higher price which the material commands in the market place (or by reduced cost or overhead so that the profit to the claimant would be substantially more).

Location

Mining claims may be located only by citizens of the United States, persons who have declared an intention to become citizens, and corporations organized under any state law. Mining claims may only be located on federal lands open to mineral entry under the mining laws, and only for mineral commodities considered to be locatable. A mineral is locatable if it is in the public domain, and is a metallic mineral, or of an uncommon variety valuable chiefly for chemical, rather than physical properties. Mining claims may be located before or after discovery of valuable mineral, on unappropriated public domain land. This claim grants the locator an exclusive possessory right to the mineral deposit. This possessory right allows the locator to continue to develop the claim as provided for by law. It is valid against the United States and other claimants only if a valuable mineral deposit has been discovered.

There are two main types of mining claims: lode and placer. Lode claims are located on indurated bedrock; while placer claims are usually located on loosely consolidated materials such as mineral bearing sands and gravels. Two additional types of mining claims may be located under the mining law: mill sites and tunnel sites. A mill site may be located on unappropriated public domain land that is nonmineral in character. It is used for the construction of a mill or reduction works, or for other uses reasonably incident to a mining operation. A tunnel site may be located on a plot of land where a tunnel is run to develop a vein or lode, or for the purpose of intersecting unknown veins or lodes. The actual location of a mining claim in Montana involves posting a notice of location at the discovery point and erecting corner posts, or monuments, on the ground to insure that the claim boundaries are readily identifiable.

Recordation

Prior to the Federal Land Policy and Management Act (FLPMA), claimants were required to file their location and assessment notices only in the office of the county recorder, or county clerk, in the county in which the claim was located. Since enactment of FLPMA, notices of location and other notices must be filed with the BLM state office, as well as the appropriate county recorder. This requirement has allowed the BLM to know the number, types, and current status of claims located on public land. Failure to file these documents with the BLM is considered abandonment of a mining claim.

Maintenance

The General Mining Law of 1872 requires performance of an annual minimum of \$100 worth of labor or improvements to retain a possessory interest in the claim. An affidavit of assessment work must be filed with both the county recorder and with the BLM State Office. Owners of mill and tunnel sites are not required to file assessment work, but are required to file a notice of intent to hold the site.

Exploration and mining activities on BLM-administered lands are subject to regulation under 43 CFR 3715, 43 CFR 3802, and 43 CFR 3809. These regulations require that an operator prevent unnecessary or undue degradation and perform reasonable reclamation.

Patents

Since October 1, 1994, Congress has imposed a budget moratorium on BLM acceptance of any new mineral patent applications. Until the moratorium is lifted, no new applications may be accepted by the BLM.

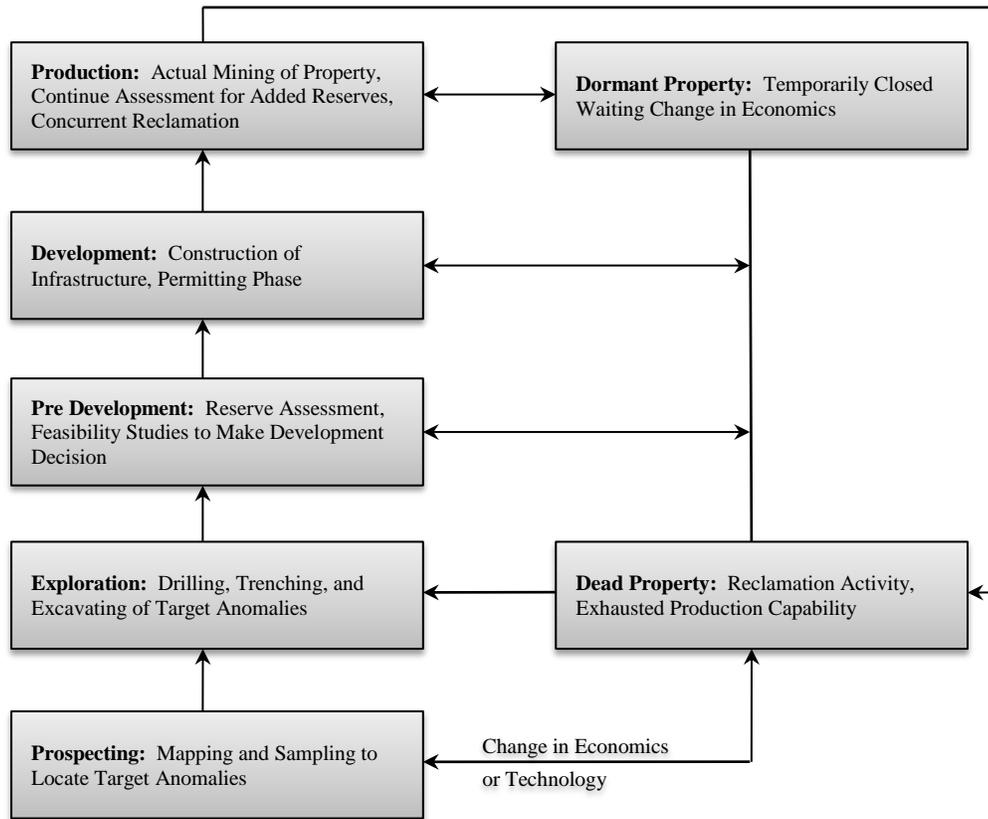
It is not necessary to have a patent to mine to remove minerals from a mining claim. In fact, it is not even necessary to have a mining claim at all if the land is open to mineral entry. However, a patent gives the owner exclusive title to the locatable minerals and, in most cases, to the surface estate. In order to obtain patent, the claimant must have performed at least \$500 worth of development work per claim; had a mineral survey and plat prepared at his expense; show he holds possessory rights by chain of title documents; publish a notice for potential adverse claimants to assert his claims; and demonstrate discovery of a valuable mineral deposit within the meaning of the Mining Law. Upon satisfactory completion of the above requirements, the claimant is given the opportunity to purchase the mining claim(s) at \$2.50 per acre for placer claims and \$5 per acre for lode claims.

Development of a Mine

The development of a mine from exploration to production can be divided into six stages. Each stage requires the application of more discriminating (and more expensive) techniques over a successively smaller land area to identify and develop an economic mineral deposit.

A full sequence of developing a mineral project involves the following stages: appraisal of a large region, reconnaissance of selected parts of the region, detailed surface investigation of a target area, three dimensional physical sampling of the target area, development of the mine infrastructure, and actual production. These can be grouped into four categories: Reconnaissance, Prospecting, Exploration, and Mine Development. A diagram showing the relationship of these various stages in the life of a mine is shown in Figure P.1.

**Figure P.1
Mine Life Cycle**



Source: BLM 2009

Reconnaissance

Reconnaissance-level activity is the first stage in exploring for a mineral deposit. This activity involves initial literature search of an area of interest, using available references such as publications, reports, maps, aerial photos, etc. The area of study can vary from hundreds to thousands of square miles.

Activity that will normally take place during reconnaissance includes regional scale mapping, regional geochemical and geophysical studies, and remote sensing with aerial photography or satellite imagery. These studies are usually undertaken by academic or government entities, or major corporations.

The type of surface-disturbing activity associated with reconnaissance level mineral inventory is usually no more than occasional stream sediment, soil, or rock sampling. Minor off-road vehicle use may be required.

Prospecting

Any anomalous results from reconnaissance are used to identify prospecting areas, ranging in sizes from a fraction of a square mile to several hundred square miles. Activities that will take place in an effort to locate a mineral prospect include more detailed mapping, sampling, geochemical and geophysical study programs. Also, this is the time when property acquisition efforts usually begin, and most mining claims are located in order to secure ground while trying to make a mineral discovery. Prospecting on an annual basis is considered a minimum requirement, under the mining laws, to secure a claim.

Types of surface-disturbing activity associated with prospecting would involve more intense soil and rock chip sampling using mostly hand tools, frequent off-road vehicle use, and placement and maintenance of mining claim monuments. This activity is normally considered casual use (43 CFR 3809.5) and does not require BLM notification or approval.

Exploration

Upon location of sufficiently anomalous mineral occurrence or favorable occurrence indicator, a mineral prospect is established and is subjected to more intense evaluation through exploration techniques.

Activities that take place during exploration include those utilized during prospecting but at a more intense level in a more focused area. In addition, activities such as road building, trenching, and drilling are conducted. In later stages of exploration, an exploratory adit or shaft may be driven. If the prospect already has underground workings, these may be sampled, drilled, or extended. Exploration activities use mechanized earth moving equipment (excavators, backhoes, drill rigs, etc.) and may involve the use of explosives.

A typical exploration project in the planning area would require construction of approximately 5,000 feet of access road, establishment of about a dozen drill sites, with several holes at each site drilled to less than 500 feet deep, and possibly several trenches 200 feet by 8 feet by 6 to 8 feet deep. If initial results are encouraging, the exploration program will be expanded to determine the limits of the deposit. Most surface disturbance associated with exploration projects amounts to less than 5 acres and is conducted under a Notice (43 CFR 3809.21 and 43 CFR 3809.300-336), requiring the operator to notify the BLM 15 days before beginning activity.

Mine Development

If exploration results show that an economically viable mineral deposit may be present, activity will intensify to obtain detailed knowledge sufficient to delineate possible reserves, mining methods, and mineral processing requirements. This will involve applying all the previously used exploration tools in a more focused effort. Once enough information is acquired, a feasibility study will be made to decide whether to proceed with mine development and what mining and ore processing methods will be used.

Once the decision to develop the property is made, the Plan of Operations process begins. Upon approval, work begins on development of the mine and its infrastructure. This includes construction of the processing facilities, offices, and a laboratory; driving of development workings if the property is to be mined underground, or prestripping if it is to be mined through open pit methods. During this time, building of access roads or haulage routes and placement of utilities are completed while also continuing any additional refinement of ore reserves.

When enough facilities are in place, actual mine production begins. Along with production, there often are satellite exploration efforts to expand the mine's reserve base and extend the project life. Upon completion of the operation, concurrent with mining, the property is reclaimed. Sub-economic resources are often left unmined and the property is dormant, waiting for changes in commodity price or production technology that would make these resources economic (Figure P.1).

Activities that occur during mine development include: actual mining, ore processing, tailings disposal, waste rock placement, solution, metal refining, and placement of support facilities such as repair shops, labs, and offices. Such activities involve the use of heavy earthmoving equipment and explosives for mining and materials handling, exploration equipment for refinement of the ore reserve base, potentially hazardous or dangerous reagents for processing requirements, and general construction activities.

The size of mines varies greatly, and not all mines would require all the previously mentioned facilities and equipment. Acreage involved can range from single acres to several hundred, with most projects requiring surface disturbance greater than casual use and an approved Plan of Operations (43 CFR 3809).

Plan of Operations Approval Process

The Montana Department of Environmental Quality (DEQ) is the state permitting authority for hardrock operations and open-cut mining in Montana. All Plans of Operations required by the BLM are reviewed and approved in coordination with the DEQ.

Often before submitting a proposed Plan of Operation to the BLM (Operating or Open-cut Permit to the DEQ), the operator will contact the agencies for guidance on specific information or data that should be included in the application. The application is then filed with both agencies that coordinate staffing needs and agency roles for the review. The pre-Plan coordination is not required by regulations, but can be arranged as a convenience to the operator.

Upon receipt, the Plan is reviewed for completeness. A completeness review involves identifying any additional information the operator must provide to allow the BLM to determine whether the Plan of Operations is adequate to prevent unnecessary or undue degradation. The deficiencies identified during a completeness review are provided to the operator within 30 days of receipt. The applicant then revises the Plan as appropriate and resubmits it to the agencies for another completeness review. The cycle of completeness review by the agencies, including subsequent modification of the Plan by the applicant, continues until the application is accepted as complete.

After a complete Plan of Operations is received, the environmental analysis is prepared in accordance with both Montana Environmental Policy Act (MEPA) and National Environmental Policy Act (NEPA) requirements. Depending on the anticipated impacts of the proposal, this may be either an environmental assessment (EA) or an environmental impact statement (EIS). Typically, but not always, three alternatives are analyzed in the document: the operator's proposal, the operator's proposal with additional agency-imposed modifications (usually the preferred alternative), and the no action alternative. During this time the BLM may require the operator to submit additional information or baseline studies that assist the BLM with its environmental analysis under NEPA, National Historic Preservation Act (NHPA) consultation, or any other review process associated with the Plan of Operations.

When the environmental analysis and review process is to the point where the BLM and the operator can anticipate what the approved Plan of Operations will be, the operator will be required to provide a Reclamation Cost Estimate (RCE). Within 30 days of receipt, the BLM will review the RCE and notify the operator of any deficiencies in the cost estimate or any additional information required.

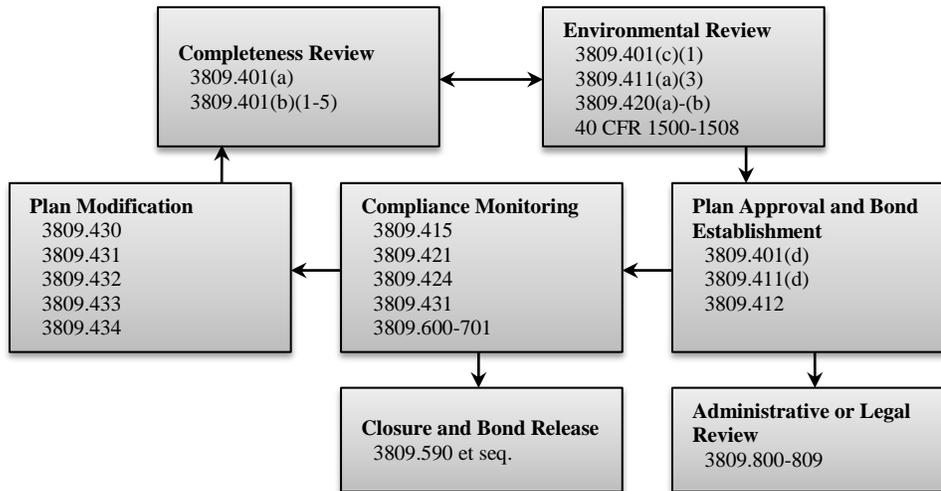
Public review and comment on the Plan of Operations may be solicited at any time during the process, but is mandatory after a complete Plan is filed. The time period for public comment is dependent on the issues and interest in the operation, but a minimum of 30 calendar days is required. Public meetings for scoping and/or comment are held as appropriate.

After the Plan of Operations review, including the environmental analysis, and the consultation requirements are complete, and the public comments have been considered, the agencies make an approval decision. Conformance with the modified mining and reclamation plans, plus any additional mitigation measures required to prevent unnecessary and undue degradation as defined in 43 CFR 3809.415, are conditions of approval. A financial guarantee based on the RCE must be posted before surface disturbance can begin.

In areas withdrawn from mineral entry, Plans of Operations will not be approved unless the Department of the Interior has determined that the mining claims covered by the Plans of Operations are valid under the surface management regulations at 43 CFR 3809.100.

The Plan of Operations approval process is laid out with associated regulation in Figure P.2, the Plan of Operations Approval Diagram below. Amendments to an existing Plan of Operations are processed in a similar manner.

Figure P.2
Plan of Operations Approval Process



Source: BLM 2009

Mining and Exploration Activities

The number of mining claims in the HiLine planning area is shown in Chapter 3, Table 3.46. It is important to note that while there are over 740 mining claims in the planning area, only a small portion (about 10%) of these claims will have any activity above the prospecting level. Many claims are adjacent to known minable areas and serve to secure the property from potential rivals. Many of the claims overlap and might cover the same portion of ground. Often blocks of claims are located to serve as a basis for exploration projects. These blocks will naturally cover more area than the initial geology indicates is warranted so as to provide room for possible expansion should the mineral prospects be favorable.

Little Rocky Mountains

Mining in the Little Rocky Mountains began in the late 1880s and proceeded intermittently until the 1970s. In 1979, large-scale mining began in the area. The ore was found amenable to the cyanide heap leaching process due primarily to the finely disseminated gold particles occurring along abundant fractures in the rock, allowing contact between the cyanide and gold without requiring crushing. From 1979 to 1998, Pegasus Gold Corporation and its wholly owned subsidiary operating company, Zortman Mining, Inc. (ZMI), operated the Zortman and Landusky Mines.

The Zortman mine consisted of eight valley fill leach pads containing an estimated 16 million tons of ore grading 0.028 ounces per ton (opt) gold and 0.171 opt silver. Solution inventory averaged about 20 million gallons.

The Landusky mine consisted of eight valley fill leach pads containing over 34 million tons of ore. One leach pad, constructed in 1987, was estimated to contain some 40 million tons when fully loaded. The average ore grade at Landusky was slightly lower than Zortman. Mined ore averaged 0.022 opt gold and 0.125 opt silver. Solution inventory averaged over 33 million gallons.

In January 1998, Pegasus Gold Corporation and ZMI filed for bankruptcy protection, and in March 1998, plans to proceed with reclamation began, using the Reclamation Plan developed by the BLM, DEQ, EPA, and the Fort Belknap Indian Reservation between 1999 and 2001. Reclamation (including water treatment and monitoring) continues to this day.

Currently, there are no exploration projects in the Little Rocky Mountains. This is mostly due to the large area of land withdrawn from mineral entry within the footprint of the Zortman and Landusky Mine reclamation. There is currently one Plan of Operations for placer mining in Alder Gulch, just outside the town of Zortman.

Sweet Grass Hills

Historical records and physical evidence indicate exploration interest in lode and placer deposits at various times through the early 1960s on all three buttes of the Sweet Grass Hills. The only reported amount of gold recovered from placer operations was near Gold Butte, yielding less than 2,000 ounces (Ross 1950). Other lode deposits around East Butte were reported at about 8,700 pounds of copper, 8,400 pounds of lead, 1,100 pounds of zinc, and 651 troy ounces of silver. This activity was reported from underground exploration at the Sweetgrass Mine in 1963 (Hubbard, et al. 1966).

Contemporary exploration in the Sweet Grass Hills commenced in the early 1970s. Several companies have had exploration interest in all three buttes, particularly in the Tootsie Creek area of East Butte, up to the early 1990s.

In 1995, the BLM completed the validity examination of 14 unpatented mining claims located on East Butte as a result of the area being segregated for evaluation of Native American traditional interests and hydrological concerns. The results indicated eight of the claims meet the test of discovery under the mining law and were found valid. (BLM 1996b).

There are currently no Notices for exploration or Plans of Operations in the Sweet Grass Hills.

Brazil Creek

Brazil Creek is an area southwest of Glasgow that has a history of bentonite mining. From 1976 to 1979, there was an open-pit mine and processing plant that had the capacity to produce approximately 200,000 tons annually. Plant production shut down in 1979, but mining of bentonite continued from 1983 through 1985, producing approximately 180,000 tons during that period.

There is currently one Notice for bentonite exploration and one Plan of Operation for bentonite mining.

Future Trends and Assumptions

This section discusses anticipated future trends and assumptions that will be made when predicting solid minerals activity in the planning area.

Commodities Produced

The major commodity of interest will continue to be the precious metals, gold and silver. This is based on the combination of price and favorable geology for mineral occurrence. Minor base metal production will occur in association with precious metals, but is not expected to be a significant factor in mine economics.

Bentonite will also continue to be a commodity of interest. The deposits within the Bearpaw Shale of Valley and Phillips counties will continue to attract exploration and mining interest.

Technology

As in most any other industry, advances in technology will have a substantial effect on future mineral exploration and development. Along with the exploration and data collection, analysis and geologic modeling methods will become more sophisticated and available to the average user. This will advance accuracy and speed when assessing a mineral deposit's potential.

Mining and mineral processing efficiency will continue to improve in the future. As general technology advances, availability to the mining industry increases as well. More knowledge from these advancements will continue to be gained through experience and research by industry and government agencies. Advancements in environmental science, including alternative mining and processing methods, could open up greater potential for development.

In the same way, reclamation science will advance as well. More detailed design efforts will continue to be placed on reclamation of mined land, resulting in an overall increase in reclamation costs. These costs should pay dividends in the long term with increased reclamation success. As the rate of reclamation success further improves by decreasing environmental impacts of mining, the potential for development will increase.

Commodity Markets

The economics of mining in the planning area will be driven by the relationship between commodity production costs and market price. Though more silver is often produced than gold, it is the relatively high unit value of gold that will be critical in establishing the economic viability of mining. While production costs can be controlled or anticipated, through management and technology, the significant unknown factor will be the price of gold. The overall profitability of an operation, and hence the level of activity at the prospecting, exploration, and mining phases, for development of gold ore bodies will be closely related to the price of gold (Table P.2).

<i>Year</i>	<i>PPI* (Metals)</i>	<i>Gold Prices 1988-2008</i>			<i>Silver Prices 1988-2008</i>		
		<i>Gold (Unadjusted)</i>	<i>Gold (2008 \$)</i>	<i>10-yr Avg.</i>	<i>Silver (Unadjusted)</i>	<i>Silver (2008 \$)</i>	<i>10-yr Avg.</i>
1988	1.187	\$436.98	\$784.13		\$6.53	\$11.72	
1989	1.241	\$381.44	\$654.69		\$5.51	\$9.46	
1990	1.229	\$383.51	\$664.67		\$4.83	\$8.37	
1991	1.202	\$362.11	\$641.68		\$4.05	\$7.18	
1992	1.192	\$343.82	\$614.38		\$3.95	\$7.05	
1993	1.192	\$359.77	\$642.88		\$4.31	\$7.70	
1994	1.248	\$384.00	\$655.38		\$5.28	\$9.02	
1995	1.345	\$383.79	\$607.79		\$5.20	\$8.24	
1996	1.31	\$387.81	\$630.56		\$5.20	\$8.46	
1997	1.318	\$331.02	\$534.96	\$643.11	\$4.91	\$7.93	\$8.51
1998	1.278	\$294.24	\$490.40	\$613.74	\$5.55	\$9.25	\$8.26
1999	1.246	\$278.98	\$476.91	\$595.96	\$5.22	\$8.92	\$8.21
2000	1.281	\$279.11	\$464.09	\$575.90	\$4.95	\$8.23	\$8.20
2001	1.254	\$271.04	\$460.38	\$557.77	\$4.37	\$7.42	\$8.22
2002	1.259	\$309.73	\$524.01	\$548.74	\$4.60	\$7.78	\$8.29
2003	1.292	\$363.38	\$599.07	\$544.35	\$4.88	\$8.04	\$8.33
2004	1.496	\$409.72	\$583.36	\$537.15	\$6.67	\$9.50	\$8.38
2005	1.608	\$444.74	\$589.11	\$535.28	\$7.32	\$9.69	\$8.52
2006	1.816	\$603.46	\$707.80	\$543.01	\$11.55	\$13.54	\$9.03
2007	1.935	\$695.39	\$765.47	\$566.06	\$13.38	\$14.73	\$9.71
2008	2.13	\$871.96	\$871.96	\$604.22	\$14.99	\$14.99	\$10.28
2009		\$957.84			\$14.40		

*Producer Price Indexes (PPI): U.S. Bureau of Labor Statistics
Gold and silver prices: <http://www.kitco.com>, 2009

The supply and demand for gold, and ultimately the price, is determined by several factors. On the supply side, production costs must be lower than price for firms to earn a profit. Relatively low-grade deposits, which were once uneconomical to mine, have become profitable resources to develop due to the emergence of new production techniques. Thus, supply has been increasing while the relative cost of production generally has declined. However, the profitability of these mining processes has increased the number of suppliers worldwide and made the market more competitive.

Factors influencing the demand for gold, both nationally and internationally, include the growth of disposable income, inflationary expectations, international stock market activity, the value of the US dollar relative to other currencies, and political events.

The primary market for bentonite is drilling muds and foundry application, so demand is tied closely with activity in these associated industries. But, when containing certain properties, bentonite can find a market in a wide range of applications in the food, medical, and construction industries. The distance from the source area to available markets is the primary limiting factor when meeting demand.

Legislative Changes

There are several areas of legislative change that may affect how the locatable mineral resources are developed.

One is the ongoing effort to amend, repeal, or reform the Mining Law of 1872. This could result in anything from simply leaving the law as is to completely restructuring it into a leasing and royalty system that is similar to what is now used for coal or oil and gas. In regards to exploration, a major change in the mining law would be if the right of self-initiation was lost, there would be a decrease in the amount of activity undertaken by small operators. Another affect, perhaps more extensive, would be if a royalty is placed on mineral production, decreasing the ultimate number and size of mines that could be developed. An increase of production cost with an added royalty would raise the cut-off ore grade, making some currently economic deposits uneconomical.

Changes in the way mining property and production is taxed could also have a substantial effect on the viability of individual operations. No changes in state tax schedules are anticipated, and no federal royalty is assumed in this analysis.

Another area of possible legislative change is in environmental laws or regulations which would affect exploration and mining activity.

For purposes of analysis, it is assumed that the mining law could be changed, the right of self-initialization will not be changed, and there will be no federal royalty system imposed. Also for this analysis, the Montana law for the ban on open-pit gold and silver mining that utilizes heap leaching or vat leaching with cyanide ore-processing reagents, Section 82-4-390, MCA, is considered a mine planning criteria, so it is not applicable to the development potential for public lands managed by the BLM.

Development and Activity Potential

The HiLine planning area is classified into three categories for development potential: high, moderate, and low as shown on Map P.1 (located at the end of this Appendix P). A fourth category is also discussed, which is the very low or unknown development potential. The term development potential as used in this document refers to the potential of the lands to support actual mine development. It is dependent on a variety of factors which include geology, engineering, and economics. It should not be anomalous amounts. All of the lands in the moderate and high development potential areas have high occurrence potential for locatable mineral (hardrock and bentonite) resources. Table P.3 shows the federal minerals by development potential.

Table P.3 Mineral Development Potential (BLM Acres)		
<i>Development Potential</i>	<i>Federal Minerals</i>	<i>Percent of the Planning Area</i>
High	12,567	0.3%
Moderate	29,204	0.8%
Low	95,182	2.5%
Very Low (Unknown)	3,626,929	96.4%

The development potential of these lands can be correlated with the types of activity and the Mine Life Cycle Diagram (Figure P.1). A description of development potential and associated level of activity follows.

Very Low or Unknown Development Potential/Reconnaissance Level Activity

The vast majority of lands in the planning area are in this category and have either little or unknown potential for locatable mineral development. Geologic conditions are not favorable for mineral occurrence, or geologic data is insufficient to support a determination. Activities that would occur on these lands are at the reconnaissance level as described in the Development of a Mine, Reconnaissance section. Negligible surface disturbance is usually associated with this level of activity.

Low Development Potential/Prospecting Level Activity

Lands in this category have geologic conditions moderately favorable for mineral resource occurrence, or have recent claim staking or property acquisition activities. These lands may contain mineral resources but cannot be put into a moderate or high development potential category due to lack of evidence indicating minable reserves, in either quality or quantity, that would warrant further consideration for development. Prospecting activities would occur on these lands as described in the Development of a Mine, Prospecting section. If an exploration program is successful further exploration would follow, and the lands may eventually be placed in a high development potential category.

Moderate Development Potential/Exploration Level Activity

Lands in this category exceed the requirements for Low Development Potential by having recent or anticipated exploration activity and/or a prospect identified requiring more intense exploration methods. These lands have high to very high mineral occurrence potential. Activities that would occur on these lands can involve use of mechanized earthmoving equipment and are described in the Development of a Mine section.

High Development Potential/Mining Level Activity

Lands in this category exceed the requirements for moderate development potential and contain proven, probable or inferred reserves and/or are within, or potential additions to, the permit area of a proposed or operating mine. Activities that would occur on these lands are described in the Development of a Mine section.

Future Activity

This section describes the extent of exploration and mine development within the foreseeable future, broken into specific geographic areas with high development potential and by alternative. This includes development of known resource occurrence and of undiscovered resource bodies resulting from prospecting and exploration activity.

The acres of disturbance due to foreseeable locatable mineral activity by alternative is shown in Table P.4 below, and the description of potential exploration and mining development activity by region and alternative follows. In some cases,

the acres of disturbance vary between short-term and long-term categories under the same alternative. This difference is due to allowing a withdrawal to expire or be reduced over a period of time, eventually opening more lands to mineral location.

Also under some of the alternatives, there are instances where development scenarios with differing acres of disturbance are discussed. For analysis, the development scenario with the greatest disturbance footprint is selected.

<i>Geographic Region</i>	<i>Acres of Disturbance by Alternative</i>						
	<i>Alternative A (Current Management)</i>		<i>Alternative B</i>	<i>Alternative C</i>	<i>Alternative D</i>		<i>Alternative E (Preferred Alternative)</i>
	<i>Short-Term</i>	<i>Long-Term</i>	<i>Short-Term and Long-Term</i>	<i>Short-Term and Long-Term</i>	<i>Short-Term</i>	<i>Long-Term</i>	<i>Short-Term and Long-Term</i>
Little Rocky Mountains	130	2,170	130	130	10	10	130
Sweet Grass Hills	110	175	110	110	110	175	110
Brazil Creek	150	150	115	115	115	115	115
Total	390	2,495	355	355	235	300	355

Little Rocky Mountains

Alternative A (Current Management)

Under this alternative, the withdrawal from mineral entry for the Zortman/Landusky Mine Reclamation in the Little Rocky Mountains (3,380 acres) would expire in October 2015, opening BLM land in this area to more exploration and mining activity in the long term. Ten possible exploration projects can be anticipated in this area. Average disturbance for this activity would be 5 acres per project, amounting to a total of 50 acres of disturbance due to exploration.

Along with other circumstances on the private land of the Zortman and Landusky Mines, lifting the current withdrawal could also result in reestablishment of mining operations. This would create disturbance on currently reclaimed areas of the mine footprint, about 1,200 acres. Foreseeable development would also include an expansion of the Zortman and Landusky Mines, about 710 acres.

If future exploration discovers an economic deposit on Antoine Butte or in the Pony Gulch area as could be anticipated, an underground mine operation would extract ore from selected mineralized areas and process it by crushing and vat leaching. The tailings from the vats would be disposed of at a facility designed to meet the applicable engineering requirements. This type of operation would result in 50 acres of surface disturbance each, totaling 100 acres.

If the exploration was successful in the discovery of sufficient reserves on either the Antoine Butte or in the Pony Gulch area, an open-pit mine with associated processing facilities could be constructed. This type of development would result in the extraction of gold and silver from the deposit. The total area of disturbance for all roads, mills, plants, pads, and ponds would be less than 100 acres each, totaling 200 acres.

Continued casual use level prospecting could also result in one anticipated placer mining operation, resulting in 10 acres of disturbance.

It is estimated that 90% of activity would occur within the high and moderate development potential areas shown on Map P.1. The remaining 10% could occur in the area having low development potential.

Alternative B

Under this alternative, the BLM would recommend a 20-year withdrawal from mineral entry for the Zortman/Landusky mine reclamation area (3,380 acres) when the current withdrawal expires in 2015. In addition to this withdrawal, the entirety of the Little Rocky Mountains area would be withdrawn under this alternative for the protection of cultural values under the Little Rocky Mountains Traditional Cultural Property (TCP) (37,387 acres). These withdrawals would eliminate any foreseeable locatable minerals development.

Alternative C

Under this alternative, the BLM would recommend a 20-year withdrawal from mineral entry for the Zortman/Landusky mine reclamation area (3,380 acres) when the current withdrawal expires in 2015. Four possible exploration projects can be anticipated in this area. Average disturbance for this activity would be 5 acres per project, amounting to a total of 20 acres of disturbance due to exploration.

The withdrawal would eliminate any foreseeable development with any possible reestablishment and expansion of the Zortman and Landusky Mines. Development of a mining operation could still potentially occur in the Pony Gulch area. If future exploration discovers an economic deposit, an underground mine operation would extract ore from selected mineralized areas and process the ore by crushing and vat leaching. The tailings from the vats would be disposed of at a facility designed to meet the applicable engineering requirements. This type of operation would result in 50 acres of surface disturbance.

If the exploration was successful in the discovery of sufficient reserves, an open-pit mine with associated processing facilities could be constructed. This type of development would result in the extraction of gold and silver from the deposit. The total area of disturbance for all roads, mills, plants, pads, and ponds would be less than 100 acres.

Continued casual use level prospecting could also result in one anticipated placer mining operation, resulting in 10 acres of disturbance.

Alternative D

As under Alternative A, the withdrawal from mineral entry for the Zortman/Landusky mine reclamation area in the Little Rocky Mountains (3,380 acres) would be allowed to expire in October 2015. This would open BLM land in this area to more exploration and mining activity in the long term, but under Alternative D, another withdrawal (15,000 acres) associated with the Little Rocky Mountains ACEC would be in place. This ACEC and withdrawal would eliminate any foreseeable development with any possible reestablishment and expansion of the Zortman and Landusky Mines.

Continued casual use level prospecting could also result in one anticipated placer mining operation in areas not withdrawn, resulting in 10 acres of disturbance.

Alternative E (Preferred Alternative)

Under this alternative, the potential level of development activity in the short term would be the same as in Alternative C, but in the long term, the Zortman/Landusky Mine Reclamation ACEC and withdrawal would be reduced from 3,380 acres to 2,605 acres. Even though this would increase the amount of land open to mineral entry, the continued withdrawal of the reclamation site would not facilitate the reestablishment or expansion of the Zortman and Landusky Mines, keeping the resulting acres of disturbance to 130 acres.

As reclamation and water treatment is further established for the Zortman and Landusky Mine sites, future assessment may deem a reduction of the withdrawn area appropriate. The amount of acres for this reduction is unknown, but any amount of acres withdrawn of the mine site would have the same influence on the reestablishment of mineral development as the current withdrawal.

Sweet Grass Hills

Alternatives A (Current Management) and D

Under this alternative, the withdrawal from mineral entry in the Sweet Grass Hills TCP (19,671 acres) would be allowed to expire in April 2017, opening BLM land in this area to more exploration and mining activity in the long term. Three possible exploration projects can be anticipated in this area. Average disturbance for this activity would be 5 acres per project, amounting to a total of 15 acres of disturbance due to exploration.

If future exploration discovers an economic deposit, an underground mine operation would extract ore from selected mineralized areas and process it by crushing and vat leaching. The tailings from the vats would be disposed of at a facility designed to meet the applicable engineering requirements. This type of operation would result in 50 acres of surface disturbance.

If the exploration was successful in the discovery of sufficient reserves, an open-pit mine with a processing facility could be constructed. This type of development would result in the extraction of gold and silver from the deposit. The total area of disturbance for all roads, mills, plants, pads, and ponds would be less than 150 acres.

Continued casual use level prospecting could also result in one anticipated placer mining operation with 10 acres of disturbance.

It is estimated that 85% of activity would occur within the high and moderate development potential areas shown on Map P.1. The remaining 15% could occur in the area having low development potential.

Alternatives B, C, and E (Preferred Alternative)

Under these alternatives, it is recommended the withdrawal from mineral entry in the Sweet Grass Hills be extended for an additional 20 years. All foreseeable future activity would be limited to the valid existing mining claims (about 100 acres) in the Tootsie Creek area of East Butte. Two exploration projects can be anticipated in this area. Average disturbance for this activity would be 5 acres per project, amounting to a total of 10 acres of disturbance due to exploration.

If future exploration discovers an economic deposit, an underground mine operation would extract ore from selected mineralized areas and process the ore by crushing and vat leaching. The tailings from the vats would be disposed of at a facility designed to meet the applicable engineering requirements. This type of operation would result in 50 acres of surface disturbance.

If the exploration was successful in the discovery of sufficient reserves, an open-pit mine with a processing facility could be constructed. This type of development would result in the extraction of gold and silver from the deposit. The total area of disturbance for all roads, mills, plants, pads, and ponds would be less than 100 acres.

Brazil Creek

Alternative A (Current Management)

In the foreseeable future, 10 exploration projects are anticipated for the Brazil Creek area. The projects would consist mostly of off-road drilling and would not occur simultaneously. At any one time, an estimated two projects would be in one of the following stages: initial evaluation, actual drilling, held open for study, or in the reclamation phase. Average disturbance would be about 5 acres per project. This would amount to a total disturbance of about 50 acres of disturbance due to exploration. The intent of exploration would vary from evaluating new deposits identified by surface study, expanding resource delineation on existing projects, or expanding reserve delineation adjacent to existing mines.

As a result of the exploration and expansion of current operations, it is estimated that four bentonite mining projects will be developed in the Brazil Creek area. These mines would be open-cut and would have 25 acres of disturbance per operation, totaling 100 acres of disturbance due to mining activity.

It is estimated that 85% of the exploration and mining activity would occur within the high and moderate development potential areas shown on Map P.1. The remaining 15% could occur in the area having low development potential.

Alternatives B, C, and D

Under these alternatives, the area of the Mountain Plover ACEC (24,672 acres) would be withdrawn from mineral entry. A total of 3,009 acres of high development potential and 6,744 acres of low development potential would be withdrawn as indicated on Map P.1. The withdrawal of this area would reduce the amount of exploration to eight projects. The projects would consist mostly of off-road drilling similar to that performed in the past. The activities would not occur simultaneously. At any one time, an estimated two projects would be in one of the following stages: initial evaluation, actual drilling, held open for study, or in the reclamation phase. Average disturbance would be about 5 acres per project. This would amount to a total disturbance of about 40 acres of disturbance due to exploration.

As a result of exploration and expansion of current operations, it is estimated that three bentonite mining projects would be developed in the Brazil Creek area. These mines would be open-cut and would have 100 acres of disturbance per operation, totaling 300 acres of disturbance due to mining activity.

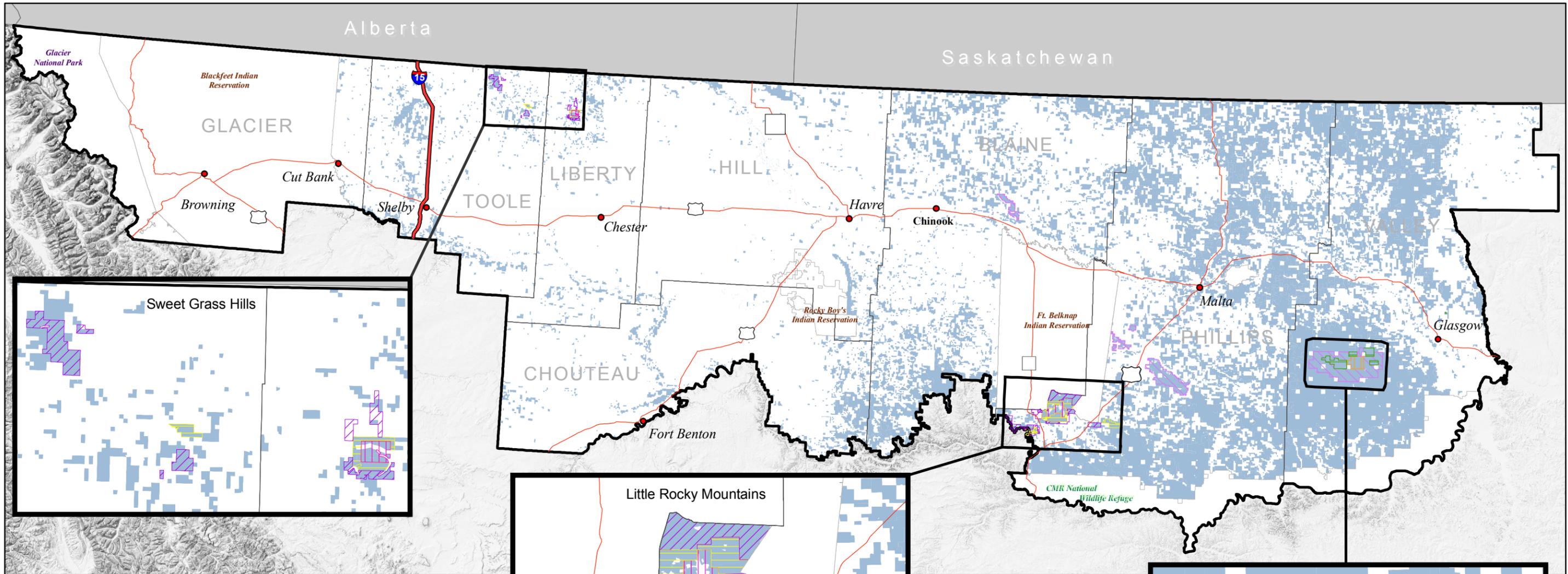
It is estimated that 85% of the exploration and mining activity would occur within the high and moderate development potential areas shown on Map P.1. The remaining 15% could occur in the area having low development potential.

Alternative E (Preferred Alternative)

Under this alternative, the area of the Sagebrush Focal Area (927,074 acres) is recommended to be withdrawn from mineral entry. A total of 6,442 acres of high development potential, 11,453 acres of moderate development potential, and 71,514 acres of low development potential would be withdrawn as indicated on Map P.1. The mining claims located within and before the withdrawal would be subject to valid existing rights as determined by a mining claim validity examination. Assuming the mining claims subject to activity are determined to be valid, the withdrawal of the Sagebrush Focal Area would reduce the amount of exploration to six projects due to the additional time it would take to conduct a validity examination. The exploration projects would consist mostly of off-road drilling similar to that performed in the past. This activity would not occur simultaneously. At any one time, an estimated two projects would be in one of the following stages: initial evaluation, actual drilling, held open for study, or in the reclamation phase. Average disturbance would be about 5 acres per project. This would amount to a total disturbance of about 30 acres of disturbance due to exploration.

As a result of exploration and expansion of current operations, it is estimated that two bentonite mining projects would be developed in the Brazil Creek area. These mines would be open-cut and have 100 acres of disturbance per operation, totaling 200 acres of disturbance as a result of mining activity.

It is estimated that 85% of the exploration and mining activity would occur within the high and moderate development potential areas shown on Map P.1. The remaining 15% could occur in the area having low development potential.



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Albers Equal Area, NAD83, Meters

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 Bureau of Land Management
 HiLine District Office

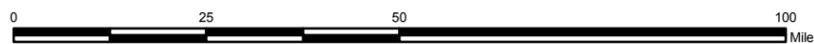


Map P.1
 Solid Minerals
 Locatable Hardrock & Bentonite
 Mineral Potentials

Map shows the Federal Mineral Estate for Locatable Minerals (Hardrock & Bentonite) The mining potential for those minerals varies even though they are both a locatable mineral, therefore the potential is shown for each type of mining.



- | | | | |
|---------------------|----------------------|--------------------|------------------------|
| High - Hardrock | High - Bentonite | Locatable Minerals | Interstate |
| Moderate - Hardrock | Moderate - Bentonite | Not Analyzed | Highway or State Route |
| Low - Hardrock | Low - Bentonite | RMP boundary | Towns |
| | | County | |



1:1,500,000

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