BLM

Burns District Office

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Celatom Mine Expansion Project

March 2011

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EP MINERALS
CELATOM MINE EXPANSION PROJECT
ENVIRONMENTAL IMPACT STATEMENT
EXECUTIVE SUMMARY

1 INTRODUCTION

1.1 Introduction and Location

EP Minerals, LLC (EPM) has been actively mining and exploring the Celatom area for many years on public, state, and private land. Eagle-Picher (now EPM) submitted a plan of operations in the 1980s and the Bureau of Land Management (BLM) prepared an environmental assessment (EA) for the project (BLM 1985). The Finding of No Significant Impacts (FONSI) for the EA was prepared and the Decision Record for the 1985 Eagle-Picher plan of operations approved the operations as identified in the 1985 EA for mining activities at the North Mill Gulch mine site, construction of two new access roads from the Altnow-Buelah County Road B24221 to the North Mill Gulch and Beede Desert mine site, and improvements to the Altnow-Beulah County Road B24221 and the Juntura Cutoff County Road B25000. The BLM documented in the Decision Record that a phased environmental review would be used to analyze future operations planned by EPM.

Pursuant to the stipulations in the 1985 approval (Section 3.1 No Action Alternative of this Environmental Impact Statement (EIS)), EPM submitted a Mine Plan of Operations (MPO) in July 2008 that proposed expansion of existing mining and exploratory drilling operations for mining diatomaceous earth (DE) at the Celatom Mine in Harney and Malheur Counties, Oregon (Project). All federal lands in the Project area are administered by the BLM Burns District Office. The Project is located approximately 50 miles east of Burns and 60 miles west of Vale, Oregon. Access to the Project is via Harney County Road 303 (Juntura Cutoff Road). The Project area extends between three and nine miles north of Highway 20 in portions of Township 19 South, Range 36 East (T19S, R36E); T19S, R37E; T20S, R36E; and T20S, R37E; Willamette Meridian (WM) (Project Area).

The Project Area covers 12,640 acres, including 1,280 acres of State of Oregon land, 1,680 acres of private land, 8,080 acres of federal land administered by the BLM, and 1,600 acres of land patented under the Stock Raising Homestead Act (SRHA) with private surface estate and federal mineral estate, 320 acres of which are owned by EPM in Section 25. EPM's existing Celatom Mine operations consist of approximately 465 acres of surface disturbance in the Project Area. Existing operations include three open pit mine areas, ore stockpiles, waste rock repositories, access roads, ground water monitoring wells, a staging area, a mine camp, exploratory drill holes, and reclaimed areas. The open pit mining areas are referred to as the Section 36 Mine Operations Area, the Kelly Field Mine Operations Area, and the Beede Desert Mine Operations Area. The Puma Claims Area represents a small mine support area with stockpiles, a water well, and a water tank.

Existing EPM mining operations on federal land in the Project Area were described in a MPO submitted by EPM to the BLM in 1984. The BLM approved the MPO after completion of an EA in 1985 (BLM 1985). Existing EPM stockpile operations on federal land at the Vines Hill Stockpile Area (VHSA) approximately 14 miles west of Vale, Oregon were described in a MPO submitted by EPM and approved by the Vale District BLM in 1986 (BLM 1986). Existing EPM mining operations on private and state land in the Project Area and EPM mill operations on private land approximately seven miles west of Vale operate under county and state permits. During preparation of this EIS, EPM is authorized to continue operations within the Project Area on federal land as

approved by BLM in 1985, at the VHSA as approved by BLM in 1986, and on private and state land permitted by county and state agencies.

Proposed actions associated with the Project consist of the following: 1) expanded mining operations at the Kelly Field Mine Operations Area, Section 36 Mine Operations Area, and Beede Desert Mine Operations Area; 2) new mining operations at the Hidden Valley, North Kelly Field, Section 25, and Eagle mine operation areas, and 3) exploratory drilling, development drilling, sampling, trenching, and bulk sampling within the Project boundary (Proposed Action). EPM proposes no changes to the permitted operations at VHSA. EPM's 2008 MPO is available for public review during normal business hours at the BLM's Burns District Office.

The BLM made the determination that the preparation of an EIS is necessary, due to the size of the proposed operations, to comply with the requirements of the National Environmental Policy Act (NEPA). This EIS analyzes proposed activities on BLM-administered land within the Project Area. The analysis area covers 9,360 acres, which includes SRHA land not owned by EPM.

1.2 Proposed Action and Purpose and Need

1.2.1 Existing and Facilities and Operations

EPM mines DE seasonally from April through November from open pits in the Section 36, Kelly Field, and Beede Desert Mine Operations Areas. Mining can run year-round depending on market demand. To date, this has not occurred because market demand has been served by the ore mined during the typical mining season. EPM hauls stockpiled ore on a year-round basis approximately 60 miles to the mill/plant located on private land seven miles west of Vale, Oregon or to the VHSA located on federal land administered by the BLM 14 miles west of Vale, Oregon. EPM operates the mill year-round and maintains continuous milling operations by hauling ore from the VHSA when weather or road conditions impede haul traffic from the Project Area.

EPM backhauls mineral process waste from the mill/plant to backfill open pits. EPM hauls approximately 24 truckloads of ore per day to the mill or VHSA and backhauls approximately two truckloads per day of mineral process waste to the mine areas.

At the mill the ore is crushed, dried, and calcined. The end product is used for the following: 1) as a particulate filter for fruit juices, wine, beer, sugar, biodiesel fuel, corn syrup, and water; 2) as an additive to paint, rubber, paper, and plastics; and 3) in other products such as absorbents, catalysts, and carriers for pesticides.

1.2.2 Purpose of and Need for Action

The BLM is responsible for administering mining activities on federal lands as authorized by mineral regulations under the General Mining Law of 1872 (for public domain lands) and Public Law 103-23 (for SRHA lands). Under the laws, qualified prospectors are entitled reasonable access to federal mineral deposits not withdrawn from mineral entry.

The purpose is to approve, or approve with conditions, EPM's proposal for an authorized MPO. The BLM could deny the proposal if the Project did not comply with regulations, particularly those under 43 Code of Federal Regulations (CFR) 3809.420. This EIS will analyze EPM's proposed MPO as

well as changes or conditions necessary to meet the performance standards of 43 CFR 3809.420 to prevent unnecessary or undue degradation. EPM proposes to expand their existing mining activities of DE and to conduct exploration operations on BLM-administered lands within the Project Area. The need for the action is established under mining laws and their enacting regulations and by the BLM's responsibilities under the Federal Land Policy and Management Act (FLPMA) to implement the BLM's multiple use mission to balance various land and resource management objectives to achieve healthy and productive landscapes and encourage development of domestic mineral resources. In addition, the need for the action is established under the BLM's objectives outlined in the Three Rivers Resource Management Plan (RMP) and Record of Decision (ROD) to provide maximum opportunity for exploration and location of locatable minerals (Energy and Minerals Objective EM 3, Three Rivers RMP/ROD, page 2-162) within areas open to mining, in an environmentally sound manner (BLM 1992). The Three Rivers RMP/ROD identified the BLM-administered lands within the Project Area as open to exploration and mining operations and identified the area as having moderate to high mineral potential (Three Rivers RMP/ROD, pages 2-162 and 2-165).

1.2.3 Alternative Proposals

1.2.3.1 Alternative 1 (No Action)

The FONSI and Decision Record (DR) for the 1985 EA and plan of operations form the basis for the No Action Alternative for this Project. The majority of the activities under the Proposed Action were included in the 1985 EA; however, the BLM determined that a phased environmental review would be used to analyze future operations planned by EPM (formerly Eagle-Picher). The DR approved the mining activities at the North Mill Gulch mine site, construction of two new access roads from the Altnow-Buelah County Road B24221 to the North Mill Gulch and Beede Desert mine site, and improvements to the Altnow-Beulah County Road B24221 and the Juntura Cutoff County Road B25000, subject to the special project stipulations and additional stipulations. Chapter 3 summarizes the BLM stipulations for the 1985 Eagle-Picher approval.

The 1985 approval states that any extension of the North Mill Gulch mine site northward of the area covered in the present plan, any extension of the Beede Desert mine site northward from private lands onto public lands, and any mining operations on public lands at the Sagebrush Flat mine site will be considered major actions requiring submission of a plan modification under the phased environmental review process. In order to insure that subsequent reviews do not involve delays which could cause mine shut-downs, Eagle-Picher will submit complete, detailed site descriptions, feasibility studies, maps, cross sections, and engineering designs and specifications to the BLM at least one year prior to the date proposed for commencement operations at these sites. This has formed the basis for the Proposed Action.

Under the No Action Alternative the BLM would not approve EPM's MPO, and EPM would not expand mining operations on BLM-administered lands or conduct additional exploratory drilling operations on BLM-administered land outside of the boundary approved by the BLM in 1985. EPM would continue to expand operations on federal land as previously approved under the 1985 DR (BLM 1985) or permitted by BLM under a subsequent Notice. EPM would also continue to expand operations on private and state land permitted separately by the Oregon Department of Geology and Mineral Industries (DOGAMI), the Oregon Department of State Lands (DSL), and Harney and Malheur County planning commissions. In addition, EPM would continue operations on federal land

at the VHSA near Vale approved by BLM in 1986 and mill operations on private land near Vale. The total existing disturbance associated with the No Action Alternative is 465 acres, as described in Chapter 2 of this EIS. However, the total permitted area that EPM has authorization to disturb encompasses 1,633.7 acres.

Federal land outside of the boundary approved by the BLM in 1985 would remain available for future DE mining or for other purposes approved by the BLM. The subject lands have not been withdrawn from mineral entry nor designated as any type of special management area.

1.2.3.2 Alternative 2 (Proposed Action)

EPM proposes expanded mining operations in the existing Section 36, Beede Desert, and Kelly Field Mine Operations Areas and new mining activities in the proposed Section 25, North Kelly Field, Hidden Valley, and Eagle Mine Operations Areas. EPM proposes to conduct exploratory drilling and bulk sampling throughout the Project Area and to construct two new roads outside of the mine operations areas. In addition, EPM plans to reconnect Hart Road (the portion that slumped into the Kelly Field open pit) to Mill Gulch Access Road in the Kelly Field Mine Operations Area once pit wall stabilization is complete.

Under the Proposed Action, EPM would expand mining operations on 72.5 acres of federal land at the existing Kelly Field Mine Operations Area. EPM would develop mines on federal land at the proposed North Kelly Field Mine Operations Area (462.5 acres on federal land), Hidden Valley Mine Operations Area (255 acres on federal land), Eagle (286 acres on federal land), Section 25 (50 acres on federal land), and the Puma Claims Area (five acres). In addition, EPM proposed to reestablish access to the Beede Desert Mine Operations Area by utilizing the Beede Access Road on federal land (seven acres). The proposed expansion of mining operations and new mining operations proposed in the Project Area include open pit mines, roads within the mine operations areas, and other operations and ancillary features. The disturbance associated with the mine expansion and other activities in the Project Area measure 1,131 acres on federal land.

EPM proposes constructing two new roads outside of the mine operations areas on federal land: 1) the connector road between Hidden Valley and Section 36; and 2) the access road from Hidden Valley north to Eagle. These two roads would create a total of 13.5 acres of disturbance.

EPM also proposes conducting exploratory drilling on 200 acres and bulk sampling on 50 acres of BLM-administered land within the Project Area. Exploration and subsequent trenching and bulk sampling would be conducted to delineate boundaries of known ore reserves and to explore for new deposits. These activities could occur on federal lands anywhere within the Project Area. Activities under the Proposed Action, including final reclamation, would be conducted over the course of approximately 50 years.

The Proposed Action includes a total of 1,394.5 acres of disturbance on federal land.

1.2.3.3 Alternative 3 (Proposed Action with Additional Design Elements)

The Proposed Action includes environmental protection measures incorporated by EPM as design features. During preparation of this EIS, the BLM identified resource-specific measures as additional environmental protection measures. Alternative 3 is the same as the Proposed Action except as modified by the following design and operations changes as well as additional or modified design elements for environmental protection. These additional elements include fenced mine areas, one additional access road, a locked gate, removal of a sediment basin, maintenance of an existing stock water pond, and installation of new stock watering ponds. Individual components and locations are discussed in the following section.

1.3 Environmental Findings

1.3.1 Air Quality

1.3.1.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, air quality impacts would be associated with the ongoing permitted mining and exploration activities.

1.3.1.2 Alternative 2 - Proposed Action

The Proposed Action consists of mining activities and actions, which may have the potential to emit air pollutants. Air pollution sources include fugitive dust from wind erosion of the ore and waste storage stockpiles and the mine haul roads, combustion of diesel and haul trucks and mobile equipment, and other sources including burning propane, fuel oil or diesel in various process equipment. Although the Proposed Project will generate increased emissions compared to the No Action Alternative, Project-related emissions of carbon monoxide (CO), nitrogen oxide (NOx), particulate matter of aerodynamic diameter less than 10 micrometers (PM_{10}), particulate matter of aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) are not expected to create ambient concentrations that exceed the Oregon State Ambient Air Quality Standards (OSAAQS) or National Ambient Air Quality Standards (NAAQS).

1.3.1.3 Alternative 3 - Proposed Action with Additional Design Elements

The air quality impacts associated with Alternative 3 would be the same as under the Proposed Action.

1.3.2 Geology and Minerals

1.3.2.1 Alternative 1 - No Action Alternative

1.3.2.1.1 Mineral Resources

Direct impacts of the No Action Alternative on geologic and mineral resources would include the permanent continued removal of diatomite ore in accordance with current approvals.

1.3.2.1.2 Geologic Hazards

Under the No Action Alternative, the slope failures that have occurred in the Kelly Field Mine Area could not be completely stabilized and continued impacts would occur.

1.3.2.1.3 Geochemical Characteristics

The majority of the waste rock associated with the existing operations and final pit walls in the Kelly Field pit would consist of either oxidized diatomite or unoxidized diatomite. The waste backfilled in the Kelly Field would not contribute to the overall acid generating potential of the waste rock or pit walls associated with the Project.

1.3.2.2 Alternative 2 - Proposed Action

1.3.2.2.1 Mineral Resources

Direct impacts of the Proposed Action on geologic and mineral resources would include the permanent continued removal of diatomite ore in quantities greater than those permitted in the No Action Alternative.

1.3.2.2.2 Geologic Hazards

Although slope failures between stable (basalt) and unstable (clay layers) rock units could occur from seismic events, the statistical probability is very low. The current slope failures would be completely mitigated and would, therefore, have no direct impact on geologic resources or to public safety.

1.3.2.2.3 Geochemical Characteristics

The geochemical characteristics of the ore and waste associated with the Proposed Action would be the same as the No Action.

1.3.2.3 Alternative 3 - Proposed Action with Additional Design Elements

Alternative 3 would have the same impacts as the Proposed Action.

1.3.3 Grazing Management

1.3.3.1 Alternative 1 - No Action Alternative

Under the No Action Alternative impacts to livestock grazing would be limited to those resulting from existing and ongoing permitted mining and exploration activities.

1.3.3.2 Alternative 2 - Proposed Action

Over the 50-year time period of the Proposed Action, mining activities would result in 1,144.5 acres of temporary disturbance over five allotments, representing a loss of 185 (Animal Unit Months (AUMs) or 3.6 percent of the total AUMs that are currently managed in the five allotments. A total

of 40 AUMs or 0.8 percent of the AUMs currently managed would be permanently lost due to pit walls and benches that would not be reclaimed.

Exploration activities would disturb a total of 250 acres of disturbance. Over the 50-year life of the Project this would have a temporary impact on 40 AUMs. No AUMs would be permanently lost from exploration activities.

1.3.3.3 Alternative 3 - Proposed Action with Additional Design Elements

Alternative 3 would impact 250 more AUMs than the Proposed Action over the 50-year life of the Project due to the construction of perimeter fences (a total of 435 AUMs). Mining impacts to AUMs would be greater than the Proposed Action. The impact to AUMs from exploration under Alternative 3 would be the same as the Proposed Action.

Under Alternative 3, EPM would use and routinely clean the stock pond on the south end of the Hidden Valley Mine Operations Area as a settling pond so it would also serve as a stock water source. EPM would install stock water tanks and maintain water in the tanks through the grazing period at the Puma Claims Operation Area.

1.3.4 Migratory Birds

1.3.4.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, the EPM would continue to expand operations on federal land as previously approved. The total existing disturbance associated with the No Action Alternative is 465 acres.

1.3.4.2 Alternative 2 - Proposed Action

Under the Proposed Action, approximately 1,394.5 acres of potential migratory bird habitat would be directly impacted over the course of 50 years; however, this disturbance would not all occur at the same time and would vary in intensity, and because similar habitat occurs adjacent to site-specific disturbance areas and on thousands of acres outside of the Project Area, migratory birds would likely utilize that habitat during Project-related activities.

The Proposed Action would result in a net loss of potential habitat, but would not contribute to a loss of viability for any migratory bird species because most mining activity would be concentrated near areas already disturbed (existing pits), extensive similar habitat is available adjacent to the Project Area, and depleted areas would be reclaimed and restored.

1.3.4.3 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to migratory bird species from Alternative 3 would be the same as those described in the Proposed Action except that approximately 10.5 miles of fence and an additional half mile of road would be constructed. Fences may alter bird distribution in an area and present potential hazards to flying birds.

1.3.5 Noise

1.3.5.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, noise levels would continue through ongoing permitted mining.

1.3.5.2 Alternative 2 - Proposed Action

The predicted Project-related noise levels are less than Oregon Department of Environmental Quality's (DEQ) maximum hourly noise level standard of 55 decibels (dB) average noise level (L_{eq}). The predicted change in hourly ambient noise levels at the nearest ranch houses is approximately 3 dB.

1.3.5.2.1 Day-Night Levels

No increases in ambient noise levels in terms of day-night level (L_{dn}) are predicted for the nearest ranch houses.

1.3.5.2.2 Traffic Noise

There would be no changes in Project-related traffic noise levels compared to the No Action Alternative.

1.3.5.2.3 Construction Noise

Maximum construction noise levels at the nearest ranch house (approximately one mile away from where grading would occur) would be in the range of approximately 25 to 45 dB.

The topography of the Project Area is expected to further reduce the construction noise levels by 5 to 10 dB or more where topography shields construction equipment from view by the ranch house.

1.3.5.3 Alternative 3 - Proposed Action with Additional Design Elements

The impacts associated with Alternative 3 would be the same as the Proposed Action.

1.3.6 Noxious Weeds

1.3.6.1 Alternative 1 - No Action Alternative

Under the No Action Alternative EPM would continue operations at the Project and current noxious weed abatement measures would continue.

1.3.6.2 Alternative 2 - Proposed Action

The Proposed Action would result in the incremental disturbance of up to 1,394.5 acres of vegetation over the 50-year life of the Project, which could produce habitat conducive to supporting noxious weeds. Implementation of reclamation and the supplementary mine activities pertaining to noxious weeds would reduce or eliminate the chance of noxious weed establishment and control infestations

that did occur.

1.3.6.3 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to noxious weeds from Alternative 3 are generally the same as those described in the Proposed Action. However, additional summer and post reclamation inspections for noxious weeds would occur.

1.3.7 Paleontology

1.3.7.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue permitted operations and expansions. The total existing disturbance associated with the No Action Alternative is 465 acres.

1.3.7.2 Alternative 2 - Proposed Action

Surface disturbing activities may cause direct and indirect adverse impacts to paleontological resources. Since fossils are usually buried, their locations cannot be confirmed unless excavation occurs in those geologic units. Common invertebrate or plant fossils may be found in the area. The potential for the Project to be sited on or impact scientifically important fossil locations are unlikely, however common fossils may be exposed through mining activities.

1.3.7.3 Alternative 3 - Proposed Action with Additional Design Elements

Impacts associated with the Alternative 3 would be the same as the Proposed Action.

1.3.8 Recreation

1.3.8.1 Alternative 1 - No Action Alternative

Under the No Action Alternative EPM would continue approved operations at the Project. The area covered by the Proposed Action would remain available for future DE processing or for other purposes.

1.3.8.2 Alternative 2 - Proposed Action

Implementation of the Proposed Action would result in an incremental and temporary loss of up to 1,394.5 acres of public land from use for dispersed recreation activities (including hunting) for the purpose of safety and security. A total of 250 acres would be permanently impacted because pit walls and benches would not be reclaimed.

The Proposed Action would not result in an increase in demand for recreational opportunities.

Solitude could be impacted in those areas where there has been limited mining or mining has not occurred. However, numerous areas nearby with similar attributes outside of the Project Area can be accessed by recreationists.

1.3.8.3 Alternative 3 - Proposed Action with Additional Design Elements

Impacts associated with the Alternative 3 would be the same as the Proposed Action.

1.3.9 Soils

1.3.9.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue permitted operations and expansions. The total existing disturbance associated with the No Action Alternative is 465 acres.

1.3.9.2 Alternative 2 - Proposed Action

Direct impacts to soil resources within the Project Area would result from the incremental disturbance of 1,394.5 acres under the Proposed Action over the 50-year life of the Project.

The Proposed Action would remove all soil cover during the life of the Project; however, erosion is expected to be limited within the confines of the open pits. Erosion and the sedimentation of precipitation runoff would be reduced through the diversion and routing of storm water around Project facilities and the construction of sediment collection ponds to protect downstream water quality. Ponds would not discharge water into the Mill Gulch drainage ditch, Altnow Pond, or other water resources.

Interim and final reclamation activities under the Proposed Action would be implemented to reduce soil erodibility hazards during the Project and stabilize and revegetate all disturbed areas within the Project Area, with the exception of pit walls and mine benches.

The greatest effects to soils within the Project Area would occur during the initial construction of activities under the Proposed Action prior to and during the installation of erosion control structures such as sediment ponds.

1.3.9.3 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to soils from Alternative 3 are generally the same as those described in the Proposed Action; however, Alternative 3 includes additional measures for growth media management.

1.3.10 Special Status Species

1.3.10.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue to expand operations on federal land as previously approved. The total existing disturbance associated with the No Action Alternative is 465 acres within a 1,633.7-acre Project Area. Approximately 295 acres occur on probable habitat but with uncertain sage grouse use. Greater than half of the acres considered probable habitat are

fragmented within potential but impaired areas, and are unlikely to receive extensive use by greater sage-grouse.

1.3.10.2 Alternative 2 - Proposed Action

The Proposed Action would result in 1,394.5 acres of incremental disturbance over the 50-year life of the Project. Overall, approximately 94 acres (5.5 percent) of yearlong habitat, and 553 acres (8.7 percent) of probable habitat with uncertain usage could be directly impacted from mining operations. This would create an indirect impact to greater sage-grouse through the loss of habitat.

Exploration activities could disturb up to 250 acres of habitat anywhere within the Project Area boundary. The indirect impact to sage grouse in the form of habitat disturbance would likely be in the range of one to five percent because it is unlikely that all of the activities would occur on yearlong habitat over the life of the 50-year Project. However, these effects are expected to be further reduced as suitable habitat for greater sage-grouse occurs adjacent to the proposed mining activities and adjacent to the Project Area and environmental protection measures to protect breeding and nesting activities of greater sage-grouse would be implemented,

Indirect impacts to greater sage-grouse from the fragmentation of habitat are unlikely.

In the long term, habitat would be restored to approximately 82 percent of the area covered by the Proposed Action.

1.3.10.3 Alternative 3 - Proposed Action with Additional Design Elements

Under Alternative 3, the impacts to greater sage-grouse are the same as those described in the Proposed Action with the exception of fence construction and another half mile of new road. The associated vegetation removal would directly impact an additional 0.08 percent of the yearlong greater sage-grouse habitat within the Project Area as compared to the Proposed Action.

1.3.11 Transportation/Roads

1.3.11.1 Alternative 1 - No Action Alternative

No changes to the transportation network would occur under the No Action Alternative.

1.3.11.2 Alternative 2 - Proposed Action

The existing public transportation network in areas near and to the north of the Project Area would not be impacted by the Proposed Action. The current levels of public access through the Project Area will be maintained and improved. The non-public mine roads would ultimately be reclaimed and therefore are instead analyzed as part of the disturbance impacts in the soils, vegetation, and special status sections. The Proposed Action would have essentially the same impacts as the existing approved operation.

1.3.11.3 Alternative 3 - Proposed Action with Additional Design Elements

Alternative 3 would have essentially the same impacts as the existing approved operation.

1.3.12 Vegetation, Forestry and Woodland Resources

1.3.12.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue operations at the Project which would result in 465 acres of disturbance. Revegetation and reclamation would minimize the impacts to vegetation.

The area covered by the Proposed Action would remain available for future DE processing or for other purposes, as approved by the BLM.

1.3.12.2 Alternative 2 - Proposed Action

1.3.12.2.1 General Removal of Vegetation

Implementation of the Proposed Action would result in the incremental disturbance of up to 1,394.5 acres of vegetation over the 50-year life of the Project, of which 250 acres would be disturbed through exploration activities. A total of 250 acres (17 percent of the total) would be permanently lost due to pit walls and benches that would not be reclaimed.

1.3.12.2.2 Particulate Deposition on Vegetation

The Project mining activities and vehicular traffic would indirectly affect vegetation by increasing the amount of airborne particulate deposition onto vegetation surfaces. These effects would be minimized by wind and periodic precipitation and the implementation of dust control measures. .

1.3.12.2.3 Modification of Vegetation Structure

Although the structure of the vegetation would be temporarily modified, the reclaimed plant community is expected to produce adequate cover to stabilize the site and provide forage for use by livestock and wildlife in the long term, thereby meeting reclamation goals.

1.3.12.2.4 Forestry and Woodland Resources

Implementation of the Proposed Action would result in logging and probable loss of up to 77 acres (54 percent) of the ponderosa pine stands over the 50-year life of the Project. Ponderosa pine seedlings would not be planted as part of reclamation, because the primary goals of rehabilitation are soil stabilization and control of noxious and invasive weeds. Secondarily, because this stand of trees is an outlier in a drier, lower location than typical for the area there is some chance that the trees are present because of the water-holding qualities of diatomite. With the diatomite mined and the pit backfilled with more porous material, plus changes in climate, it is likely that pines would not survive on the mined sites.

1.3.12.3 Alternative 3 - Proposed Action with Additional Design Elements

Implementation of Alternative 3 would result in essentially the same impacts to vegetation as the Proposed Action over the 50-year life of the Project. Alternative 3 includes additional measures for

growth media management such as seed mixes designed to improve reclamation success. Alternative 3 would result in impacts to an additional 1.24 acres of mountain big sagebrush/grassland and an additional 0.32 acre of big sagebrush/perennial grassland for the proposed Eagle Cutoff Road. Alternative 3 would result in a reduction of impacts to big sagebrush/perennial grassland by 2.86 acres because the sediment basin would not be constructed in the Hidden Valley Mine Operations Area for this alternative.

Impacts to forestry and woodland resources from Alternative 3 are the same as those described in the Proposed Action.

1.3.13 Visual Resources

1.3.13.1 Alternative 1 - No Action Alternative

The total existing disturbance associated with the No Action Alternative is 465 acres. Under the No Action Alternative there would continue to be a contrast from the existing operations as permitted under Visual Resource Management (VRM) Class IV guidelines.

1.3.13.2 Alternative 2 - Proposed Action

The proposed mining activities would be visible from Drinkwater Pass on U.S. Highway 20 (at Key observation point (KOP) #1). The post-mining/post-reclamation contrasts in form, line, and color are naturally mitigated by the distance from the KOP to the disturbance and the contrasts would be further mitigated after reclamation of the mined areas.

1.3.13.3 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to visual resources from Alternative 3 are the same as the Proposed Action.

1.3.14 Water Quality and Quantity

1.3.14.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, direct and indirect disturbance of water quantity and water quality would continue under already approved actions, until those projects are completed.

1.3.14.2 Alternative 2 - Proposed Action

1.3.14.2.1 Surface Water Quantity

The Proposed Action would not result in the diversion of water that would impact other users or reduce the flow of streams, springs, or seeps.

1.3.14.2.2 Surface Water Quality

The Proposed Action would not have impacts on surface water quality.

1.3.14.2.3 Ground Water Quantity

The Proposed Action would not result in ground water quantity impacts that would lower the water table enough to impact other users. The open pits would be backfilled or partially backfilled during reclamation ensuring no long-term impacts would result from the Proposed Action.

1.3.14.2.4 Ground Water Quality

Nominal ground water could potentially flow into the proposed North Kelly Field West pit excavations as soon as the pit is deepened to below the water table. For all scenarios analyzed, ground water inflow through the diatomite walls of the pit would be nominal. The initial rates of inflow through the pit bottom would range from eight gallons per minute (gpm) with a floor barrier of 40 feet, to as much as 97 gpm with a floor barrier of five feet. The inflows would decrease in time as heads in the formations are lowered. There have been no identified impacts associated with past or current mining and no impacts are expected in the future.

1.3.14.3 Ground Water Conditions during Mining

In the proposed Mill Gulch North Kelly Field West open pit, the low-permeability diatomite would limit ground water inflow to the pit during and after mining, resulting in year-to-year dry conditions since inflow would be less than evaporation. Proposed mining in the North Kelly Field East pit, Eagle Mine and Hidden Valley areas would not extend below the water table, and therefore, pits would remain dry except for seasonal meteoric accumulations. Low-*K* diatomite pit walls and floors would minimize seepage of the waters until they evaporate in the dry season.

1.3.14.4 Ground Water Conditions during Closure

The surface expression of ground water (albeit transient) would be mitigated under the Proposed Action through the partial backfilling of the North Kelly Field West open pit that intersect ground water. The intent of this closure strategy would be to maintain the pit as an evaporative sink for ground water (i.e., no flow-through), while reducing the potential for free-standing water with low pH.

The amount of backfill required for the North Kelly Field West open pit would be calculated during ongoing activities and based on site-specific conditions; therefore, there would be no effect to ground water.

1.3.14.5 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to water resources from Alternative 3 are generally the same as those described in the Proposed Action.

1.3.15 Wilderness Characteristics

1.3.15.1 Alternative 1 - No Action Alternative

Under the No Action Alternative, approximately 150 acres of the Rocky Basin WIM unit lie within the 1985 MPO area and would continue to be affected by the approved uses.

1.3.15.2 Alternative 2 - Proposed Action

Implementation of the Proposed Action would affect the Rocky Basin Wilderness Inventory Maintenance (WIM) unit. Of the 11,360 acres in the Rocky Basin WIM unit, approximately 4,338 acres are in the proposed Project Area.

For the purpose of this analysis, the Proposed Action would diminish or eliminate wilderness characteristics on the 4,338 acres in the Project Area.

1.3.15.3 Alternative 3 - Proposed Action with Design Elements for Environmental Protection

Impacts to Lands with Wilderness Characteristics from Alternative 3 are the same as those described in Alternative 2.

1.3.16 Wildlife and Fisheries

1.3.16.1 Alternative 1 - No Action Alternative

The total existing disturbance associated with the No Action Alternative is 465 acres within a 1,633.7 acre Project Area.

1.3.16.2 Alternative 2 - Proposed Action

1.3.16.2.1 General Wildlife and Game Species

In the long term, the combination of the common nature of the habitats in the Project Area, the adaptability of many of the typical species, reclamation of most of the mined areas, and all other factors being equal, post-mining populations of habitat use by common wildlife and game species would be approximately equal to pre-mining populations and habitat use. The Proposed Action would result in a net loss of potential habitat, but would not contribute to a loss of viability for wildlife, including game species.

In the short term there would be some impacts to wildlife species in the mined areas; however, because the habitats in the Project Area are common and because the wildlife species involved are generally mobile, the impacts of the Proposed Action would likely be unmeasureable to the affected populations with the exception of the removal of the small ponderosa pine stands.

1.3.16.3 Alternative 3 - Proposed Action with Additional Design Elements

The impacts to wildlife would be the same as those described in the Proposed Action, with the exception of new fence construction and another new road. The additional 10.5 miles of fence would potentially alter big game movement or increase potential for injury from entanglement or collision relative to the other Alternatives. Fences would be constructed to BLM standards, which are designed to reduce potential entanglement and allow passage of big game animals.

EP MINERALS
CELATOM MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

March 2011

United States Department of Interior
Bureau of Land Management
Burns District Office
28910 Highway 20 West
Hines, Oregon 97738

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EP MINERALS
CELATOM MINE EXPANSION PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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EP MINERALS
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1 INTRODUCTION / PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

EP Minerals, LLC (EPM) has been actively mining and exploring the Celatom area for many years on public, state, and private land. Eagle-Picher (now EPM) submitted a plan of operations in the 1980s and the BLM prepared an environmental assessment (EA) for the project (BLM 1985). The FONSI for the EA was prepared and the Decision Record for the 1985 Eagle-Picher plan of operations approved the operations as identified in the 1985 EA for mining activities at the North Mill Gulch mine site, construction of two new access roads from the Altnow-Buelah County Road B24221 to the North Mill Gulch and Beede Desert mine site, and improvements to the Altnow-Beulah County Road B24221 and the Juntura Cutoff County Road B25000. The Bureau of Land Management (BLM) documented in the Decision Record that a phased environmental review would be used to analyze future operations planned by EPM.

Pursuant to the stipulations in the 1985 approval (Section 3.1 No Action Alternative of this EIS), EPM submitted a Mine Plan of Operations (MPO) in July 2008 that proposed expansion of existing mining and exploratory drilling operations for mining diatomaceous earth (DE) at the Celatom Mine in Harney and Malheur Counties, Oregon (Project). All federal lands in the Project area are administered by the BLM Burns District Office. The Project is located approximately 50 miles east of Burns and 60 miles west of Vale, Oregon (Figure 1.1.1). Access to the Project is via Harney County Road 303 (Juntura Cutoff Road). The Project area extends between three and nine miles north of Highway 20 in portions of Township 19 South, Range 36 East (T19S, R36E); T19S, R37E; T20S, R36E; and T20S, R37E; Willamette Meridian (WM) (Project Area) (Figure1.1.2).

The Project Area covers 12,640 acres, including 1,280 acres of State of Oregon land, 1,680 acres of private land, 8,080 acres of federal land administered by the BLM, and 1,600 acres of land patented under the Stock Raising Homestead Act (SRHA) with private surface estate and federal mineral estate, 320 acres of which are owned by EPM in Section 25 (Figure 1.1.2). EPM's existing Celatom Mine operations consist of approximately 465 acres of surface disturbance in the Project Area. Existing operations include three open pit mine areas, ore stockpiles, waste rock repositories, access roads, ground water monitoring wells, a staging area, a mine camp, exploratory drill holes, and reclaimed areas. The open pit mining areas are referred to as the Section 36 Mine Operations Area, the Kelly Field Mine Operations Area, and the Beede Desert Mine Operations Area. The Puma Claims Area represents a small mine support area with stockpiles, a water well, and a water tank.

Existing EPM mining operations on federal land in the Project Area were described in a MPO submitted by EPM to the BLM in 1984. The BLM approved the MPO after completion of an EA in 1985 (BLM 1985). Existing EPM stockpile operations on federal land at the Vines Hill Stockpile Area (VHSA) approximately 14 miles west of Vale, Oregon were described in a MPO submitted by EPM and approved by the Vale District BLM in 1986 (BLM 1986). Existing EPM mining operations on private and state land in the Project Area and EPM mill operations on private land approximately seven miles west of Vale operate under county and state permits.

During preparation of this Environmental Impact Statement (EIS), EPM is authorized to continue operations within the Project Area on federal land as approved by BLM in 1985, at the VHSA as approved by BLM in 1986, and on private and state land permitted by county and state agencies.

Proposed actions associated with the Project consist of the following: 1) expanded mining operations at the Kelly Field Mine Operations Area, Section 36 Mine Operations Area, and Beede Desert Mine Operations Area; 2) new mining operations at the Hidden Valley, North Kelly Field, Section 25, and Eagle Mine Operations Area, and 3) exploratory drilling, development drilling, sampling, trenching, and bulk sampling within the Project boundary (Proposed Action). EPM proposes no changes to the permitted operations at VHSA. EPM's 2008 MPO is available for public review during normal business hours at the BLM's Burns District Office.

The BLM made the determination that the preparation of an EIS is necessary, due to the size of the proposed operations, to comply with the requirements of the National Environmental Policy Act (NEPA). This EIS analyzes proposed activities on BLM-administered land within the Project Area. The analysis area covers 9,360 acres, which includes SRHA land not owned by EPM (Figure 1.1.2). EPM's past, present, and reasonably foreseeable future activities (RFFAs) on private and state land and on federal land at the VHSA are analyzed under cumulative effects in Chapter 6 of this EIS.

1.2 Purpose of and Need for Action

The BLM is responsible for administering mining activities on federal lands as authorized by mineral regulations under the General Mining Law of 1872 (for public domain lands) and Public Law 103-23 (for SRHA lands). Under the laws, qualified prospectors are entitled reasonable access to federal mineral deposits not withdrawn from mineral entry.

The purpose is to approve, or approve with conditions, EPM's proposal for an authorized MPO. The BLM could deny the proposal if the Project did not comply with regulations, particularly those under 43 Code of Federal Regulations (CFR) 3809.420. This EIS will analyze EPM's proposed MPO as well as changes or conditions necessary to meet the performance standards of 43 CFR 3809.420 to prevent unnecessary or undue degradation. EPM proposes to expand their existing mining activities of DE and to conduct exploration operations on BLM-administered lands within the Project Area. The need for the action is established under mining laws and their enacting regulations and by the BLM's responsibilities under the Federal Land Policy and Management Act (FLPMA) to implement the BLM's multiple use mission to balance various land and resource management objectives to achieve healthy and productive landscapes and encourage development of domestic mineral resources. In addition, the need for the action is established under the BLM's objectives outlined in the Three Rivers Resource Management Plan (RMP) and Record of Decision (ROD) to provide maximum opportunity for exploration and location of locatable minerals (Energy and Minerals Objective EM 3, Three Rivers RMP/ROD, page 2-162) within areas open to mining, in an environmentally sound manner (BLM 1992). The Three Rivers RMP/ROD identified the BLM-administered lands within the Project Area as open to exploration and mining operations and identified the area as having moderate to high mineral potential (Three Rivers RMP/ROD, pages 2-162 and 2-165).

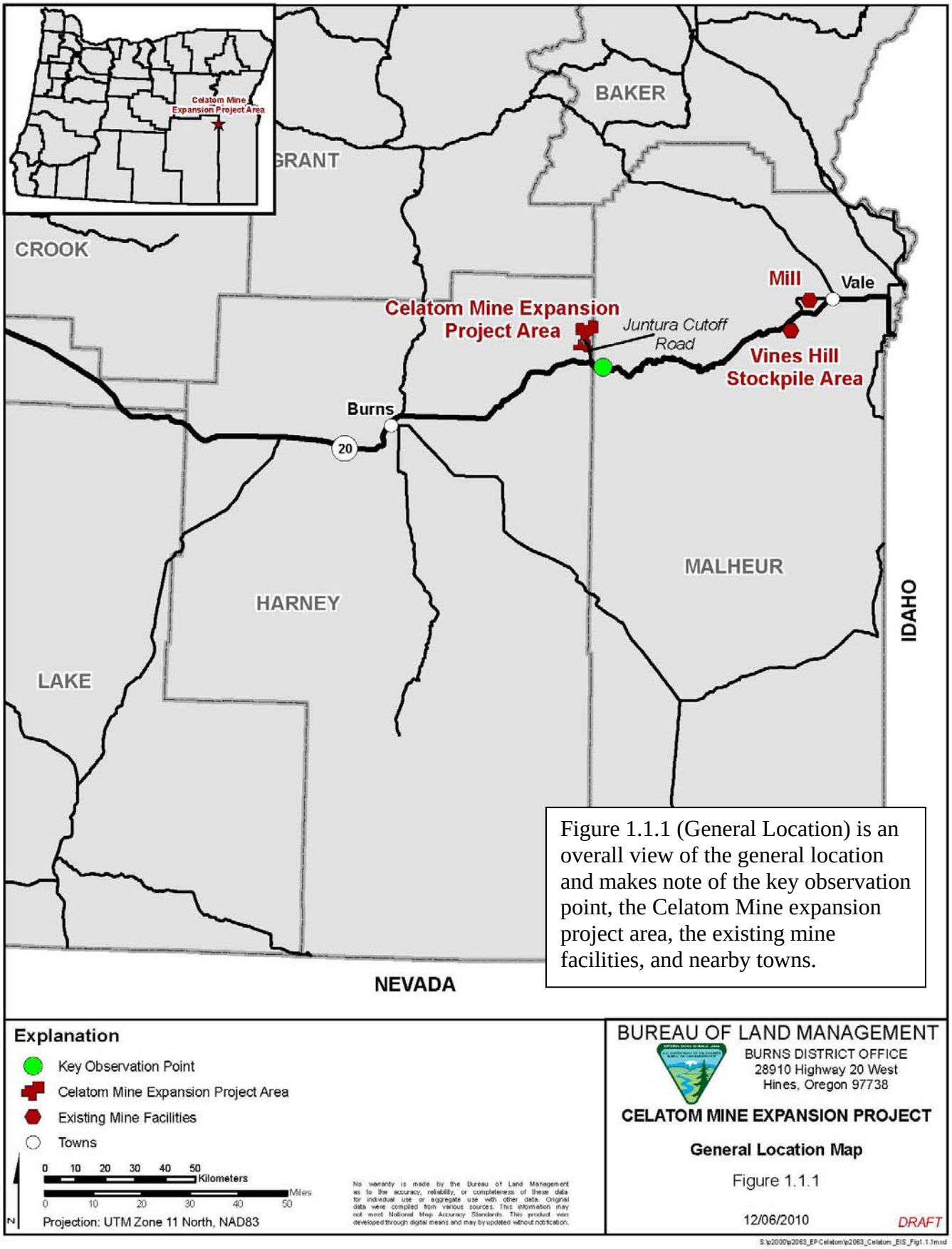

Figure 1.1.1 (General Location) is an overall view of the general location and makes note of the key observation point, the Celatom Mine expansion project area, the existing mine facilities, and nearby towns.

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North Kelly Field
Refer to
Figure 3.2.3

Eagle
Refer to
Figure 3.2.5

Section 25

Kelly Field
Refer to
Figures 2.2.2 and 3.2.2

Beede Desert
Refer to
Figures 2.2.3 and 3.2.6

Hidden Valley
Refer to
Figure 3.2.4

Section 36
Refer to
Figure 2.2.1

Puma Claims
Refer to
Figure 2.2.4

Sagebrush Flat

Figure 1.1.2 (Land Ownership) details the land ownership within the project boundary as well as the existing and proposed mine operations areas. Ownership is categorized as private, federal, state, or a combination thereof.

Explanation

- Existing Roads
- Project Boundary
- Existing and Proposed Mine Operations Areas
- Excluded Area within Project Boundary
- Public Lands
- State Land
- Private Land
- Split Estate with Federal Minerals (SRHA) on Private Land
- Split Estate with Federal Minerals (SRHA) on EPM Land
- Split Estate with Federal Minerals (Not SRHA)

0 500 1,000 1,500 2,000 Meters

0 2,000 4,000 6,000 8,000 Feet

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Projection: UTM Zone 11 North, NAD83

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may by updated without notification.

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Land Ownership (Private/Federal/State)

Figure 1.1.2

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1.3 Authorizing Actions

A proposal submitted to the BLM may be approved only after an environmental analysis is completed. BLM decision options include approving EPM's MPO as submitted, approving alternatives to the MPO to mitigate environmental impacts, approving the MPO with stipulations to mitigate environmental impacts, or denying the MPO. If the BLM approves the MPO, then only those activities on public lands detailed in the MPO would be authorized to occur. If the BLM denies the MPO, EPM can modify and resubmit the MPO to address the decision made by the BLM on the original MPO regarding unnecessary or undue degradation of federal land and to provide for reasonable reclamation.

Since EPM's proposed mining and exploration activities would occur on public land administered by the BLM, such operations must comply with BLM regulations for mining on public land (43 CFR 3809, Surface Management Regulations), 43 CFR 3715 (Use and Occupancy), 43 CFR 3814 (SRHA), the Mining and Mineral Policy Act of 1970, and the FLPMA of 1976. These laws recognize the statutory right of mining claim holders to develop federal mineral resources under the General Mining Law of 1872. These laws, in combination with other BLM policies, also require the BLM to analyze proposed mining operations to ensure the following: 1) adequate provisions are included to prevent undue or unnecessary degradation of public land, 2) measures are included to provide for reasonable reclamation of disturbed areas, and 3) proposed operations would comply with other applicable federal, state, and local statutes and regulations. In accordance with 43 CFR 3809 regulations, the BLM would conduct periodic inspections of the Project.

In addition to the BLM, other federal, state, and local agencies have jurisdiction (including inspection responsibilities) over certain aspects of the Proposed Action.

1.4 Conformance with Land Use Plans

1.4.1 BLM Three Rivers Resource Management Plan

The Three Rivers RMP/ROD provides management direction to 1.71 million acres of BLM-administered public lands in Harney, Grant, Lake, and Malheur Counties, including federal and SRHA lands within the Project Area (BLM 1992). The Energy and Minerals Objective EM 3 in the RMP/ROD calls for providing maximum opportunity for mineral exploration and development on federal mineral estate in areas identified as open to operation of the mining laws. The Three Rivers RMP/ROD identified the BLM-administered lands within the Project Area as open to exploration and mining operations and identified the area as having moderate to high mineral potential (Three Rivers RMP/ROD, pages 2-162 and 2-165).

1.4.2 BLM Southeastern Oregon Resource Management Plan

The Southeastern Oregon RMP/EIS (SEORMP/EIS) includes sustainable management direction for 4.4 million acres of public land in the Malheur (MRA) and Jordan (JRA) Resource Areas in the BLM Vale District in accordance with FLPMA (BLM 2001). These two resource areas were combined for management efforts due to the following items: common issues; similar landscape; increased efficiency of a combined impact analysis; and effective use of personnel (BLM 2001). The Energy and Minerals Objective 1 in the SEORMP/EIS calls for providing opportunities for exploration and development of locatable and leasable energy and mineral resources and to

provide for public demand for saleable minerals from public land while protecting other sensitive resources (BLM 2001).

1.5 Consistency with Laws, Regulations, and Policies

1.5.1 Federal Land Policy and Management Act, the Mining and Mineral Policy Act of 1970, and BLM Mineral Policy

Public lands under BLM jurisdiction are managed "…on the basis of multiple use and sustained yield unless otherwise specified by law" (Sec. 102(a)(7), FLPMA). Section 102(a)(12) of FLPMA states that "the public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber, and fiber from the public lands including implementation of the Mining and Minerals Policy Act of 1970 (84 Stat. 1876, 30 U.S.C. 21a) as it pertains to the public lands". The Mining and Minerals Policy Act declares that it is the continuing policy of the federal government to foster and encourage private enterprise in the development of domestic mineral resources. BLM Mineral Policy (1984) states that public lands will remain open and available for mineral exploration and development unless withdrawal or other administrative action is clearly justified in the national interest.

1.5.2 National Environmental Policy Act (NEPA)

This EIS was prepared in conformance with the policy guidance provided in BLM's NEPA Handbook H-1790-1 (BLM 2008). The BLM Handbook provides instructions for compliance with the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA and the Department of the Interior's (DOI's) manual on NEPA (516 DM 1-7). These are the purposes of an EIS: a) analyze the potential impacts from the Project based on the Proposed Action; b) identify reasonable alternatives; c) inform the public about the Project; d) solicit public comment on the Project and alternatives; and e) provide agency decision makers with adequate information upon which to base the decision to approve or deny the Project or an alternative development scenario and determine appropriate mitigation measures.

1.5.3 Federal Mineral Regulations

Mining Law regulations at 43 CFR 3809.411(d) allow BLM to approve a MPO after completion of environmental analysis and after the MPO has been made available for public comment for 30 days. Approval may be subject to terms and conditions identified in the environmental analysis process necessary to meet the performance standards of 43 CFR 3809.420 and to prevent undue or unnecessary degradation of public land. The BLM is allowed to disapprove or withhold approval of a MPO for the following reasons: 1) the MPO is not complete according to content requirements at 43 CFR 3809.401; 2) the MPO proposes operations in an area segregated or withdrawn from mineral entry; or 3) the MPO proposes operations that would result in unnecessary or undue degradation of public land as defined at 43 CFR 3809.415.

Additional regulations at 43 CFR 3715 and 43 CFR 3814 govern requirements for use and occupancy under the mining laws (wells, cattleguards, signs, and fences on federal land associated with a MPO) and mining activities on SRHA lands.

In accordance with federal regulations, proponents are required to follow procedures and standards to prevent unnecessary or undue degradation of public land and reclaim disturbed

areas. These procedures include submitting a MPO and reclamation cost estimate, public review and environmental analysis of the Proposed Action; providing a financial guarantee for reclamation for operations on federal land; obtaining BLM approval before beginning operations; modifying the MPO before making changes to the operations described in the approved MPO; and addressing impacts from unforeseen circumstances.

1.5.4 Additional Policies

BLM's Oregon State Office adopted and agreed to implement wherever possible the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon (Oregon Strategy), completed in 2005 by the Oregon Department of Fish and Wildlife (ODFW) in cooperation with several state and federal agencies. The BLM implements the Oregon Strategy in accordance with special status species management policy in the revised BLM Manual 6840 (BLM 2008).

The US Fish and Wildlife Service (USFWS) is responsible for conformance with federal laws, regulations, and policies regarding threatened and endangered species and migratory birds. No endangered or threatened species or their critical habitat is located within the Project Area. USFWS is a cooperating agency in the preparation of this EIS.

1.6 State and County Plans and Regulations

1.6.1 Oregon's Statewide Planning Goals and Guidelines

Oregon has maintained a statewide land use planning program since 1973. The program is based on 19 Statewide Planning Goals. The goals outline Oregon's policies on land use and related topics, such as citizen involvement, housing, and natural resources (ODLCD 2010). Most of the goals include guidelines that suggest specific applications for the goal. Guidelines are not mandatory. Oregon's statewide goals are implemented through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan, zoning, and land-division ordinances required to establish the plan (ODLCD 2010). The local comprehensive plans are required to be consistent with the Statewide Planning Goals. Plans are reviewed for consistency with the Statewide Planning Goals by Oregon's Land Conservation and Development Commission (LCDC). When the LCDC officially acknowledges a local government's plan, the plan becomes the controlling document for land use in the area covered by that plan (ODLCD 2010).

The Statewide Planning goals include the following 19 topics:

1. Citizen Involvement
2. Land Use Planning
3. Agricultural Lands
4. Forest Lands
5. Open Spaces, Scenic and Historic Areas and Natural Resources
6. Air, Water and Land Resources Quality
7. Areas Subject To Natural Disasters and Hazards
8. Recreation Needs
9. Economy of the State
10. Housing
11. Public Facilities and Services

12. Transportation
13. Energy
14. Urbanization
15. Willamette Greenway
16. Estuarine Resources
17. Coastal Shorelands
18. Beaches and Dunes
19. Ocean Resources

1.6.2 Harney County Comprehensive Management Plan

The Harney County Comprehensive Plan (HCCP) was developed for the purpose of providing a guide for the conservation of Harney County's land resources (Harney County 2001). The HCCP is a long-range policy guide and decision-making tool to optimize the economic, social and physical development of Harney County. The policies and statements included in the HCCP are based on inventories, physical and political limitations on development, projected future needs, and public comments.

The HCCP coordinates significant factors, which will influence the future development of Harney County while simultaneously conserving the county's unique natural resources (Harney County 2001). Harney County established a planning program in 1978 to develop an updated Comprehensive Plan.

The HCCP designates the Project Area as EFRU-1, Exclusive Farm and Range Use (County of Harney 2001). Mineral exploration and mining operations in this zone require a conditional use permit from the Harney County Planning Commission if activities are on private land and SRHA land with private surface estate and federal mineral estate. No conditional use permit is required for mining operations on federal land. Harney County is a cooperating agency in the preparation of this EIS.

Malheur County does not have a county comprehensive plan with land use designations. Mineral exploration and mining operations on private and SRHA land would require a conditional use permit from the Malheur County Planning Commission but EPM is not proposing facilities or operations on private or SRHA land in Malheur County beyond those that have already been permitted by Malheur County.

1.6.3 Oregon Department of State Lands

The Oregon Department of State Lands (DSL) is responsible for leasing state-owned mineral rights on sand and gravel, gold, rock, diatomite, and natural gas resources. Leaseholders pay a fee based on the amount of mineral resources they extract from state land. DSL deposits these payments in the Common School Fund, which supports Kindergarten through Grade 12 schools.

1.6.4 Oregon Department of Geology and Mineral Industries

Mining operations on private, state, and federal lands are regulated by the Oregon Department of Geology and Mineral Industries' (DOGAMI's) Mineral Land Regulation and Reclamation Program. In accordance with state regulations regarding mining and reclamation, proponents are required to follow procedures and standards including submitting a MPO, providing a financial

guarantee of reclamation, and operating under a state permit. In addition, DOGAMI implements the federal Clean Water Act General Storm Water Permit and the state Water Pollution Control Facility Permit at mine sites based upon an agreement with the Oregon Department of Environmental Quality (DEQ). DOGAMI is a cooperating agency in preparation of this EIS.

1.6.5 Oregon Department of Environmental Quality

DEQ is responsible for air quality permit requirements at facilities and operations in Oregon. DEQ currently requires no air quality permit for existing operations in the Project Area.

1.7 Scoping

BLM published a Notice of Intent (NOI) to prepare an EIS in the Federal Register on September 15, 2008, and sent a copy of the Federal Register Notice to the Project EIS mailing list on September 17, 2008. The scoping period ran from September 15 to November 14, 2008.

The BLM provided information about the Project and announced the dates and locations of public scoping meetings in a news release dated October 20, 2008. The BLM sent a copy of the news release to the individuals and organizations on the mailing list on October 20, 2008.

Public scoping meetings for the proposed Project were held on October 29 and 30, 2008. The public scoping meeting on October 29, 2008, was held in Vale, Oregon, at the Vale District BLM Office. A total of four members of the public attended this meeting. The public scoping meeting on October 30, 2008, was held in Burns, Oregon, at the Harney County Senior Center. A total of three members of the public attended this meeting.

Six written comments were received. The public scoping comments were summarized in a memorandum dated December 17, 2008. The memorandum is on file in the administrative record at the Burns District BLM Office.

1.8 Key Issues

Key issues identified during internal and public scoping include the following:

- Access for Other Users or Uses;
- Air Quality;
- Cultural Resources and Native American Concerns;
- Dust;
- Grazing;
- Jobs/Economic Benefits;
- Reclamation;
- Reclamation and Revegetation Success;
- Special Status Species;
- Timber Sale in the North Kelly Field Area;
- Visual Impacts;
- Visual Resources;
- Water Quality;
- Wilderness Characteristics Inventory and Monitoring; and

- Windblown DE Creating Dust and Affecting Air Quality.

2 EXISTING FACILITIES AND OPERATIONS

This chapter describes EPM's existing facilities and operations on all land within the Project Area (Figure 2.1.1) including private, state, and BLM-administered land. The cumulative effects analysis in Chapter 6 describes EPM's proposed activities on private and state land not yet permitted by state and county agencies.

Mining operations on federal land administered by BLM, mostly at Kelly Field Mine Operations Area, were analyzed in an EA prepared in 1985 (BLM 1985) and approved in the DR for EA-OR-020-5-2. Mining operations on state land in Section 36 and on private land at Beede Desert and part of Kelly Field Mine Operations Areas were permitted separately by the Oregon DSL, DOGAMI Office of Mineral Land Regulation and Reclamation, and Harney and Malheur County planning commissions.

EPM mines DE seasonally from April through November (but may run year-round depending on market demand) from open pits in the Section 36, Kelly Field, and Beede Desert Mine Operations Areas. To date, this has not occurred because market demand has been served by the ore mined during the typical mining season. EPM hauls stockpiled ore on a year-round basis approximately 60 miles to the mill/plant located on private land seven miles west of Vale, Oregon, or to the VHSA located on federal land administered by the BLM 14 miles west of Vale, Oregon. EPM operates the mill year-round and maintains continuous milling operations by hauling ore from the VHSA when weather or road conditions impede haul traffic from the Project Area.

EPM backhauls mineral process waste from the mill/plant to backfill open pits. EPM hauls approximately 24 truckloads of ore per day to the mill or VHSA and backhauls approximately two truckloads per day of mineral process waste to the mine areas.

At the mill the ore is crushed, dried, and calcined. The end product is used for the following: 1) as a particulate filter for fruit juices, wine, beer, sugar, biodiesel fuel, corn syrup, and water; 2) as an additive to paint, rubber, paper, and plastics; and 3) in other products such as absorbents, catalysts, and carriers for pesticides.

Table 2.1-1 outlines the existing permitted surface disturbance by land ownership in the Project Area. The surface disturbance at VHSA and the mill are located 60 miles from the mine areas that were permitted separately, and no changes are proposed; therefore, the VHSA and the mill are not included in the permitted and existing surface disturbance acreages in Table 2.1-1. Section 36, Kelly Field, and Beede Desert Mine Operations Areas account for 165, 183 and 98 acres of existing surface disturbance, respectively.

Each of the three mine areas have ore stockpiles, waste rock stockpiles, internal roads, storm water catchment ditches and ponds, exploration drilling areas, ground water monitoring wells, and areas that have been reclaimed. The Section 36 Mine Operations Area includes an operations staging area and a mine camp for multiple camp trailers. The Puma Claims are five-acre mill site claims (instead of 20-acre placer or lode claims) on BLM-administered land where EPM constructed a well. EPM uses water from the Puma Claims well for dust abatement on roads and mine areas. EPM also stockpiles road aggregate for mine haul roads at the Puma Claims. The Mill Gulch Access Road provides access to the Kelly Field and Section 36 Mine Operations Areas. The Beede Desert Access Road and Beede Access Road provide access to the Beede

Desert Mine Operations Area. Currently permitted surface disturbance in the Project Area includes approximately 465 acres on 1,633.7 acres of federal, private, and state land.

Table 2.1-1: Existing Surface Disturbance

Activity	Existing BLM Surface Disturbance (acres)	Existing Private Surface Disturbance (acres)	Existing State Surface Disturbance (acres)	Total Existing Surface Disturbance
Section 36 Mine Operations Area	0	0	165	165
Kelly Field Mine Operations Area	133	50	0	183
Beede Desert Mine Operations Area	3	95	0	98
Puma Claims	3	0	0	3
Mill Gulch Access Road	2	2	5	9
Beede Desert Access Road	7	0	0	7
Total	**148**	**147**	**170**	**465**

EPM conducted exploratory drilling operations under Notices prior to 1984. EPM never reclaimed some of the bladed drill site access roads. EPM submitted a MPO to the BLM in 1984, which was approved in 1985 (BLM 1985). After 1992, the BLM permitted EPM to conduct exploratory drilling on federal land outside of the approved 1985 boundary under additional Notices to allow EPM to gather information for preparation of a plan for mine expansion. Reclamation of post-1992 exploratory drilling activities was completed except for an access road bladed in 1999 to Hidden Valley, as the road is still in use. Hidden Valley access road surface disturbance remains under a Notice. In 1999, the BLM required EPM to construct a storm water catchment pond on federal land south of the Beede Desert Mine Operations Area outside of the approved 1985 boundary to prevent storm water runoff from the ore stockpile flowing southward toward Altnow Reservoir. In 2006 and 2009, the BLM required EPM to construct ground water monitoring wells on federal land outside of the approved 1985 boundary in order to gather hydrology information for environmental analysis of EPM's MPO for mine expansion. All of the activities outside of the 1985 mine boundary were authorized under the same Notice for the Hidden Valley access road and Beede Desert storm water catchment pond.

2.1 Mining Methods

Mining operations are typically seasonal and run from April through November, when precipitation is minimal but may run year-round depending on market demand. Open pit mining techniques are utilized throughout the operation. Open pit sizes vary with location because of different geologic characteristics and ore deposit size. The mining phase consists of three steps: 1) removing and stockpiling topsoil and overburden for later use as growth media for reclamation purposes; 2) mining and stockpiling ore; and 3) removing and stockpiling waste rock interbeds encountered during the mining process. Mine waste is stockpiled in areas outside open pits or backfilled into open pits that have been exhausted. Greater than 50 percent of the material excavated from the open pits consists of ore processed and used in commerce; therefore, the open pits are not completely backfilled with mine waste rock, backhauled mineral process waste, overburden, or topsoil. Large depressions remain after mining ceases and the site has been reclaimed. Final reclamation involves slope reduction and recontouring combined with seeding

Figure 2.1.1 (Existing Facilities and Operations) indicates the location of the permitted facilities and operations and the approved mine operations areas within the project boundary.

Explanation

- Existing Roads
- Project Boundary
- Approved Mine Operations Areas
- Permitted Facilities and Operations
- Excluded Area within Project Boundary
- Public Lands
- State Land
- Private Land
- Split Estate with Federal Minerals (SRHA) on Private Land
- Split Estate with Federal Minerals (SRHA) on EPM Land
- Split Estate with Federal Minerals (Not SRHA)

0 500 1,000 1,500 2,000 Meters

0 2,000 4,000 6,000 8,000 Feet

N

Projection: UTM Zone 11 North, NAD83

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Existing Facilities and Operations

Figure 2.1.1

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with a BLM-approved seed mix. All existing mine operations in the Project Area follow this simple mine process, with the exception of the Beede Desert Mine Area, which utilizes a mining method called contour mining. In this method, once the ore has been extracted, the open pit excavations are then backfilled with a combination of mine waste and backhauled plant mineral process waste to an elevation approximating the original topography. The shallow Beede Desert ore deposits make this mining method possible.

Mining is completed using an excavator and haul trucks. A dozer equipped with a ripper and scrapers are also used predominantly for removal or placement of topsoil. Alternatively, scrapers can be used to mine ore or to remove overburden. Trucks and scrapers transport ore to stockpiles for solar air-drying so ore weight and fuel consumption at the mill are reduced. A dozer spreads dried ore piles into lifts at stockpile areas for storage until the ore is hauled to the mill or the VHSA. Mineral process waste is backhauled from the plant to mine areas and is used to backfill open pits as part of reclamation. A water truck is used to provide dust abatement and a grader to construct level driving surfaces.

2.2 Mining Operations Areas

Existing open pit mines are located at Section 36, Kelly Field, and Beede Desert Mine Operations Areas. Although DE is mined from all three of these areas, each mine area has ore with unique characteristics used to produce products with specific end uses. Table 2.1-1 shows the current amount of surface disturbance in each of the existing mine areas.

2.2.1 Section 36 Mine Operations Area

The Section 36 Mine Operations Area is located in Section 36, T19S, R36E in Harney County, Oregon (Figure 2.2.1). At the southern border of Section 36, County Road 303 terminates, at which point EPM maintains an improved road called Mill Gulch Access Road for an additional two miles in a northerly direction. The improved road is used to access both open pits in Section 36 (Section 36 Main Open Pit and Section 36 East Open Pit), as well as the Kelly Field Mine Operations Area. EPM leases Section 36 from the State of Oregon. The total permitted area in Section 36 is 640 acres of which 165 acres are disturbed. No BLM-administered land has been disturbed associated with operations at Section 36 Mine Operations Area.

Mining operations began in Section 36 Mine Operations Area in 1985 and the site contains all necessary infrastructure for operations. The mine shop, mine office, mine camp, a primary water well, fuel and lube islands, equipment staging areas, and two open pit operations (Main and East) are located within Section 36.

Section 36 Main Open Pit and Section 36 East Open Pit are separated by Mill Gulch, a drainage which flows seasonally, primarily from November through May. A 100-foot setback of pit limits from Mill Gulch is maintained, except where access road or haul road crossings are required. Currently there are several stockpiles or mine haul roads within 100 feet of Mill Gulch. These would remain as long as storm water runoff can be controlled. These roads have culverts that can accommodate a 100-year storm event.

2.2.1.1 Section 36 Main Open Pit

The Section 36 Main Open Pit has been designed with final pit wall angles ranging between 50 and 89 degrees. The Section 36 Main Open Pit would have a final width of approximately 1,000 feet, a final length of 2,600 feet, and a potential depth of 150 feet. Haul road ramp widths average 25 feet, and ramp slopes range between zero and 15 percent. The open pit is currently 90 feet deep, and the extent of economic ore reserves is unknown at this time.

2.2.1.2 Section 36 East Open Pit

The Section 36 East Open Pit operation is in the initial stages of development and is therefore shallow in depth at this time. The Section 36 East Open Pit will continue to expand with the lowest level expected to have an elevation of 3,800 feet above mean sea level (amsl); therefore, the total pit depth will be approximately 100 feet. The Section 36 East Open Pit would have a final width of 2,000 feet and a final length of 3,500 feet. The exact size of the Section East Open Pit will be determined by economic and geologic factors. Due to surface topography, there will be a minimal pit wall along the western side of the East Open Pit. The final pit wall on the east side will range between 30 and 70 degrees. The mine plan currently includes working bench heights of approximately ten feet in the Section 36 East Open Pit workings. Mine haul roads will average 25 feet in width with slopes between zero and 15 degrees.

2.2.1.3 Section 36 Mine Ore Stockpiles

Each open pit mine has a nearby ore stockpile pad for reduced haul distance between the mine and the ore stockpiles. Ore stockpiles are located where they can be reached by haul trucks year-round and where natural air flow and solar heating reduce haul weight and mill process fuel requirements by reducing the amount of moisture contained in the ore. The deposit in Section 36 contains ore that is unoxidized with high moisture content. Moisture evaporation prior to haulage is important.

Each stockpile area can have several individual ore stockpiles because diatomite ore has natural variations or characteristics. Commercial demand determines how much ore of each characteristic is mined and stockpiled, although in places, ore with unwanted characteristics must be mined and stockpiled in order to mine ore with desired characteristics. During mining, the ore is characterized and hauled to the appropriate ore stockpiles containing ore of like character. The number, size and location of stockpiles vary with commercial demand. There are two main stockpile areas at the Section 36 Mine Operations Areas containing ore mined from the open pit. The two main stockpile areas contain a total of six individual stockpiles.

2.2.1.4 Section 36 Mine Waste Stockpiles

There are three mine waste stockpiles located in Section 36. The first and largest waste stockpile is located directly south of Section 36 Main Open Pit and directly north of one of the ore stockpile pads. The second waste stockpile is located approximately 1,300 feet south of Section 36 East Open Pit. Both mine waste stockpiles have drainage systems in place to prevent storm water runoff from reaching the Mill Gulch drainage.

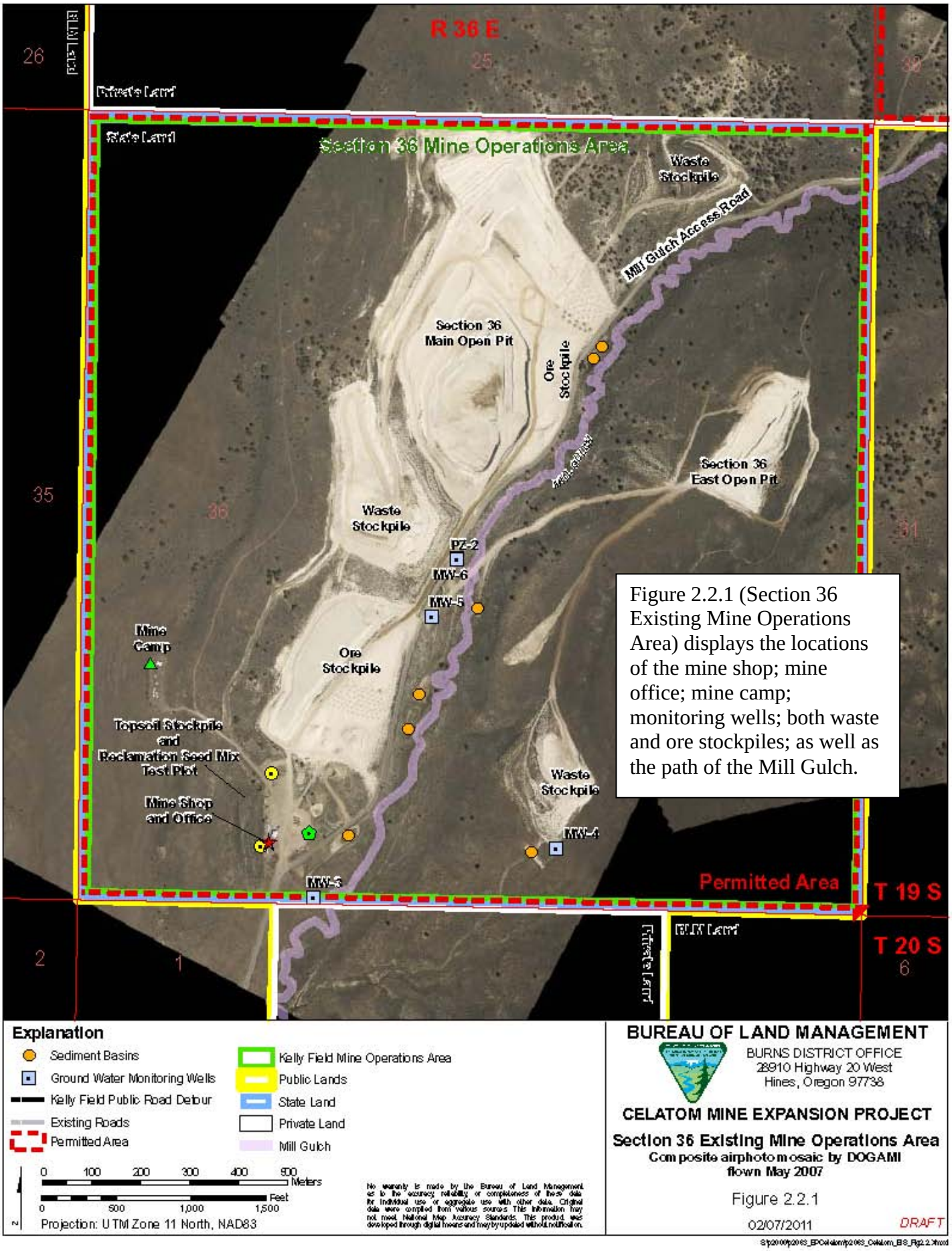

Figure 2.2.1 (Section 36 Existing Mine Operations Area) displays the locations of the mine shop; mine office; mine camp; monitoring wells; both waste and ore stockpiles; as well as the path of the Mill Gulch.

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2.2.1.5 Section 36 Mine Growth Media Stockpile

In 1985, before mining began at Section 36, EPM salvaged and placed topsoil from the proposed mine and operations areas into a large stockpile to be used as a reclamation test plot. The reclamation test plot consists of approximately 30,000 cubic yards of topsoil stockpiled west of the mine shop and seeded in accordance with standards established by the BLM, DOGAMI, and ODFW. The area was fenced to prevent wildlife and livestock from grazing in the test plot. Vegetation success is monitored by DOGAMI and the BLM. The BLM used the monitoring data for revegetation success to determine the reclamation seed mix used by EPM.

2.2.1.6 Section 36 Storm Water Control and Pit Dewatering

A network of drainage ditches is in place in Section 36 to capture and channel storm water runoff into seven different sediment basins. These sediment basins capture all storm water runoff from stockpiles, pits, waste stockpiles, or other working areas. One basin captures runoff from the mine camp, another from the mine shop and staging area, and a third captures all runoff from the Section 36 East Open Pit mine area. The remainder of the sediment basins capture storm water runoff or water from the Section 36 Main Open Pit dewatering operations and stockpile areas. All of these sediment basins function as both retention basins and evaporation ponds and do not discharge water into the Mill Gulch drainage. As the sediment basins fill up with sediment, they are cleaned, and the excavated material is used either for reclamation purposes or deposited in a waste stockpile. This information is detailed in Section 4.15.3.

Pit dewatering occurs in the Section 36 Mine Operations Area after unusually wet winter seasons. In this situation, water is pumped from the Section 36 Main Open Pit (located west of Mill Gulch drainage) and channeled into one or more of the sediment basins located in Section 36, in order to prevent turbid pit water from reaching the Mill Gulch drainage ditch. As the mining operations expand in the eastern portions of Section 36, additional drainage ditches and sediment basins will be installed to prevent turbid storm water or pit water from reaching Mill Gulch. DOGAMI and BLM will be notified of the location and size of the sediment basins before they are installed.

EPM is required to obtain and maintain permits, licenses, and other entitlements as discussed in Section 2.5.7.

2.2.2 Kelly Field Mine Operations Area

The Kelly Field Mine Operations Area is located in Section 30, T19S, R37E, in Malheur County, Oregon (Figure 2.2.2). The Kelly Field Main Open Pit is approximately one mile northeast of the Section 36 Main Open Pit (Figure 1.1.2) and is currently the largest and most northern active mining area in the Project Area. The Kelly Field Main Open Pit is located on the east side of Mill Gulch and could potentially reach a depth of 200 feet. Kelly Field West Open Pit is proposed for development on the west side of Mill Gulch as part of the Proposed Action of this EIS and is currently the location of the Kelly Field Public Road Detour, an ore stockpile, a topsoil stockpile, and a storm water ditch and storm water catchment pond (sediment basin).

Mining operations at the Kelly Field Main Open Pit have been continuous since EPM initiated activities in 1986. The Kelly Field Open Pit mining operations are located on both public lands administered by the BLM and on private land owned by EPM. Current surface disturbance is 133

acres on public land, where it is at the limit of surface disturbance analyzed in the 1985 EA, and 50 acres on private land. The Kelly Field Main Open Pit currently supplies more than 50 percent of the ore used by the mill and, therefore, has a minimum of four months of mining activity every season and utilizes more than 50 percent of the labor hours.

In 2003 and 2008, highwall slope failures occurred along the east side of Kelly Field Main Open Pit. In response, EPM developed a highwall remediation program. The program will take a minimum of five years to fully complete and will involve three main phases. The first phase began in spring 2006 and included surveying the area and establishing ground movement monitoring stations. Monitoring occurs on a regular basis, when mine activities are conducted in the area of slope failure in order to detect any ground movement above the working area. The second phase of the remediation program includes determining the exact location of the boundary between the basaltic rock and the ore contact. The third phase includes excavation of safety catch benches down the pit wall face to create the final pit wall. Under the Proposed Action, Kelly Field Main Open Pit would continue to expand to the east as the Agency Mountain slope failures are remediated. The second and third phases are discussed in detail in Section 3.2 (Proposed Action).

Primary access to the Kelly Field Mine Area is an improved road that also serves as public access to federal land north of the Kelly Field Mine Area. This primary access road is maintained by EPM as a gravel road adjacent to Mill Gulch from the mine maintenance shop in the Section 36 Mine Operations Area to the Kelly Field Main Open Pit. To keep the public out of the active operations area at the Kelly Field Mine Area, EPM has placed signage indicating the primary access road as closed to the public and signage on the old Mill Gulch Access Road as a detour route.

There are two additional roads that are used to access the Kelly Field Mine Operations Area during the summer months: a 4-wheel drive (4WD) road west of the mine area that has no outlet and Hart Road that terminates at the southeast edge of the mine area due to the Agency Mountain slope failures that developed during mining activity. These two additional roads are used intermittently by local ranchers and recreationists.

The current open pit design for the Kelly Field Mine Operations Area contains ramps and mine haul roads that have travel widths varying between 25 and 100 feet with slopes between zero and 15 degrees.

Final pit wall angles in Kelly Field Main Open Pit will vary depending upon the location and configuration of the open pit. The current open pit is scheduled to expand to the south and will increase in depth. Along the western edge of the Kelly Field West Open Pit, EPM proposes final highwall angles ranging between 60 and 85 degrees. Along the eastern edge of Kelly Field Main Open Pit, EPM proposes final highwall slope angles ranging between 45 and 60 degrees. Public safety is maintained by putting fences around the open pits and facilities to preclude entrance by the public and big game species.

2.2.2.1 Kelly Field Mine Ore Stockpiles

EPM excavates ore from the Kelly Field Main Open Pit during the mining season; stockpiles ore in numerous stockpiles located throughout the Kelly Field Mine Operations Area, including two stockpile areas located west of Mill Gulch and one east of Mill Gulch; and hauls ore from the

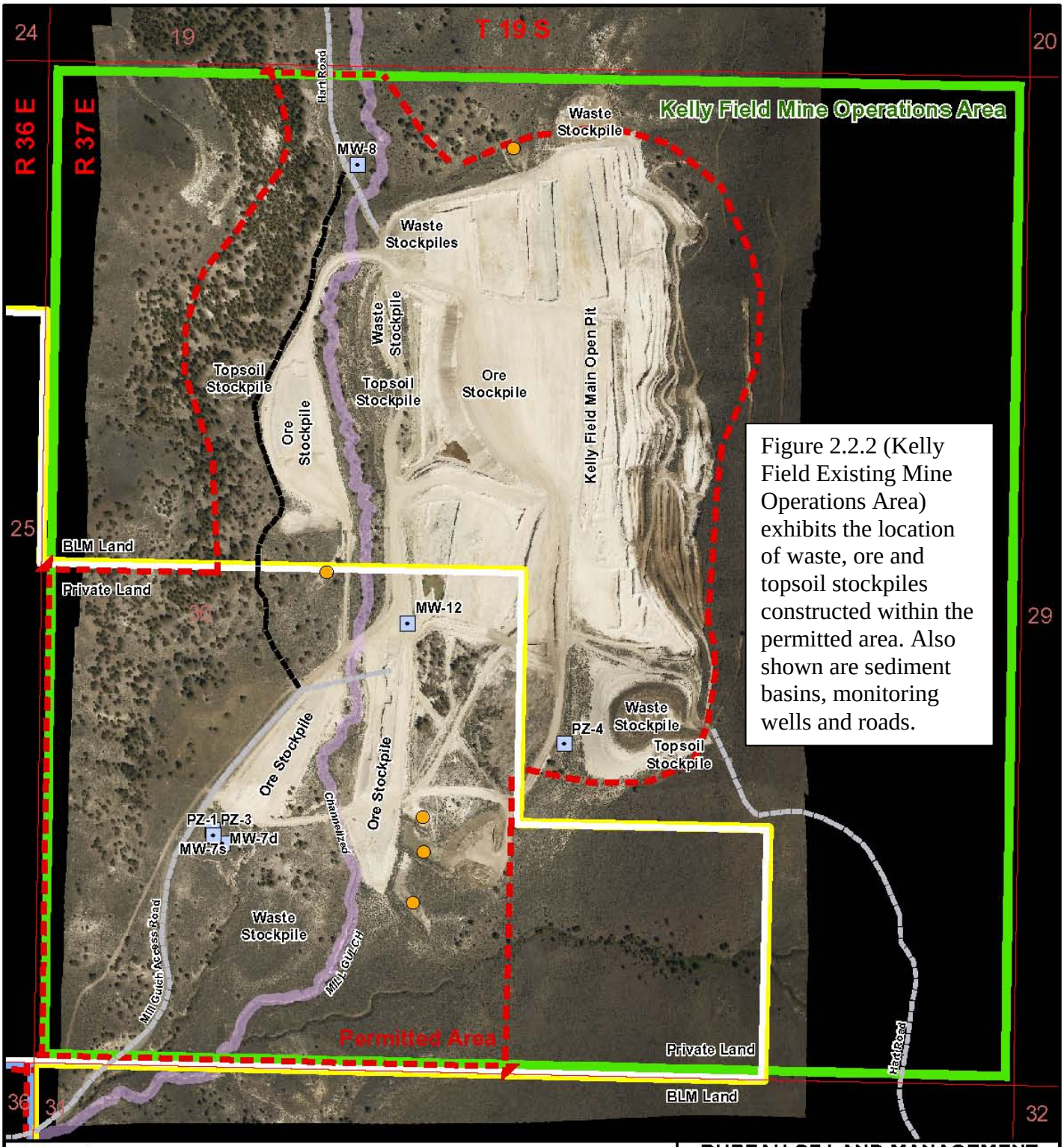

Figure 2.2.2 (Kelly Field Existing Mine Operations Area) exhibits the location of waste, ore and topsoil stockpiles constructed within the permitted area. Also shown are sediment basins, monitoring wells and roads.

Explanation

- Sediment Basins
- Ground Water Monitoring Wells
- Kelly Field Public Road Detour
- Existing Roads
- Permitted Area
- Kelly Field Mine Operations Area
- Public Lands
- State Land
- Private Land
- Mill Gulch

0 100 200 300 400 500 Meters

0 500 1,000 1,500 Feet

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Kelly Field Existing Mine Operations Area

Composite airphoto mosaic by DOGAMI flown May 2007

Figure 2.2.2

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stockpiles to the mill throughout the year. EPM prefers to stockpile unoxidized ore with high moisture content in open areas with greater exposure to wind and sun for expedited drying.

Additional ore stockpile pads may be required within the permitted operations area. The exact size and number of ore stockpiles will vary from year to year based on the amount of Kelly Field ore required during a particular mining season. Before a new stockpile area is constructed, all topsoil will be removed and stockpiled for future reclamation. When possible, new stockpile pads will be located within disturbed areas.

2.2.2.2 Kelly Field Mine and Mill Mineral Process Waste Stockpiles

Four waste rock stockpiles have been constructed at the Kelly Field Mine Operations Area. The oldest stockpile is located adjacent to Mill Gulch northwest of Kelly Field Main Open Pit and has revegetated. The most visible stockpile is located southeast of the Kelly Field Main Open Pit adjacent to Agency Mountain and resembles a butte in shape. The third waste stockpile contains both mine waste and mineral process waste and is located in the center portion of the Kelly Field Main Open Pit. This waste stockpile was completed in 2007 by backfilling the excavated open pit. An additional waste stockpile was needed to accommodate the generation of mine waste from the 2008 mining season and was constructed on private property southwest of the Kelly Field Main Open Pit.

2.2.2.3 Kelly Field Mine Growth Media Stockpiles

Topsoil has been deposited in three small stockpiles at the northwestern and southeastern ends of the open pit (Figure 2.2.2) and west of the ore stockpile located west of Mill Gulch.

2.2.2.4 Kelly Field Storm Water Control and Pit Dewatering

Currently, a series of drainage ditches and sediment basins are in place within the Kelly Field operating area, which are necessary to prevent turbid storm water runoff or pit water from reaching the Mill Gulch drainage. There are a total of five sediment basins located throughout the Kelly Field Operations Area. One basin is located west of Mill Gulch drainage and captures the runoff from a stockpile pad located near the basin. All other sediment basins are east of Mill Gulch drainage and capture the runoff from the pit, waste stockpiles, or stockpile pads. As the sediment basins fill up with sediment, they are cleaned, and the excavated material is used either for reclamation purposes or deposited in a waste stockpile. Pit dewatering activities have been rare at the Kelly Field mine; however, as the pit continues to expand and reach greater depths, pit dewatering is possible. The BLM and DOGAMI will be notified before additional basins are installed.

2.2.3 Beede Desert Mine Operations Area

EPM will continue mining at the north end of Beede Desert Mine and continue to stockpile ore in the vicinity. The Beede Desert Mine Operations Area is located in the east half of Section 33 and the west half of Section 34, T19S, R36E, in Harney County (Figures 1.1.2 and 2.2.3). All mine operations are on private land (patented mining claims leased by EPM) with the exception of one placer claim located on federal land administered by the BLM that expired in 2008 because EPM reclaimed the sediment basin and re-channeled the drainage, negating the need of

the Notice. The working mine areas lie on the eastern edge of Otis Valley and are approximately 3,800 feet amsl.

Beede Desert Mine Operations Area consists of a small operation with a total of 320 permitted acres and existing disturbance of 98 acres. Mining continues at a declining rate at the north end of the Beede Desert Mine Operations Area, due to the depletion of ore reserves. In the spring and fall of 2008, 35 acres of the operation disturbance was reshaped and seeded. The Beede Desert Mine Operations Area lies two miles directly west of the Section 36 Mine Operations Area and is accessible by an improved road constructed by EPM in 1985.

2.2.3.1 Beede Desert Mine Storm Water Control and Pit Dewatering

Located within the Beede Desert Mine Operations Area are several small sediment basins. These basins collect storm water runoff from precipitation events. A series of surface drainage ditches channel water to each of these sediment basins. Ground water runoff from all of the working areas of the pits, ore stockpiles, waste stockpile and roadways is channeled into the sediment basins. Due to the shallow depths of the Beede Desert Open Pit and the practice of backfilling with waste material, pit dewatering has never been required. The sediment basins are cleaned out as needed with the excavated material being used either for reclamation purposes or placed in the waste stockpile.

2.2.4 Puma Claims Area

The Puma Claims Area is located southeast of Beede Desert Mine Operations Area in the southeast quarter of Section 3, T20S, R36E, (Figure 2.2.4) on federal land administered by the BLM. Access is from the Beede Access Road. Surface disturbance at Puma Claims Area measures approximately three acres and represents a mine support area. No active mining activities have occurred at this location. There is a 300-foot deep water well that was drilled in 1985. The water from the well is used for dust suppression. There are also gravel stockpiles and a water tank at the Puma site.

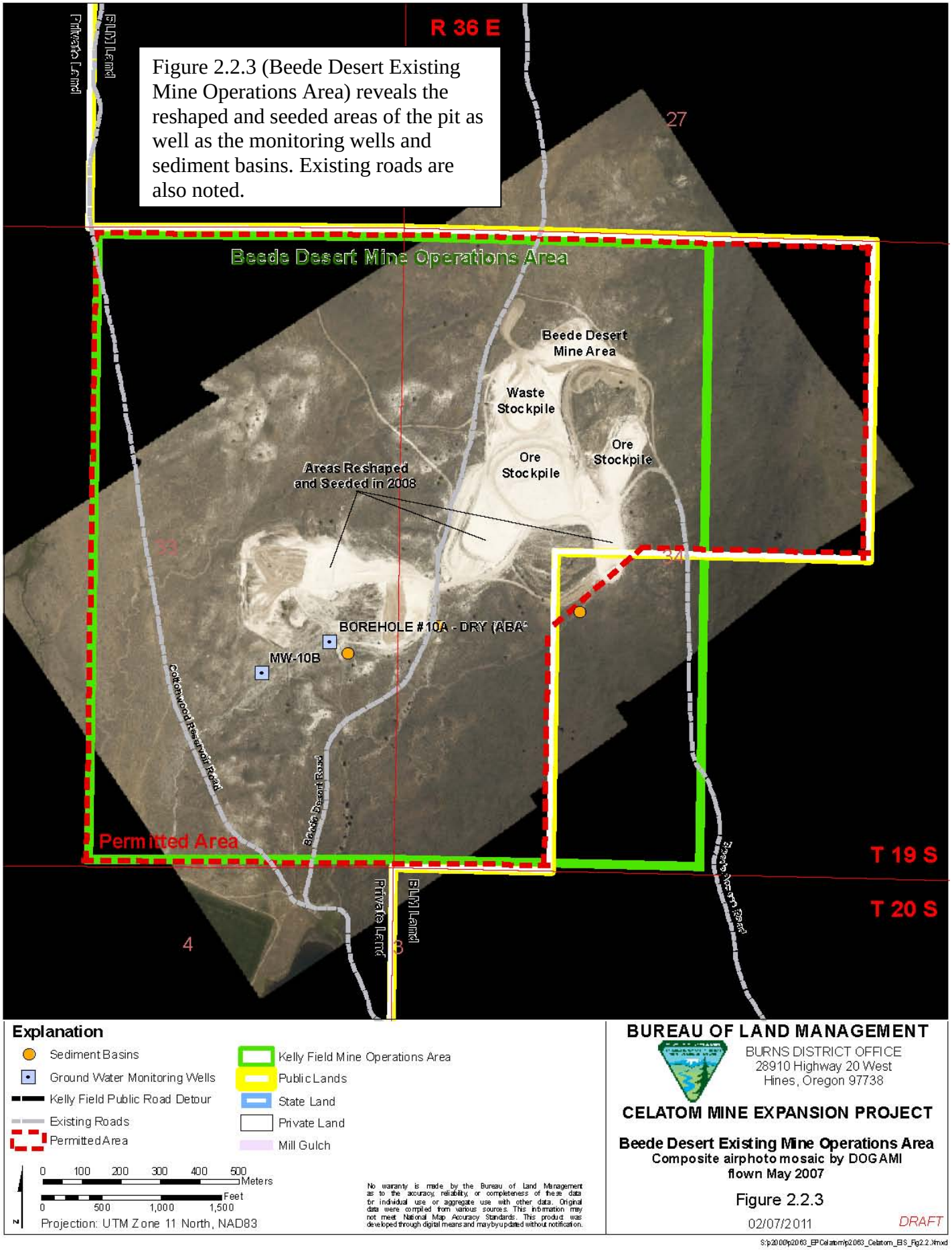
2.3 Support Facilities

2.3.1 Mine Camp

Due to the remote location of the Project Area and because most employees who work at the site live near Ontario and Vale, Oregon, EPM constructed and maintains a mine camp for the mine employees. This camp is located in the southwest quarter of Section 36 (Figure 2.2.1) and is accessed by the Mill Gulch Road. The mine camp contains a generator building, water tank, shower house, septic system, and during the operating months, up to 12 camp trailers.

2.3.2 Work Force

Mine operations currently utilize two crews working a consecutive four-day work schedule (twelve-hour days), throughout the mining season with a total of 21 employees. The working crew resides in the camp trailers for the course of their rotation. Ore hauling is currently completed by use of a contractor who employs 12 to 15 people to load and haul ore to the plant located in Vale, Oregon, where 61 people are currently employed.


R 36 E
Figure 2.2.3 (Beede Desert Existing Mine Operations Area) reveals the reshaped and seeded areas of the pit as well as the monitoring wells and sediment basins. Existing roads are also noted.
Private Land
BLM Land
27
Beede Desert Mine Operations Area
Beede Desert Mine Area
Waste Stockpile
Ore Stockpile
Ore Stockpile
Areas Reshaped and Seeded in 2008
33
34
BOREHOLE #10A - DRY (ABA
MW-10B
Cottonwood Reservoir Road
Beede Desert Road
Permitted Area
T 19 S
T 20 S
Private Land
BLM Land
Beede Access Road
4
3
Explanation
Sediment Basins
Ground Water Monitoring Wells
Kelly Field Public Road Detour
Existing Roads
Permitted Area
Kelly Field Mine Operations Area
Public Lands
State Land
Private Land
Mill Gulch
0 100 200 300 400 500 Meters
0 500 1,000 1,500 Feet
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Projection: UTM Zone 11 North, NAD83
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CELATOM MINE EXPANSION PROJECT
Beede Desert Existing Mine Operations Area
Composite airphoto mosaic by DOGAMI
flown May 2007
Figure 2.2.3
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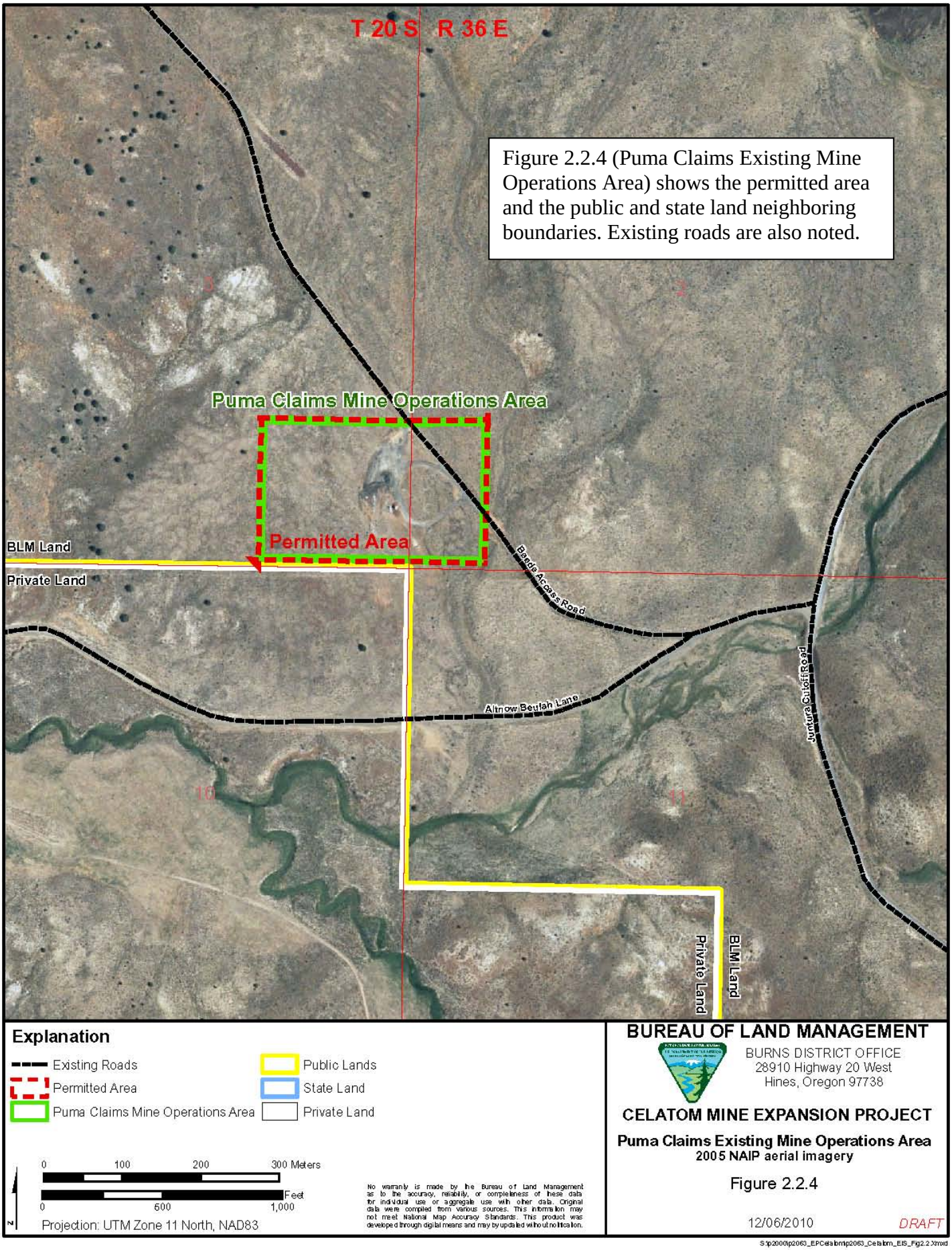
T 20 S R 36 E
Figure 2.2.4 (Puma Claims Existing Mine Operations Area) shows the permitted area and the public and state land neighboring boundaries. Existing roads are also noted.
Puma Claims Mine Operations Area
Permitted Area
BLM Land
Private Land
Bandit Access Road
Juniper Cutoff Road
Altnow Beulah Lane
Private Land
BLM Land
Explanation
Existing Roads
Permitted Area
Puma Claims Mine Operations Area
Public Lands
State Land
Private Land
0 100 200 300 Meters
0 500 1,000 Feet
Projection: UTM Zone 11 North, NAD83
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CELATOM MINE EXPANSION PROJECT
Puma Claims Existing Mine Operations Area
2005 NAIP aerial imagery
Figure 2.2.4
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2.3.3 Mobile Equipment

EPM extracts ore with multiple types of mining and ancillary equipment commonly used in the open pit mining and heavy construction industries. The primary equipment utilized for ore extraction, mine waste removal, and overburden removal is a combination of articulated haul trucks loaded by a mining shovel or excavator. The size and number of the truck and shovel fleet depend upon the ore requirements for that mining season. Although not commonly used in a production role, scrapers are used for removing thin layers of soil or other poorly consolidated material (growth media) or when moving growth media for reclamation. Bulldozers are used for road construction, reclamation, stockpile leveling, soil removal, and ripping.

Ancillary equipment currently used at the Project Area includes a service truck, motor grader, water truck, rotary air drill, and pickup trucks. Equipment is selected annually to fit the needs of the mining operation.

2.3.4 Water Supply

The two primary uses for water for the mine operations in the Project Area are dust suppression and personal hygiene. Water is pumped from two wells. The first well, MW-1, was installed in 1985 in the Puma Claims Area and is located in the southeast quarter of Section 3, T20S, R36E (Figure 2.2.4). This well supplies water primarily for dust suppression. The second well, MW-3, was installed in 1999 and is located in the Section 36 Mine Operations Area near the mine shop in the southwest quarter of Section 36, T19S, R36E (Figure 2.2.1). This well pumps water to a nearby storage tank and provides water for both the mine camp and for dust suppression.

Water is normally drawn from one well at a time; however, if proposed mining operations begin in Hidden Valley, in combination with reclamation activities at Beede Desert Mine Operations Area, both water wells will be used concurrently. In addition to supplying the needs of the mining operations, EPM has historically provided water at no cost to local ranchers for their cattle during times of drought.

In the 1985 DR, the BLM approved EPM's 1984 MPO subject to special project stipulations including one that states "*Eagle-Picher shall design and construct a reservoir in T.20S., R.36E., W.M. Section 25: NW¼SW¼ in the 3 C's pasture of the Chalk Hills allotment at a site to be selected by the BLM. This shall serve as the sole reservoir for the pasture, replacing use of the existing reservoir in the Chimney Creek pasture and drawing cattle away from the main haul road. Gates in the fence along the western boundary of the CC reservoir shall remain closed while either the 3 C's or the Chimney Creek pastures are in use*" (BLM 1985, stipulation 2). In lieu of constructing this reservoir, the BLM requested that EPM drill a well in that location. The well was drilled in 1985 along the fence line in the southwest quarter of Section 26, T20S, R36E, however, the well no longer produces water. The grazing permittee currently hauls water to the 30-foot trough at the well site.

2.3.5 Mine Power Supply

Three diesel-powered generators are located in the Section 36 Mine Operations Area and are used to provide power to the mine shop area, the mine camp, and the Beede Desert water well. Generators are normally located in small generator buildings or on portable trailers. Diesel fuel used to power the generators is stored in tanks with secondary containment. Generators are

operated on an as-needed basis. In the mine shop area, electricity is used to power air compressors, welders, and other assorted mine support equipment. In the mine camp, electricity is used primarily for refrigeration and lighting. In the Project Area, electricity is used to operate two water well pumps that supply water for dust suppression and for toilet facilities that are on a septic system.

2.3.6 Fuel and Oil Spill Prevention and Control

EPM has a Spill Prevention and Control Plan, required by the State of Oregon under OAR 340-141, in place for the Project Area that addresses the storage and use of petroleum products and waste for mining operations (EPM 2008; Appendix 31). There is a central fuel island in the Project Area where off road diesel and gasoline are stored. This central fuel island is located near the mine shop in the southwest quarter of Section 36 (Figure 2.2.1). Both the gasoline and diesel fuel tanks are located inside a concrete containment basin that is capable of holding the contents of both tanks in the event of a tank rupture. These tanks are used to store petroleum products required to operate and maintain the equipment utilized at the mine site. There are five oil storage tanks with a total capacity of 2,100 gallons of hydraulic, lubrication, and waste oil. Diesel fuel is stored in one 10,000 gallon tank, one portable 500 gallon tank, two stationary 150 gallon tanks, and one portable 100 gallon tank. There is one gasoline tank with a capacity of 4,000 gallons. Located adjacent to the mine shop in Section 36 is an additional concrete containment basin where lubrication, hydraulic, and waste oils are stored. This containment basin also has sufficient capacity to contain the contents of all the tanks in the event of a tank rupture. The remote generators also have individual fuel tanks with separate containment structures to prevent fuel from contacting the ground or contaminating the ground water. The service truck that is used to fuel and service the mine machinery is equipped with a double-walled 500 gallon diesel tank. All tanks are inspected regularly to ensure that they are in proper working condition.

In the event of a fuel or oil spill at the mine, EPM will make every effort to contain the spill as rapidly as possible in order to prevent any spilled material from reaching areas outside the containment, as described in the Spill Prevention and Control Plan. As required, regulatory agencies will be promptly notified in the event a spill should occur. In case of petroleum-based product spill, DE will be used to absorb any spilled material, as it possesses excellent absorbent properties. Once the DE absorbs the spill, it will be gathered and transported to the mill to be incinerated in the rotary kilns.

2.3.7 Roads and Haul Roads

Existing mining operations require numerous roads with various types of construction to facilitate access to and throughout the operations. Existing roads within or running through the Project Area include improved roads or mine haul roads and service roads used for maintaining fences and other facilities in the Project Area. The improved roads are used to access the mine from outside the Project boundaries, whereas the mine haul roads are used by the mine operator to facilitate the mining process. Figure 2.3.1 shows the existing roads in the Project Area.

Figure 2.3.1 (Existing Roads in the Project Area) details the existing county roads and the mine haul roads within the Project Area.

Explanation

- Project Boundary
- Excluded Area within Project Boundary
- Approved Mine Operations Areas

Existing Roads

- County
- Other

- Public Lands
- State Land
- Private Land
- Split Estate with Federal Minerals (SRHA) on Private Land
- Split Estate with Federal Minerals (SRHA) on EPM Land
- Split Estate with Federal Minerals (Not SRHA)

0 500 1,000 1,500 2,000 Meters

0 2,000 4,000 6,000 8,000 Feet

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Existing Roads in the Project Area

Figure 2.3.1

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2.3.7.1 Access and Improved Roads

EPM has constructed or upgraded a total of approximately 16 miles of road including the improvement of existing county roads located on public lands within the Project Area. In 1990, through a joint venture with Harney County, 6.4 miles of County Road 303, extending north from U.S. Highway 20 to the Beulah Reservoir turnoff, was paved with asphalt. A one-mile paved extension was later added from the Beulah Reservoir turnoff to the Section 36 Mine Operations Area staging area, making the total paved distance 7.4 miles. As a result of the initial joint venture, road maintenance for the paved road has been a collaborative effort between EPM, a subcontractor, and Harney County. Where the improved road intersects U.S. Highway 20, the road approaches were constructed in accordance with the Oregon State Highway Department standards and specifications. All culverts installed along or under the necessary improved roads were designed to withstand a 100-year storm event.

The Project Area has haul roads that are either closed to the public or have restricted access for safety reasons. In the 1985 DR, the BLM approved EPM's 1984 MPO subject to special project stipulations including one that states "*Eagle-Picher shall post permanent signs along the county road providing warning of truck traffic, and post road closure signs on the new access roads to the Beede Desert and Mill Gulch mine sites at their junctures with the county road*" (BLM 1985, stipulation 9). Further explanation of this stipulation states "*This road will be used primarily by Eagle-Picher's haul trucks, but the public may not be aware of this use. Signs warning of truck traffic will minimize potential accident hazards involving the general public. Closure of the new haul roads is also needed to prevent public traffic from interfering with the mining operations*" (BLM 1985). As a result, the new haul roads (Beede Access Road and Mill Gulch Access Road) were closed to the public for safety reasons by the 1985 DR (BLM 1985).

Therefore, to facilitate public access and safety, EPM relocated a segment of Hart Road around the east and north sides of Kelly Field Main Open Pit. In 2003, slope failures triggered by EPM mining activities closed the new segment of Hart Road. The Mill Gulch Access Road is the only means of public access to federal land north of Kelly Field. The public is allowed to use EPM's improved Mill Gulch Access Road to Kelly Field Mine Operations Area, but then they must use the old Mill Gulch Access Road route west of the mining operations to reach federal land north of Kelly Field Mine Operations Area (Figure 2.2.2). The public road detour keeps the public out of active mining areas and reduces the potential accident hazard.

EPM allows a local rancher to trail cattle through the Kelly Field Mine Areas to move cattle between private land north of the Kelly Field Mine and private land to the east. EPM allows this because the rancher's traditional route has been closed due to the slope failures.

The roads accessing the Project Area cross multiple fence lines. Where required, U-80 design cattle guards were installed using concrete piers for anchorage. A total of seven cattle guards were installed along the various improved roads in the mid-1980s.

2.3.7.2 Mine Haul Roads

Each mine area has numerous mine haul roads classed as unimproved roads, and as such, these roads are not constructed to any local or state road specifications. These roads are not intended for public travel, and as a result, public access is prohibited for reasons of safety. All mine haul roads are constructed in compliance with the Mine Safety and Health Administration (MSHA)

regulations under 30 CFR. Mine haul roads have road grades ranging from zero to 15 percent, and road travel widths vary between 25 feet and 100 feet. Mine roads are only maintained for use when mining is in progress in a particular working area. Road maintenance includes leveling with either a bull dozer or motor grader and watering with a water truck to control the generation of fugitive dust. Mine roads will be reclaimed when mining activities have concluded, with the exception of roads that are integral to a final pit wall, which will be topsoiled and seeded but not recontoured.

2.3.8 Storm Water Runoff Control

In all current mine workings, a series of surface water drainage ditches have been constructed to channel storm water runoff or pit water into multiple sediment basins. These drainage and interceptor ditches are similar to ditches commonly found along rural roads, having a depth of one to two feet and a width of four to 12 feet, depending on surface topography. As discussed in Sections 2.2.1.6, 2.2.2.4, and 2.2.3.3, the sediment basins are evaporative sediment basins and are located in the working areas of Section 36, Beede Desert, and Kelly Field Mine Operations Areas. The sediment basins and drainage ditches are designed to contain the runoff generated by a 100-year storm event. The basins located at the Beede Desert Mine Operations Area are also evaporative sediment basins and do not discharge into the watershed toward Altnow Pond.

2.3.9 Dust Control

EPM has a dust control plan in place (EPM 2008, Appendix 32), as required by the Oregon DEQ in accordance with OAR 340-240, to minimize blowing dust from the roads and stockpiles. The plan details the use of water trucks and other Best Management Practices (BMPs) used as dust control measures.

2.3.10 Noxious Weed Management

EPM conducts a weed control program that actively monitors for weeds in the spring, summer, and fall seasons, and treats weed occurrences as necessary. Treatments are conducted by EPM's state-certified herbicide technician, utilizing BLM-approved herbicides. The technician is also responsible for coordinating with and reporting to the BLM and Harney County weed specialists and for submitting pesticide use proposals and records of pesticide use in the Project Area to the BLM.

2.3.11 Open Pit Dewatering

The relatively arid climate found in the Project Area rarely produces sufficient rainfall to require mine dewatering activities. However, after winters with above normal precipitation, it is occasionally necessary to pump water from the lowest levels of the open pits. Even after these events, mine dewatering has never been required at the Beede Desert Mine Operations Area. When pumping is necessary to facilitate mining activities, all water pumped from the open pits is channeled through storm water drainage ditches to the sediment basins, thereby preventing pit water from reaching the Mill Gulch drainage. When conditions permit, any accumulated water in the lower levels of the open pits is allowed to evaporate. As the currently permitted open pits are expanded, pit dewatering may occur with more frequency; however, all mining activity will be constrained to ensure no water discharges out of the sediment basins into the Mill Gulch drainage.

2.3.11.1 Section 36 Mine Operations Area

Pit dewatering occurs in Section 36 after unusually wet winter seasons. In this situation, water is pumped from the West pit and channeled into one or more of the sediment basins located in Section 36. Additional drainage ditches and sediment basins will be installed as the mining operations expand in the eastern portions of Section 36, in order to prevent storm water or pit water from reaching Mill Gulch. The DOGAMI and BLM will be informed of the location and size of the sediment basins before they are installed.

2.3.11.2 Kelly Field Mine Operations Area

Pit dewatering activities have been rare at the Kelly Field mine; however, as the pit continues to expand and reaches greater depths, pit dewatering is possible. The BLM and DOGAMI will be notified before additional basins are installed.

2.3.11.3 Beede Desert Mine Operations Area

No dewatering has occurred at the Beede Desert Open Pit because it is shallow and has been partially backfilled with waste material.

2.3.12 Health and Human Safety

All operations conducted within the confines of the Project Area fall under the jurisdiction of MSHA. MSHA is charged with ensuring that all mines operating inside the United States follow all applicable regulations under 30 CFR. If, at any time, work instructions issued by DOGAMI or the BLM conflict with MSHA regulations, EPM will require that all involved agencies reach a mutual understanding before any work is completed.

EPM conducts mining operations in a safe and efficient manner at all times. Any condition that jeopardizes the safety of an EPM employee, contractor, or the public traveling through the mine area is corrected immediately. As soon as EPM detects or is made aware of any issue, corrective action commences as soon as possible. It is important to note the lack of heavy equipment on site during the winter months may limit the ability of EPM to correct slope stability issues, drainage issues, or other problems that can develop during the winter months. These issues are corrected as soon as possible in the spring once the equipment is brought back on site. In addition, signs are posted in the Project Area warning of hazards.

When adverse conditions are observed, EPM takes corrective action to prevent environmental degradation and ensures the safety of all employees. The primary hazard that occurs because of weather at the Project Area includes high winds, heavy rainfall, or lightning. During these events, operations cease, and employees take shelter until the adverse conditions cease.

2.3.13 Ground Water Monitoring Wells and Piezometers

Ten of the 12 drill holes drilled in 2005 were completed as monitoring wells in accordance with the regulations specified by Oregon Administrative Rules (OAR) 690 Division 240. All monitoring wells were completed under the supervision of a qualified well installer with a current license from the State of Oregon who was subcontracted directly by WDC Exploration

and Drilling (WDC). Following completion of each monitoring well, the subcontractor prepared certified well records for submittal to the Oregon Department of Water Resources (ODWR).

Each monitoring well was constructed of either two-inch or four-inch Schedule-40 PVC casing, depending upon the subsurface conditions encountered. The screened interval was constructed with 0.020-inch slotted Schedule 40 PVC casing across the desired interval. In most cases, the screened interval was placed across the water table. However, in low-permeability zones, such as diatomite, ground water recharge into the drill hole is slow and often takes several hours (or days) for the water to recover to static conditions, and it was not always possible to allow the water level to equilibrate over a long period of time. For wells MW-4, MW-6, and MW-9, the depth to the static level had to be estimated for the purpose of selecting the depth of the well screen. Also, three of the wells were installed below the diatomite deposit (MW-2, MW-5 and MW-11). For these wells, the screen interval was placed to capture ground water within discrete lithologic zones.

The sand pack was placed in a uniform and continuous manner, such that hydraulic segregation and bridging was minimized or eliminated. The well casings extend at least two feet above the ground surface and are enclosed in locking steel surface casing with a permanent well identification label (tag) affixed to the outside. Each tag is stamped with a well tag number issued by the State of Oregon.

The wells were developed using a combination of bailing and swabbing until the ground water was devoid of settleable (very fine sand-sized) material. Following bailing, the wells were pumped until the water was clear or until field parameters (temperature, pH, electrical conductivity (EC), and oxidation-reduction potential (Eh)) stabilized to +/- ten percent. Field parameters were collected at regular intervals using a Myron ULTRAMETER™ 6P instrument.

The BLM requested that an additional monitoring well be placed closer to the Kelly Field Pit in the vicinity of the EP Test Well #5. This monitoring well (MW-12) was installed during June 2008 in a location approximately 200 feet north of the EP Test Well #5 and was installed to monitor saturated diatomite immediately downgradient of the Kelly Field Pit.

Drilling and installation methods for MW-12 were the same as those employed during the previous ground water investigation (2005), which included drilling by rotosonic methods and installing a two-inch monitoring well. An SRK project-level geologist was present during drilling and monitoring well construction. In addition, a licensed well driller was present during the drilling and installation of MW-12.

Following completion, MW-12 was developed to remove the loose fine material in the borehole adjacent to and within the sand pack. The monitoring well was developed using a submersible pump to purge the well until the water was clear and devoid of fine material.

During the 2008 drilling event, two piezometers (PZ-1 and PZ-2) were drilled. Piezometer PZ-1 was drilled downgradient of the Kelly Field Pit within about 15 feet of MW-7s. Piezometer PZ-2 was drilled downgradient of the Section 36 Pit and within about 15 feet of an existing monitoring well (MW-6). These piezometers were installed to serve as observation points during subsequent hydraulic testing. Because of the low permeability of the diatomite, the boreholes were specified to be approximately four inches in diameter with standpipe piezometers no larger than necessary (i.e., one-inch PVC casings).

2.4 Material and Waste Rock Characterization and Disposal

In summary, the majority of the waste rock associated with the existing and proposed operations will consist of either oxidized diatomite or unoxidized diatomite. Likewise, the final pit walls in the Kelly Field Open Pits and Eagle Mine Open Pit will mainly consist of these two material types. Based on the results of the material characterization, the oxidized diatomite contains no sulfides and is essentially inert. The unoxidized diatomite contains sulfide minerals and is considered acid generating based on net acid generating (NAG) and meteoric water mobility procedure (MWMP) data. The waste backfilled in the Kelly Field area consists of a mixture of oxidized and unoxidized diatomite as well as mineral process waste, and the acid generating potential of this material falls between these two endpoints. The remaining materials types (i.e., interbedded ash/tuff and basalt) comprise a small percentage of the total material to be mined or will not be encountered or exposed during mining and, therefore, will not contribute to the overall acid generating potential of the waste rock or pit walls associated with the project. The material characterization for each of the different material sources discussed below and studied by SRK (2010a) is located in Appendix A.

The DE in the Project Area contains different species of diatoms as well as various levels of oxidation. The upper portion of the diatomite layers contains a zone that has undergone substantial oxidation with a locally thin layer of topsoil, overburden, and oxidized ore.

The oxidized materials are easily identifiable by their light color, low moisture content, and decomposed ash and clay seams. Depending on the location of the DE deposit, interbedded ash seams may be interbedded with oxidized ore. The primary agent responsible for the oxidation of the upper strata of the ore body is the migration of meteoric water; therefore, very little sulfur or iron is found in the oxidized strata. Trace amounts of minerals such as pyrite (FeS_2), gypsum ($CaSO_4$ $2H_2O$), goethite (Fe_2O_3 H_2O), and disseminated amorphous ferric hydroxide (Fe [OH]) are found in the oxidized strata. Since the time of deposition, calcium has combined with the organic sulfur to form gypsum. Volcanic-generated iron sulfide is the probable source of the latter organic iron and sulfur in the deposit. The pyrite has also oxidized into goethite, which in turn has combined with ground water to form limonite.

In general, oxidized overburden and the associated interbedded materials have been leached, removing most metals and sulfur. These materials are composed almost entirely of DE and present minimal risk of either acid generation or metal solubility because the diatomite acts as both an absorbent and a liner that prevents migration into the water table.

Separating the upper and lower portions of the deposit is a material that has undergone moderate levels of oxidation and is known as the transition zone. The transition zone is comprised of diatomite and ash that is normally tan in color and contains low to moderate iron staining. Higher concentrations of iron, sulfur, and gypsum are typical of the transition ore strata. Decomposed ash and clay seams are found within the transition ore zone.

The lower portions of the deposit contain a material that has undergone little to no oxidation and is known as the unoxidized zone. Ores within the unoxidized zone are commonly called green ore due to the dark green or nearly black color and higher level of organic content. Green ores also contain organic sulfur that can be easily identified by smelling a raw ore sample. The carbon, iron, calcium, and sulfur present in the unoxidized ore strata have undergone little alteration since their deposition. The unoxidized ore retains much of the organic material from

the diatoms and, as a result, contains much higher moisture content than either the oxidized or transition ores. Ash seams are also very common in the unoxidized ore zones.

Interbedded waste and low quality diatomite from the transition zone and unoxidized zone can contain materials that have the potential to generate acid if there is sufficient water, oxygen, and time. These materials can be identified by their distinct color and smell and are separated for disposal.

Interbedded waste and low quality diatomite are typically dealt with in one of two ways: 1) backfilling into one of the open pits; or 2) stockpiling the material within the mine area disturbance. Backfilling is the primary disposal technique because it eliminates the need to construct additional stockpiles, minimizes risk of surface water contamination, and returns the contours of the open pits to near natural topography. In addition, the surrounding DE in the pit serves as a low permeability liner to encapsulate and prevent solution migration into ground water. Once the open pit is backfilled, it is graded to minimize runoff and run-on (i.e., infiltration of runoff), and eventually reclaimed. These areas revegetate quickly, as DE is a natural growth media and is used in soil applications.

Mine waste including DE that did not meet quality specifications, non-DE material found within the ore body such as clay and volcanic ash, and non-soil overburden material such as rocks and mudstone are placed into stockpiles located at each of the working areas within the Project Area.

In addition to the mine waste, the mill also generates an alkaline mineral process waste, which is ore material rejected by the mill. This waste is typically a combination of DE, fine particles of rock (basalt), volcanic ash, minor amounts of pyrite, clay, and other impurities found within the ore body. Mineral process waste is typically backhauled to the mine areas and is used to backfill previously mined-out open pits or placed in the waste stockpiles located within the various mine areas. Most of the mineral process waste has been hauled to the Beede Desert waste stockpile. The Beede Desert ore deposit is shallow and has been backfilled during operations with a combination of mine waste and mineral process waste to an elevation approximating the original topography.

The recently established waste stockpile at Kelly Field is also currently in use and will continue to be used until the proposed Hidden Valley operation is approved and fully operational.

2.5 Existing Reclamation

The goal of the reclamation process is to limit the total active disturbance acreage throughout the life of the Project, minimize disturbance, prevent unnecessary or undue degradation of the environment, and ensure visual and functional compatibility with surrounding areas. The objective of reclamation is to return the land to its pre-mining condition. This objective includes the establishment of a permanent ground cover of perennial vegetation, which controls erosion and provides wildlife habitat values and livestock forage. Reclamation is completed to the standards described in Oregon Revised Statute (ORS) 517.702-992 and 43 CFR 3809. EPM utilizes the BLM 2003 approved seed mix as shown in Table 2.5-1. This seed mix was also approved by DOGAMI. The seed mix has demonstrated revegetation success throughout the Project Area.

Table 2.5-1: BLM 2003 Approved Reclamation Seed Mix

Common Name	Scientific Name	Pounds PLS*/Acre
Wyoming big sage	*Artemisia tridentata* s. *wyomingensis*	0.1
Goldar or Secar bluebunch wheatgrass	*Pseudoroegneria spicata*	4.0
Covar sheep fescue	*Festuca ovina*	4.0
Antelope bitterbrush	*Purshia tridentata*	1.0
Range alfalfa	*Medicago sativa*	1.0
	Total	**10.1**

*Pure Live Seed

Once mining activities have ceased, access to open pits will be limited by the placement of berms, or fences and remaining haul roads will be revegetated. The open pits will be backfilled where practicable with remaining high walls left in place. Once an open pit is backfilled or partially backfilled, a minimum of a 12-inch layer of mine waste or overburden will be used to cover the top of the mineral process waste, thereby forming an effective cap. Stockpiles will be recontoured to an average slope of 3Horizontal:1Vertical (3H:1V) and scarified to a depth of two to six inches. Topsoil will be placed, and the piles will be revegetated. Sediment basins will be safely sloped and revegetated. Any improved roadways on public lands will be turned back to the BLM or the county**.**

Once final operations in the Project Area cease, all buildings, structures, and support facilities will be removed from the site, or buried on site. All gravel from work areas or abandoned roads will be removed from these facilities and used to maintain existing roads in accordance with route categories and specifications. The resulting bare ground will be scarified to a depth of five to 12 inches and seeded. Water wells will be abandoned in accordance with DOGAMI regulations.

2.5.1 Section 36 Mine Operations Area

Reclamation activities performed to date or required as part of the 1985 MPO in the Section 36 Mine Operations Area are described below.

2.5.1.1 Soil Stockpiles

The soil stockpiles west of the mine shop and north of the Section 36 Main Open Pit have been contoured and seeded. The soil stockpiles currently exhibit mature plant species and provide local habitat for indigenous desert animals. During final reclamation the soil stockpiles will be excavated and used to provide topsoil/growth media cover prior to reseeding.

2.5.1.2 Waste Stockpiles

Waste stockpiles and soil stockpiles located south of the Section 36 East Open Pit are currently being built as a result of mining activities. When stockpiling is no longer necessary, rough shaping and seeding with the approved seed mix will be implemented to control erosion. Ditches and terraces will be maintained to control runoff and collect sediments. Lower portions of the original waste stockpile have been seeded with the BLM 2003 approved seed mix shown in Table 2.5-1. Due to aridity and the current steep angle of repose, colonization of plant species has had limited success. Erosion has been limited by the surviving plants and controlled by local drainage terraces and sediment impoundments. Reshaping and reseeding of the original waste

stockpile during final reclamation will stabilize and protect the waste stockpile from erosion. Slopes will be brought to DOGAMI standards of 3H:1V for final reclamation.

2.5.2 Kelly Field Mine Operations Area

Open pit mining operations are currently in progress in Section 30 of the Kelly Field Mine Operations Area. All extraction activities have occurred east of Mill Gulch in the Kelly Field Main Open Pit. Oxidized and unoxidized ores are being excavated and stockpiled for haulage to the mill. There are currently two ore stockpiles located west of the Mill Gulch drainage. Kelly Field Main Open Pit has expanded to the south onto EPM private property and to the northwest on lands administered by the BLM (Figure 2.2.2). Reclamation activities performed to date or as required as part of the 1985 MPO for the Kelly Field Mine Operations Area are described below.

2.5.2.1 Soil Stockpiles

The original soil stockpiles located in the western portion of the Kelly Field Mine Operations Area were seeded with the approved seed mix during initial stripping to reduce erosion. The stockpiled soil will be spread over disturbed areas during the final reclamation phase and reseeded.

2.5.2.2 Waste Stockpiles

The original waste rock stockpiles in the Kelly Field Mine Operations Area have been reclaimed and exhibit a mature population of native plants from seeding and colonization from nearby plants. For example, ponderosa pine seedlings are growing in the reclaimed stockpile areas.

EPM deposited mine waste material to form a butte located southeast of Kelly Field Main Open Pit. This waste stockpile is currently in use as part of the Agency Mountain slide remediation project. During 2001 through 2007, mine and mineral process waste material were backfilled in the center of Kelly Field Main Open Pit. The top of the waste stockpile in the center of Kelly Field Main Open Pit will now be used as an ore stockpile location.

2.5.2.3 Roads

Mine roads will be shaped to match local topography using bulldozers or road graders and seeded at the time of reclamation. Mill Gulch Access Road will remain open after mine reclamation for public use including ranchers, recreationists, and state and federal personnel.

2.5.3 Beede Desert Mine Operations Area

The Beede Desert Mine Area has a small open pit mining operation comprised of several shallow open pits where highly oxidized DE has been extracted and stockpiled for future use. These shallow pits will be completely backfilled with waste diatomite, mineral process waste, ash, and clayey materials. Safety berms are not used in the final reclamation plans for this area because there will be no pit high walls. Most work in this area is conducted on private property regulated by the DOGAMI.

2.5.3.1 Waste Stockpiles

Two waste rock stockpiles created during the early stages of mining in the Beede Desert Mine Operations Area have been fully reclaimed. The remaining waste rock stockpile, which is backfilling a portion of the open pit, will be reclaimed once the open pit is completely backfilled.

2.5.3.2 Roads

Mine roadways between stockpiles and open pits in the Beede Desert Mine Operations Area will be reclaimed after the ore reserves are fully depleted. The Cottonwood Reservoir Road, Beede Desert Access Road, and Beede Access Road (Figure 2.1.1) will not be reclaimed at the end of mining because they will continue to be used by ranchers, recreationists, and state and federal personnel.

2.5.4 Puma Claims Area

The well will continue to be used to supply a water trough for use by livestock and wildlife. Water from the well will also be used for dust abatement. The site will also continue to be used to stockpile aggregate for use on roads in the area.

2.5.5 Interim Reclamation

Interim reclamation is conducted whenever a mine area is no longer needed or stockpiles need to be stabilized or reclaimed. In specific cases, open pits or cuts are backfilled, recontoured to resemble existing topography or to a 3H:1V slope, covered with topsoil or other growth media, and reseeded. Soil stockpiles or any other stockpiles that are not being used are seeded. EPM, as a general rule, completes reclamation as soon as practicable in order to reduce the amount of surface erosion and acreage of active surface disturbance in the Project Area.

2.5.6 Reclamation Schedule

Final reclamation will begin at the earliest practicable time within mine areas considered inactive, without potential, or completed. Earthwork and revegetation activities are limited by the time of year during which they can be effectively implemented. Table 2.5-2 outlines the anticipated reclamation schedule on a quarterly basis. Site conditions or yearly climatic variations may require this schedule be modified to achieve revegetation success. Reclamation activities will be coordinated with the BLM and the DOGAMI. The proposed reclamation will involve grading and seeding within one year, with final reclamation completed within five years of the site closure. Revegetation success is anticipated to take three years after the time of seeding.

Table 2.5-2: Anticipated Reclamation Schedule

TECHNIQUES	Quarter				
	1st Jan-Mar	2nd April-June	3rd Jul-Sept	4th Oct-Dec	Year(s)
Regrading					Within two years of Project completion
Seeding					Within two years of Project completion
Monitoring					Three years beyond regrading and reseeding

2.5.7 EPM Permits, Licences, and Entitlements

EPM is required to obtain and maintain permits, licences, and other entitlements for their current and proposed activities associated with the development of DE. These permits, licences, and entitlements are listed below.

1. Permit to Appropriate the Public Waters (ground water) (State of Oregon, Counties of Malhuer and Harney)
2. Pond Permits (BLM and DOGAMI through MPO approval)
3. Road rerouting/construction applications (BLM and DOGAMI through MPO approval)
4. Spill Prevention and Control Plan (DOGAMI)
5. Hazardous Material Storage Permit (Oregon State Fire Marshal)
6. Federal Clean Water Act General Storm Water Permit and the State Water Pollution Control Facility (WPCF) Permit at aggregate mine sites based upon an agreement with DEQ (DOGAMI/Mineral Land Regulation and Reclamation [MLRR])
7. Fugitive Dust Control Plan (DOGAMI)
8. Exploration Permit (BLM and DOGAMI)
9. Mine Plan (BLM and DOGAMI)
10. Operating Permit, Operating and Reclamation Plan (DOGAMI) – renewed annually until the mining and reclamation are complete http://www.oregongeology.com/sub/mlr/newmlrrpermitting.htm
11. Annual Report
12. Reclamation Plan (BLM and DOGAMI)
13. Reclamation Cost Estimate (BLM and DOGAMI)
14. Closure Plan (BLM and DOGAMI)

3 ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 Alternative 1 - No Action Alternative

In accordance with BLM guidelines (H-1790-1, Chapter V) and the CEQ regulations (40 CFR 1502.14(d)), this EIS evaluates the No Action Alternative. The objective of the No Action Alternative is to describe the environmental consequences that would result if the Proposed Action was not implemented. The No Action Alternative forms the baseline from which the impacts of all other alternatives can be measured.

The FONSI and DR for the 1985 EA and plan of operations form the basis for the No Action Alternative for this Project. The majority of the activities under the Proposed Action were included in the 1985 EA; however, the BLM determined that a phased environmental review would be used to analyze future operations planned by EPM (formerly Eagle-Picher). The DR approved the mining activities at the North Mill Gulch mine site, construction of two new access roads from the Altnow-Buelah County Road B24221 to the North Mill Gulch and Beede Desert mine site, and improvements to the Altnow-Beulah County Road B24221 and the Juntura Cutoff County Road B25000, subject to the special project stipulations and additional stipulations. The following is a summary of the BLM stipulations for the 1985 Eagle-Picher approval.

1. Eagle-Picher will submit detailed site locations, preconstruction feasibility studies, and design specifications for all impoundments, water diversion structures, stream modifications, waste disposal slurry plans, and final reclamation plans (with proposed seed mix and detailed seeding methods) to the BLM for review at least 90 days prior to the proposed start-up date for this work.

2. Eagle-Picher will design and construct a reservoir in T20S, R36E, Section 25, in the 3C's pasture of the Chalk Hills allotment at a site to be selected by the BLM. This will serve as the sole reservoir for this pasture, replacing use of the existing reservoir in the Chimney Creek pasture and drawing cattle away from the main haul road. Gates in the fence along the western boundary of the CC reservoir will remain closed while either the 3C's or the Chimney Creek pastures are in use.

3. To minimize impacts to wildlife, removal of the stand of ponderosa pine and western juniper along the western side of the North Mill Gulch mine site will be delayed as long as this can feasibly be accomplished without interfering with the mining operations. Eagle-Picher will notify the BLM at least one year in advance of the date when this removal must be completed to allow BLM adequate time to determine the most suitable method for disposal of the timber (e.g., commercial timber sale vs. ground clearing by Eagle-Picher, etc.) and make all necessary arrangements.

4. In the course of upgrading the county road, Eagle-Picher will remove the existing BLM light duty cattle guards, place them in storage temporarily at the Puma Claim site, and install appropriately sized heavy duty cattle guards on the improved road. The BLM will make arrangements to pick up their cattle guards from the Puma Claim site.

5. During the first two years of operations, Eagle-Picher will install a system of ground water monitoring wells in locations to be determined by the BLM and monitor these wells on a quarterly basis. The system will consist of approximately eight to ten wells (including the domestic well at the Puma Claims). Information from this monitoring

program will be used to determine if mining operations are impacting ground water and surface water downgradient from the mine and to develop corrective measures, if necessary. Eagle-Picher will monitor water levels in these wells on a monthly basis for at least one year after installation, and on a quarterly basis thereafter throughout the life of the mining operations.

Beginning with the first season of operations, Eagle-Picher will begin monitoring precipitation in the project area, and surface water levels and total suspended sediment loads in Mill Creek. This will require installation of a weather station at the Puma maintenance site, installation of a stream gauging station a short distance upstream from the new culvert stream crossing for the Juntura Cutoff County Road B25000 at Mill Creek, and periodic collection and analysis of water samples taken from Mill Creek at the gauging system.

Stream gauging and weather monitoring will be carried out for the life of the project on a continuous basis. Water sampling and analysis will be more intensive during the first two years of operations to establish baseline data and initial impacts. Sampling schedules thereafter will be set according to the baseline data to meet long-term monitoring requirements for ongoing mining operations.

For the first two years of operations, at least one sample will be collected every two weeks. In addition to this base level, more intensive sampling will be required during periods of rainfall, with at least one sample collected per day while it is raining and one sample collected within 12 hours after rainfall ceases.

6. Low water crossing structures noted on the road design maps are not approved and shall not be used, as the final design specifications call for substitution of culverts at the alternate sites shown.

7. Eagle-Picher will have Safeco Insurance Company of America provide BLM with a rider on bond 4712658, posted for surface mining permit No. 13-0062 with the State of Oregon, Department of Geology and Mineral Industries; will have said bond description modified to specifically identify all public lands on which operations will be conducted under this plan (excepting those improvements to existing county roads); will specify that the BLM rider applies to the total amount of the bond; and will list on the bond the condition that the bond applies to all operations conducted under the provisions of 43 CFR 3809, “including access roads constructed under these regulations.”

8. Road construction work during 1985 within the Iron Springs pasture will be completed prior to 9/01/85 to avoid adverse effects on grazing use which will start as of that date. If it is necessary to continue road work in that pasture after 9/01/85 while cattle are present, Eagle-Picher will be required to construct a fence along the western boundary of T20S, R36E, Section 11,W.M. as a mitigating measure to avoid these adverse effects.

9. Eagle-Picher will post permanent signs along the county road providing warning of truck traffic, and post road closure signs on the new access roads to the Beede Desert and Mill Gulch mine sites at their junctures with the county road.

10. During the course of operations, Eagle-Picher will prevent sediments due to runoff erosion from the mine, stockpiles, etc., from entering Mill Creek by using intercept ditches downhill from these sites to collect runoff and direct it into temporary settling ponds. The intercept ditches and the settling ponds will be located at least 200 horizontal feet from the Mill Creek channel. As noted in stipulation 1, operations in Mill Creek channel will require separate review to determine specific operating stipulations.

11. Eagle-Picher will begin to conduct test plantings on stockpiles as soon as sufficient area is available to begin such work, in order to minimize erosion from these sites. Consultation with the BLM in selecting seed mixes will be required.

12. Final reclamation work in the project area will begin as soon as possible after completion of mining activities, and where feasible, shall be conducted concurrently with mining activities throughout the life of the project.

13. All conditions identified in the Malheur and Harney County Conditional Use Permits which relate to public lands are hereby incorporated as mandatory design features under this plan.

14. Conditions identified in State of Oregon's, Department of Geology and Mineral Industries Surface Mining Operating Permits which relate to public lands and are hereby incorporated as mandatory design features under this plan, as follows:

    Permit 23-0183, Condition 1, will apply to all reclamation work conducted at all sites on public lands and included in this plan.

    Permit 13-0064, Condition 1, is incorporated as written.

15. The BLM will monitor operations on a regular basis throughout each year and review the plan of operations and baseline data annually to insure that the operations are not causing undue or unnecessary degradation, and the individual or cumulative impacts (anticipated or unforeseen) do not exceed the levels addressed in the environmental assessment. If such problems are identified at any time during the course of operations, the BLM may request that Eagle-Picher modify their plan in accordance with 43 CFR 3809.1-7.

16. Any extension of the North Mill Gulch mine site northward of the area covered in the present plan, any extension of the Beede Desert mine site northward from private lands onto public lands, and any mining operations on public lands at the Sagebrush Flat mine site will be considered major actions requiring submission of a plan modification under the phased environmental review process. In order to insure that subsequent reviews do not involve delays which could cause mine shut-downs, Eagle-Picher will submit complete, detailed site descriptions, feasibility studies, maps, cross sections, and engineering designs and specifications to the BLM at least one year prior to the date proposed for commencement operations at these sites.

17. The plan of operations calls for the initial mining activity and placement of stockpiles to take place in T19S, R37E, Section 19, WM. As this portion of the project area lies outside of the Malheur County Conditional Use Permit, Eagle-Picher will obtain any

necessary permits from the Malheur County Planning Commission prior to commencing work in this area.

18. A cultural resources survey of that portion of the Beede Desert mine site which extends onto public lands in T19S, R36E, Section 34, must be completed by the BLM before operations on those lands can be approved.

The 1985 approval states that any extension of the North Mill Gulch mine site northward of the area covered in the present plan, any extension of the Beede Desert mine site northward from private lands onto public lands, and any mining operations on public lands at the Sagebrush Flat mine site will be considered major actions requiring submission of a plan modification under the phased environmental review process. In order to insure that subsequent reviews do not involve delays which could cause mine shut-downs, Eagle-Picher will submit complete, detailed site descriptions, feasibility studies, maps, cross sections, and engineering designs and specifications to the BLM at least one year prior to the date proposed for commencement operations at these sites. This has formed the basis for the Proposed Action.

Under the No Action Alternative the BLM would not approve EPM's MPO, and EPM would not expand mining operations on BLM-administered lands or conduct additional exploratory drilling operations on BLM-administered land outside of the boundary approved by the BLM in 1985. EPM would continue to expand operations on federal land as previously approved under the 1985 DR (BLM 1985) or permitted by BLM under a subsequent Notice. EPM would also continue to expand operations on private and state land permitted separately by the DOGAMI, the Oregon DSL, and Harney and Malheur County planning commissions. In addition, EPM would continue operations on federal land at the VHSA near Vale approved by BLM in 1986 and mill operations on private land near Vale. The total existing disturbance associated with the No Action Alternative is 465 acres, as described in Chapter 2 of this EIS. However, the total permitted area that EPM has authorization to disturb encompasses 1,633.7 acres (Figure 2.1.1).

Federal land outside of the boundary approved by the BLM in 1985 would remain available for future DE mining or for other purposes approved by the BLM. The subject lands have not been withdrawn from mineral entry nor designated as any type of special management area.

3.2 Alternative 2 - Proposed Action

EPM proposes expanded mining operations in the existing Section 36, Beede Desert, and Kelly Field Mine Operations Areas and new mining activities in the proposed Section 25, North Kelly Field, Hidden Valley, and Eagle Mine Operations Areas (Figure 3.2.1). EPM proposes to conduct exploratory drilling and bulk sampling throughout the Project Area and to construct two new roads outside of the mine operations areas. In addition, EPM plans to reconnect Hart Road (the portion that slumped into the Kelly Field open pit) to Mill Gulch Access Road in the Kelly Field Mine Operations Area once pit wall stabilization is complete (Figure 3.2.1).

Mining operations and exploratory drilling associated with existing and proposed mine areas on private and state lands (Section 36 Mine Operations Area, the majority of Beede Desert Mine Operations Area, portions of Kelly Field Mine Operations Area, and portions of the proposed Section 25 Mine Operations Area [private and SRHA lands]) are, or would be, approved under a

Figure 3.2.1 (Proposed Mine Operations Areas and Roads in the Project Area) shows both the existing county and mine haul roads as well as the proposed roads within the project boundary.

Explanation

- Project Boundary
- Excluded Area within Project Boundary
- Proposed Mine Operations Areas
- Approved Mine Operations Areas
- Proposed Roads
- Ambient Noise Measurement Sites

Existing Roads

- County
- Other

- Public Lands
- State Land
- Private Land
- Split Estate with Federal Minerals (SRHA) on Private Land
- Split Estate with Federal Minerals (SRHA) on EPM Land
- Split Estate with Federal Minerals (Not SRHA)

0 500 1,000 1,500 2,000 Meters

0 2,000 4,000 6,000 8,000 Feet

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Proposed Mine Operations Areas and Roads in the Project Area

Figure 3.2.1

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separate permitting process by the Oregon DSL, DOGAMI, and Harney and Malheur County planning commissions. Activities on private and state land are included in Table 5.1-1 under Cumulative Effects in Chapter 5. The activities on private and state land are similar to the activities described in the Proposed Action. The following sections describe only EPM's proposed activities and surface disturbance on BLM-administered land and SRHA lands not owned by EPM, which consist of 9,360 acres or 74 percent of the Project Area (Figure 3.2.1).

Under the Proposed Action, EPM would expand mining operations on 72.5 acres of federal land at the existing Kelly Field Mine Operations Area. EPM would develop mines on federal land at the proposed North Kelly Field Mine Operations Area (462.5 acres on federal land), Hidden Valley Mine Operations Area (255 acres on federal land), Eagle (286 acres on federal land), Section 25 (50 acres on federal land), and the Puma Claims Area (five acres). In addition, EPM proposed to reestablish access to the Beede Desert Mine Operations Area by utilizing the Beede Access Road on federal land (seven acres) (Figure 2.3.1). The proposed expansion of mining operations and new mining operations proposed in the Project Area include open pit mines, roads within the mine operations areas, and other operations and ancillary features. The disturbance associated with the mine expansion and other activities in the Project Area measure 1,131 acres on federal land.

EPM proposes constructing two new roads (Figure 3.2.1) outside of the mine operations areas on federal land: 1) the connector road between Hidden Valley and Section 36; and 2) the access road from Hidden Valley north to Eagle. These two roads would create a total of 13.5 acres of disturbance.

EPM also proposes conducting exploratory drilling on 200 acres and bulk sampling on 50 acres of BLM-administered land within the Project Area. Exploration and subsequent trenching and bulk sampling would be conducted to delineate boundaries of known ore reserves and to explore for new deposits. These activities could occur on federal lands anywhere within the Project Area. Activities under the Proposed Action, including final reclamation, would be conducted over the course of approximately 50 years.

The Proposed Action includes a total of 1,394.5 acres of disturbance on federal land. Table 3.2-1 outlines the acres of proposed disturbance that would be created by the Proposed Action. The previously approved existing disturbance acres on federal land within the Project Area are outlined in Table 2.1-1.

3.2.1 Mining Methods

Under the Proposed Action, the same mining methods would be used as described in Section 2.1 of Chapter 2 (Existing Facilities and Operations).

3.2.2 Mining Operations Areas

Activities on private and state land are discussed under Cumulative Effects in Chapter 5 of this EIS. The following paragraphs describe proposed operations on BLM-administered land including lands with federal mineral rights (i.e., SRHA lands that are not owned by EPM) at the Kelly Field, North Kelly Field, Hidden Valley, and Eagle Mine Operations Areas.

Table 3.2-1: Proposed Surface Disturbance

Activity	Proposed Surface Disturbance (acres)
Existing Mine Areas-Expansion[1]	
Kelly Field Mine Operations Area	72.5
Puma Claims Area	5.0
Proposed New Mine Areas[1]	
North Kelly Field Mine Operations Area	462.5
Hidden Valley Mine Operations Area	255.0
Eagle Mine Operations Area	286.0
Section 25 Mine Operations Area	50.0
Total Mine Area Acreage	**1,131.0**
Roads (outside of mine operations areas)	
Connector Road between Hidden Valley and Section 36	6.5
Access Road from Hidden Valley north to Eagle	7.0
Total Road Acreage	**13.5**
Other Activities	
Exploration Activities	200.0
Trenching & Bulk Sampling	50.0
Total Other Activities	**250.0**
Proposed Action Total	**1,394.5**

[1] Includes open pit mines, roads and other operations/ancillary facilities.

3.2.2.1 Kelly Field Mine Operations Area Expansion

EPM proposes to expand the Kelly Field Main Open Pit beyond the Permitted Area boundary identified in their 1984 MPO and approved by BLM in 1985 and shown on Figure 3.2.2. EPM proposes to expand the waste stockpile at the southeast corner of the Kelly Field Main Open Pit to extend to the edge of federal land and onto private land to the south. EPM may extend operations north to the section line.

EPM proposes to remediate the pit wall slope failures that developed in 2003 and 2008, east of the Permitted Area boundary. There were slope failures at the Kelly Field Open Pit Mine in 2003 and 2008 for which EPM developed a highwall remediation program. The first phase began in spring of 2006 and included surveying the area and establishing ground movement monitoring stations. The second phase of the remediation program includes determining the exact location of the boundary between the basaltic rock and the ore contact. The contact area has been identified on the southern portions of the slide, but the contact area has not been located on the northern portions of the slide. Once the exact location of the contact zone has been determined, benches would be constructed in the basalt rock high-wall. The third phase includes excavation of safety catch benches down the pit wall face to create the final pit wall. The exact location and dimensions of these benches are to be determined; however, it is anticipated the bench height and width would be approximately 20 to 25 feet forming an overall pit wall angle of approximately 45 degrees. In places, the pit wall would be steeper because the more competent basaltic rock can safely withstand a steeper slope angle. In other places the angle of the pit wall may be shallower if tuffs or volcanic conglomerates are present. The final pit wall angle would be dependant upon the geologic formations and structures encountered. The final remediation would occur once the operating permit boundary is expanded to allow work to occur in these areas. A safety berm would be installed at the top of the slide area. Hart Road would be reconnected once the pit wall stabilization is complete in approximately five years (Figure 3.2.1).

In addition to expanding the Kelly Field Main Open Pit, EPM proposes to develop a new open pit mine west of Mill Gulch drainage to be named the Kelly Field West Open Pit (Figure 3.2.2). The Kelly Field West Open Pit is currently the location of the Kelly Field Public Road Detour, an ore stockpile, a topsoil stockpile, and a storm water ditch and storm water catchment pond (sediment basin).

Development of the Kelly Field West Open Pit would require removal of approximately 77 acres of the ponderosa pine in Section 19, T19S, R37E. EPM would give the BLM two year's notice prior to the expansion of mining into the area where the pine trees are located. The BLM would conduct and implement a timber sale for the portion of the trees that would be removed. Post mining reclamation of the logged area would include seeding with a BLM-approved seed mix.

3.2.2.2 North Kelly Field Mine Operations Area

The North Kelly Field Mine Operations Area would be located in Section 19, T19S, R37E, (Malheur County) and in Section 24, T19S, R36E, (Harney County). The proposed North Kelly Field Mine Operations Area lies directly north of the current Kelly Field Mine Operations Area.

A preliminary mine design has been completed and includes two open pits: the North Kelly Field East Open Pit and North Kelly Field West Open Pit. Mining in the North Kelly Field Operations Area would be conducted in two phases. Phase I would consist of the North Kelly Field East Open Pit (east of Mill Gulch) construction with mine waste (including unoxidized ore) deposited in the current Kelly Field Main Open Pit. Phase II would be the excavation of the West Open Pit (west of Mill Gulch). All topsoil removed from the mining areas would be stockpiled and used during the reclamation process. These locations are shown on Figure 3.2.3.

Final pit wall angles in the open pits within the proposed North Kelly Field Mine Operations would vary depending upon location. Along the west edge of the North Kelly Field East Open Pit, the final wall slope angles would range between 60 and 85 degrees and on the east side of the open pit, the wall slope angle would be closer to 45 degrees. In the North Kelly Field West Open Pit, final pit wall slope angles on the east side would be approximately 45 degrees and on the west side the final pit, wall angles would range between 60 and 85 degrees. The proposed open pits would utilize ramps and mine haul roads that have an average travel width varying between 25 feet and 100 feet with slopes between zero and 15 degrees.

In order to support ongoing mining efforts, a truck scale could be installed in the mine area. There would also be a need for one or more additional water wells to supply water for dust suppression activities. These improvements would be located on private property owned by EPM.

3.2.2.2.1 North Kelly Field Ore Stockpiles

The DE excavated from the North Kelly Field Mine Operations Area would be stockpiled during the mining season and later hauled by EPM or a subcontractor to the mill. There would be a number of stockpiles located throughout the North Kelly Field Mine Operations Area. The ore would be stockpiled based on grade and ore quality. Stockpiles would be located east and west of Mill Gulch depending upon which open pit is in operation. Also, the exact size and number of ore stockpiles would vary from year to year because the size and number of stockpiles would be

dependant upon the amount of North Kelly Field ore required during a particular mining season. Due to the high moisture content of the unoxidized ores, the stockpiles in North Kelly Field Mine Operations Area would be constructed in such a fashion as to aid in evaporation by use of natural air flow and solar heating.

3.2.2.2.2 North Kelly Field Mine Waste Stockpiles

During Phase I at the North Kelly Field Mine Operations Area, all mine waste (volcanic ash, volcanic tuff, opalite, and clay, poor quality DE, and overburden) and mineral process waste (a combination of DE, fine particles of rock (basalt), volcanic ash, minor amounts of pyrite, clay, and soda ash) would be deposited in the current Kelly Field Open Pit. The Kelly Field Main Open Pit would provide ample capacity for all mine waste generated from the North Kelly Field East Open Pit. When mining progresses to Phase II, the mine waste from the North Kelly Field West Open Pit and the mineral process waste would be used to backfill the North Kelly Field East Open Pit. The North Kelly Field East Open Pit would not be mined below the water table making it suitable for backfilling with mine and mineral process waste. This would result in the North Kelly Field East Open Pit being partially backfilled, the Kelly Field Main Open Pit being partially backfilled, and a final open pit in the western area of North Kelly Field. If mining advances below the water table in the North Kelly Field West Open Pit, the open pit would have an engineered partial backfill that would allow the open pit to act as an evaporative sink, but would minimize the potential for the ponding of water on the backfill (i.e., backfill the open pit to a point where evaporation would equal inflow and all ponded water would evaporate). Under this partial-backfill scenario, evaporation would occur mostly by capillary action (i.e., a phenomenon where liquid spontaneously rises in a narrow space such as a thin tube) so that ponded water on the backfill is less likely to occur, but evaporation (and possibly transpiration through vegetation) would continue, and a localized ground water sink would be maintained. Ground water would flow toward the open pit eliminating the potential for dissolved constituents from waters ponding in the open pit to migrate into and impact the ground water system.

3.2.2.2.3 North Kelly Field Mine Roads

The North Kelly Field Mine would be accessed by mine personnel via the BLM road that runs through the Section 36 and Kelly Field Mine Areas (Mill Gulch Access Road) and then Hart Road after its junction with Mill Gulch Access Road in the NW1/4 Section 30 (Figure 3.2.1). These roads would generally only be used by mine personnel and not used for ore hauling.

3.2.2.2.4 North Kelly Field Mine Ditches and Surface Water Control

Interceptor and drainage ditches constructed throughout the North Kelly Field Mine Operations Area would direct water to the nearest accessible sediment basin. The interceptor ditches would be constructed before surface disturbance was initiated. As the mine expanded, additional drainage ditches would be added to properly channel surface water into sediment basins. The sediment basins would be of sufficient size to contain the water from a 100-year storm event.

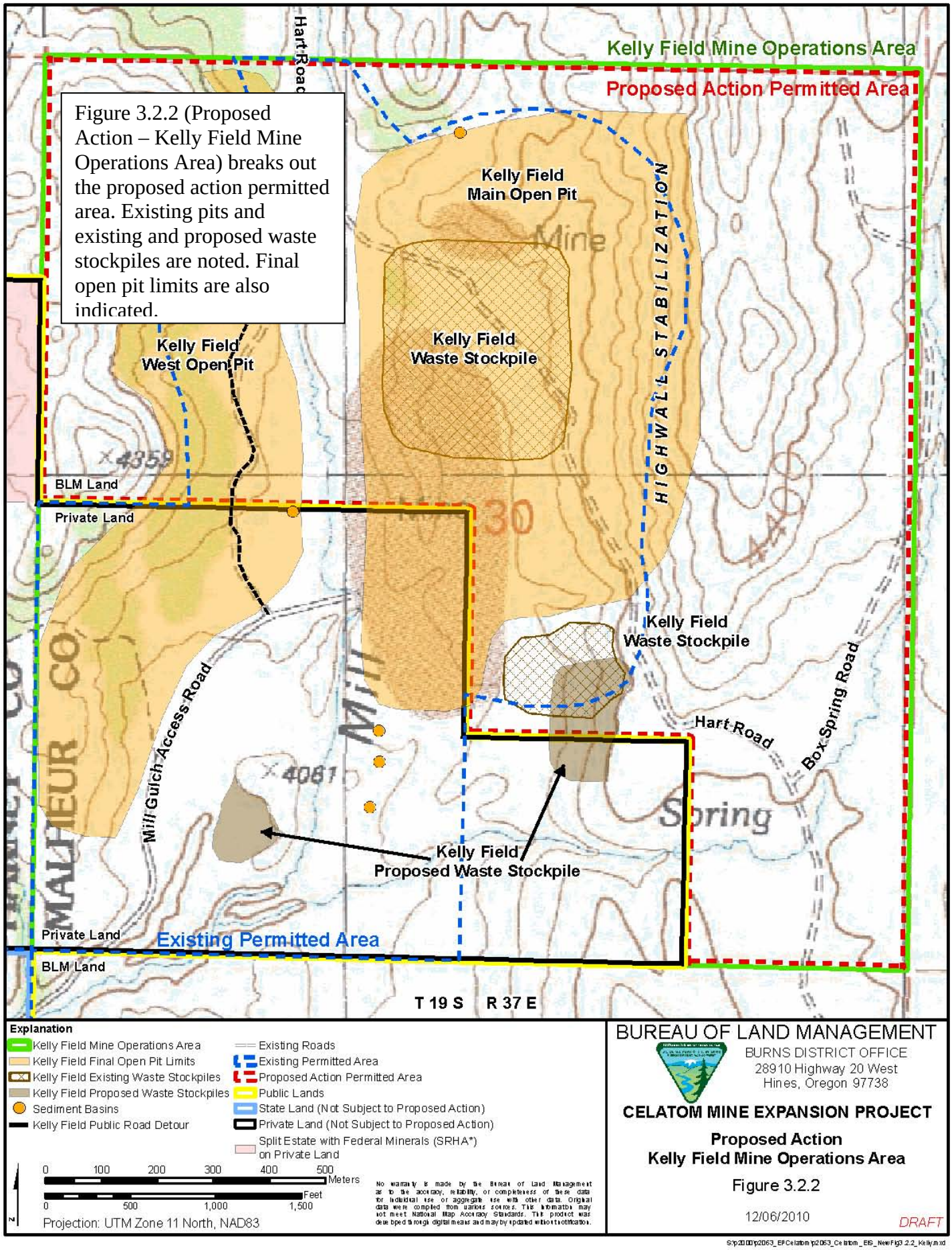
Figure 3.2.2 (Proposed Action – Kelly Field Mine Operations Area) breaks out the proposed action permitted area. Existing pits and existing and proposed waste stockpiles are noted. Final open pit limits are also indicated.
Kelly Field Mine Operations Area
Proposed Action Permitted Area
Hart Road
Kelly Field Main Open Pit
Mine
HIGHWALL STABILIZATION
Kelly Field West Open Pit
Kelly Field Waste Stockpile
4359
BLM Land
Private Land
30
Kelly Field Waste Stockpile
Box Spring Road
Hart Road
Mill Gulch Access Road
4081
Spring
Kelly Field Proposed Waste Stockpile
Private Land
Existing Permitted Area
BLM Land
T 19 S R 37 E
Explanation
Kelly Field Mine Operations Area
Kelly Field Final Open Pit Limits
Kelly Field Existing Waste Stockpiles
Kelly Field Proposed Waste Stockpiles
Sediment Basins
Kelly Field Public Road Detour
Existing Roads
Existing Permitted Area
Proposed Action Permitted Area
Public Lands
State Land (Not Subject to Proposed Action)
Private Land (Not Subject to Proposed Action)
Split Estate with Federal Minerals (SRHA*) on Private Land
0 100 200 300 400 500 Meters
0 500 1,000 1,500 Feet
Projection: UTM Zone 11 North, NAD83
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
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CELATOM MINE EXPANSION PROJECT
Proposed Action
Kelly Field Mine Operations Area
Figure 3.2.2
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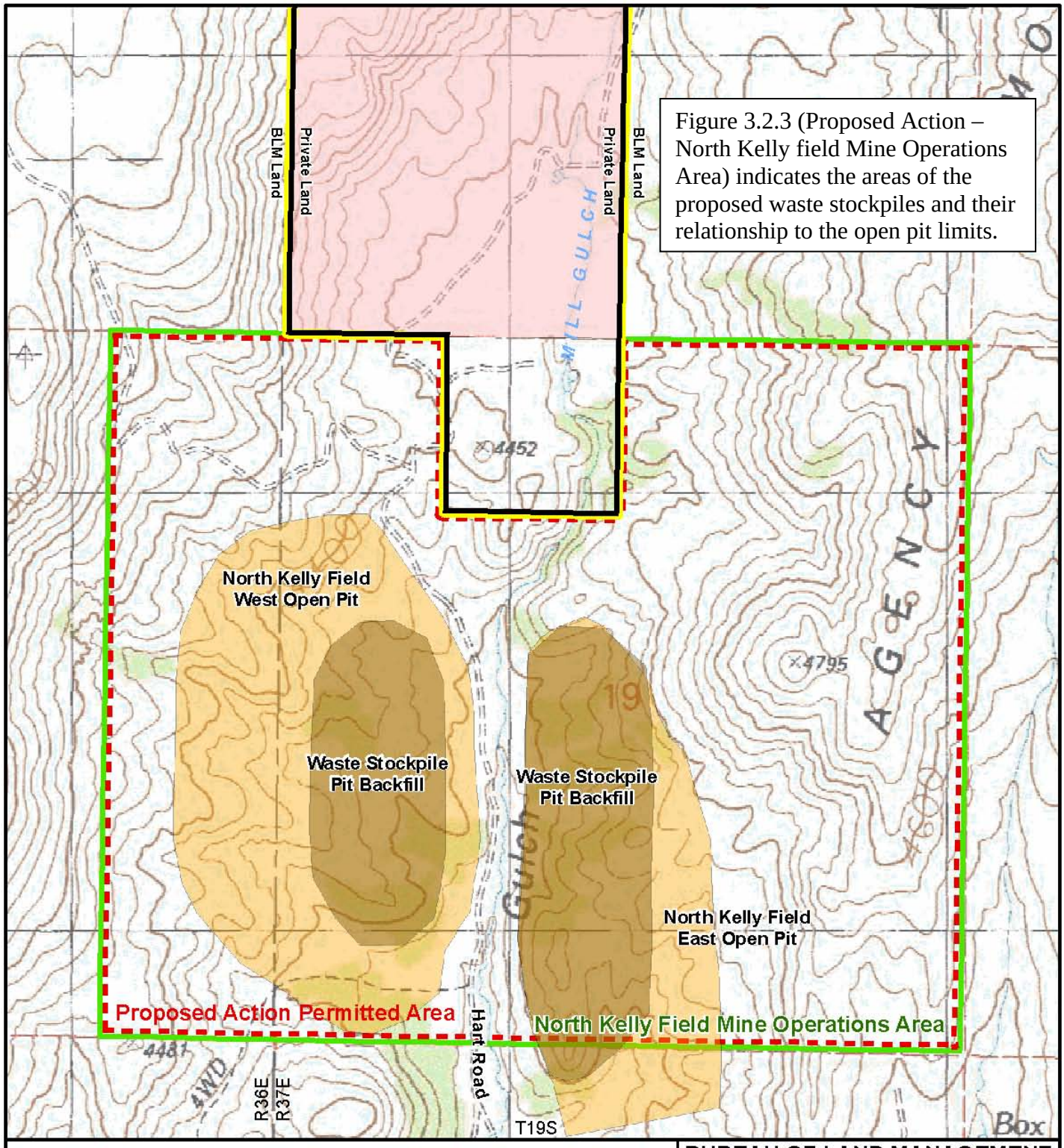

Figure 3.2.3 (Proposed Action – North Kelly field Mine Operations Area) indicates the areas of the proposed waste stockpiles and their relationship to the open pit limits.

Explanation

- North Kelly Field Mine Operations Area
- North Kelly Field Open Pit Limits
- North Kelly Proposed Waste Stockpiles
- Existing Roads
- Proposed Action Permitted Area
- Public Lands
- Private Land (Not Subject to Proposed Action)
- Split Estate with Federal Minerals (SRHA*) on Private Land

0 100 200 300 400 500 Meters

0 500 1,000 1,500 2,000 Feet

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Proposed Action
North Kelly Field Mine Operations Area

Figure 3.2.3

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3.2.2.2.5 North Kelly Field Mine Open Pit Dewatering

In the North Kelly Field Mine Operations Area, no pit dewatering is anticipated except in response to meteoric water collection in the open pits. The current practice of controlling pit water by evaporation would continue. If evaporation proved not to be sufficient, the water would be pumped into an evaporative sediment basin, and the pH would be monitored to ensure that values are between pH 5 and 7.5. If the pH is below a standard unit of 5 then a sample of the water would be collected for full chemical analysis, and corrective action would be taken in order to prevent potential contaminant release to ground water. Corrective action could include, but would not be limited to, water treatment with agricultural lime, dilution with well water, or treatment with soda ash. No water would be discharged into Mill Gulch.

3.2.2.3 Hidden Valley Mine Operations Area

The Hidden Valley Mine Operations Area would be located in the E½ of Section 34, T19S, R36E. The Hidden Valley Mine Operations Area is east of the Beede Desert Mine Operations and west of the Section 36 Mine Operations Areas (Figure 3.2.4). The ore deposit is oriented in a north-south direction between two ridgelines.

Prior to mining the Hidden Valley ore deposit, EPM may need to complete additional developmental drilling, test bulk samples of the ore in the mill, construct access roads, and construct a storm water drainage system. New access roads would need to be constructed in order to allow easy access to the proposed mine area.

Mining would likely begin at the northern end of Hidden Valley. The clearing of overburden may begin as soon as the Project is approved and may occur outside of the normal mining season of April through November. After a large initial section of pit is opened up, the open pit may extend to the width of the valley as well as advance downward and to the south. The Hidden Valley Open Pit has been designed with pit wall angles ranging between 35 and 70 degrees. Although final dimensions of the open pit would depend upon economic factors (e.g., price and demand for the specific grade of DE) and geologic conditions, the open pit is expected to have a width of 900 to 1,200 feet, a length of 4,500 feet and an average depth of approximately 100 feet. The southern portion of the open pit would remain as a final pit wall. The established bench height for the Hidden Valley Open Pit would be approximately ten feet; however, EPM may need to change the bench height to match geologic, ore grade, equipment, or other conditions.

Numerous haul roads would exist within the Hidden Valley Open Pit. Ramps connecting different benches within the open pit would be 25 to 50 feet wide and would have slopes ranging from ten to 15 percent. Haul roads would be off limits to the public and would have signs posted at either end of the open pit advising use of the alternate route. Mining equipment would be the primary traffic on these roads.

As the open pit boundaries advance south, topsoil would be removed and stockpiled outside the open pit limits for use later in reclamation. All mine waste would be deposited at the waste stockpile area located at the north end of the valley.

3.2.2.3.1 Hidden Valley Mine Ore Stockpiles

Ore mined from the Hidden Valley deposit would be stockpiled during the mining season, which typically runs from April through November. This material would then be hauled by EPM or a subcontractor to the mill. The stockpile area would be located adjacent to the improved road currently leading to the Beede Desert Mine Area and the current unimproved road leading into the southern portions of the valley (Figure 3.2.5). This stockpile area would encompass approximately five to ten acres.

3.2.2.3.2 Hidden Valley Mine Waste Stockpiles

Both mine and mineral process waste would be deposited in the Hidden Valley waste stockpile located at the north end of the valley. This waste stockpile would eventually extend into the open pit, thereby partially backfilling the northern extent of the mine workings. The absence of ground water (all monitoring wells in Hidden Valley are dry) makes Hidden Valley an ideal location for the backfill of mineral process waste. During the mining season, mine haul trucks would place mine waste both at the top and bottom of the outlined waste depository; this would allow the waste stockpile to be built with the southern slope at an average of 3H:1V. All other sides of the waste stockpile would be constrained by surface topography. The southern slope of the waste stockpile would be constructed from the start of mining with an average slope of 3H:1V in accordance with the DOGAMI and BLM reclamation standards. When practicable and in order to help control dust, the coarser grained mine waste would be deposited concurrently with the finer grained mineral process waste for dust control. When active mining is not taking place, the mineral process waste would be deposited at the toe of the waste stockpile, minimizing wind exposure and erosion. Whenever possible, the waste stockpile would be covered with topsoil and seeded with the 2003 BLM-approved seed mix to minimize fugitive dust, and any surface disturbance no longer needed for the mining process would be recontoured and revegetated.

3.2.2.3.3 Hidden Valley – Eagle Mine Road

The working areas would be accessed via the proposed Hidden Valley – Eagle Road that would connect with the Beede Access Road (Figure 3.2.1). This road would extend north into the Hidden Valley and Eagle Mining Operations Areas. This road would be used by heavy mining equipment and mine support equipment, and signage would inform the public that the Hidden Valley – Eagle Road was not a public road. The road would be constructed to BLM Standards and left in place after mining is complete. Hidden Valley – Eagle Road would have cattle guards or gates installed where crossing fence lines. The Hidden Valley – Eagle Road would have the following specifications:

- The Hidden Valley - Eagle Road would be used to allow highway-rated semi trucks access to diatomite ore stockpiles from the Hidden Valley and Eagle Mine Operations Areas.

  The Hidden Valley - Eagle Road would be 1.9 miles long and 26 feet wide and would traverse the crest of the ridge line that runs between Hidden Valley and Beede Desert. The road would make a 180 degree turn at the northern extent of Hidden Valley allowing the road to reach the waste stockpile on the gently sloping saddle. When Eagle

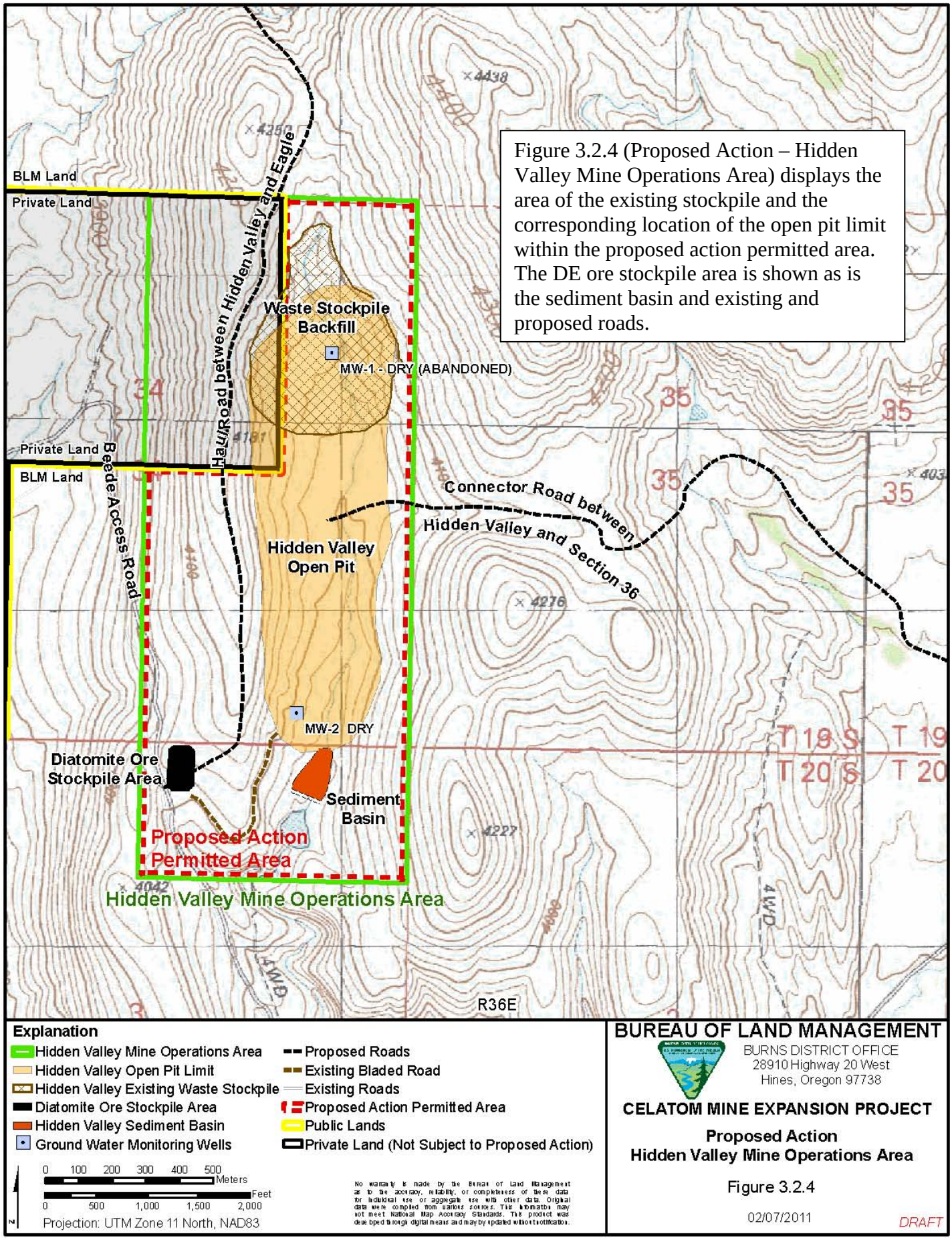

Figure 3.2.4 (Proposed Action – Hidden Valley Mine Operations Area) displays the area of the existing stockpile and the corresponding location of the open pit limit within the proposed action permitted area. The DE ore stockpile area is shown as is the sediment basin and existing and proposed roads.

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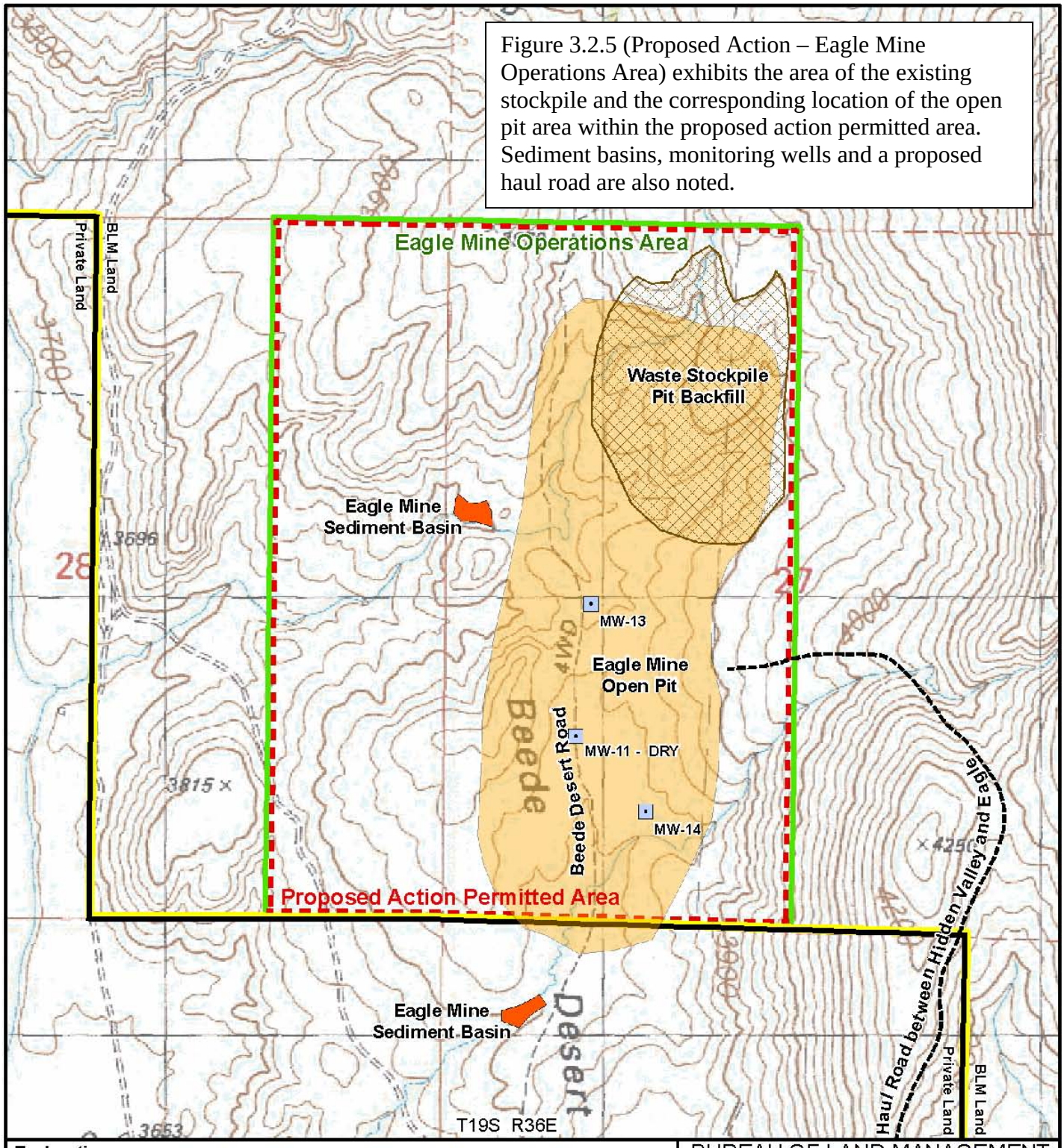
Figure 3.2.5 (Proposed Action – Eagle Mine Operations Area) exhibits the area of the existing stockpile and the corresponding location of the open pit area within the proposed action permitted area. Sediment basins, monitoring wells and a proposed haul road are also noted.



Explanation

- Eagle Mine Operations Area
- Eagle Mine Open Pit Area
- Eagle Mine Waste Stockpile
- Eagle Mine Sediment Basins
- Ground Water Monitoring Wells
- Proposed Roads
- Existing Roads
- Proposed Action Permitted Area
- Public Lands
- Private Land (Not Subject to Proposed Action)

0 100 200 300 400 500 Meters
0 500 1,000 1,500 2,000 Feet
Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Proposed Action
Eagle Mine Operations Area

Figure 3.2.5

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Mine becomes operational, this road would be extended north into Section 27 thereby allowing access to the north side of the Eagle Mine Area.

- All waste material generated during road construction would be used as fill where needed.

- The road surface would be a minimum of six-inches thick and comprised of minus two-inch crushed stone (gravel).

- Drainage controls would include the use of gravel on the road surface in steeply sloping areas (greater than ten percent grade), diversion berms to channel surface water away from the road surface, and drainage ditches to channel surface water into sediment basins.

- All creek crossings would be constructed to withstand a 100-year storm event and would include appropriately sized culverts.

- Vehicle speeds would be limited to 25 miles per hour.

A bulldozer and motor grader would be used to construct the road, and dump trucks would be used to haul gravel onto the road.

This road is located in Harney County. EPM would use BLM road specifications and BMPs to design and construct all improved roads. This road would also be used by EPM's subcontractor who operates the highway legal trucks to haul ore to the mill and mineral process waste to the mine for backfill. This improved road would be closed to public access until all mining operations in Hidden Valley were completed.

3.2.2.3.4 Connector Road

A new road would be constructed from the Section 36 Mine Area to the Hidden Valley Mine Area providing access to Hidden Valley and the Eagle Mine Area. The Connector Road (Figure 3.2.1) would be an unimproved road for use only by mine equipment and would be constructed to MSHA specifications. The public would not be allowed to use this road. Once mining had been completed in the Hidden Valley and Eagle Mine Areas, this road would be fully reclaimed. This proposed road would terminate at the Hidden Valley Mine and would have cattle guards or gates installed where crossing fence lines. The Connector Road would have the following specifications:

- The Connector Road would be used to transport (drive) mine equipment from the Section 36 Operations Area to the Hidden Valley Operations Area;

- The Connector Road would be 1.75 miles long and 25 feet wide with wider areas in places to allow passing vehicles. The passing areas would be no more than 50 feet wide and 100 feet long;

- All materials generated during the construction of the road would be used as fill where needed;
- The road surface would be composed of soil, rocks, and gravel to limit erosion;

- Drainage controls would include the use of gravel on the road surface in steeply sloping areas (greater than ten percent grade), diversion berms to channel surface water away from the road surface, and drainage ditches to channel surface water into sediment basins. Roads may be seeded with a BLM-approved grass seed if erosion becomes a problem;

- All creek crossings would be constructed to withstand a 100-year storm event and would include appropriately sized culverts;

- Vehicle speeds would be limited to 25 miles per hour;

- A bulldozer and motor grader would be used to construct the road; and

- The Connector Road would be reclaimed when mining activities have ceased.

3.2.2.3.5 Hidden Valley Mine Ditches and Surface Water Control

Drainage and interceptor ditches and a single sediment basin for the collection of all drainage water would be installed to prevent storm water runoff or pit water from exiting the operating area or reaching any stream. The current stockwater pond located at the south end of Hidden Valley would be utilized as the catchment basin. Drainage ditches would run along improved roads and haul roads, encircle all stockpiles, and other working areas. Interceptor ditches would form a perimeter around all working areas in Hidden Valley and would intercept surface runoff before it could enter the open pit. The sediment basin would be constructed to hold runoff generated by a 100-year storm event in the Hidden Valley watershed.

3.2.2.3.6 Hidden Valley Mine Open Pit Dewatering

No dewatering activities would be planned unless there was a seasonal meteoric water event resulting in excess water in the open pit. The current practice of controlling pit water by evaporation would continue. If evaporation proved not to be sufficient, the water would be pumped into an evaporative sediment basin.

3.2.2.4 Eagle Mine Operations Area

A preliminary mine design has been completed for the Eagle Mine ore deposit (Figure 3.2.5). The Eagle Mine would be located north of the Beede Desert Mine Operations Area (Figure 1.1.2) and would be accessed via the improved road currently used to reach the Beede Desert Mine. When the proposed Eagle Mine becomes operational, the Hidden Valley - Eagle road would be extended north into Section 27 (Figure 3.2.1) and allow access to the north side of the Eagle Mine Operations Area.

Before EPM would commence mining activities in the Eagle Mine area, additional development drilling and bulk sampling may be required. The necessary access roads and storm water drainage system would also be constructed. All removed topsoil would be stockpiled for later use during the reclamation process.
The Eagle Mine Open Pit has been designed with final pit wall angles ranging from 45 to 70 degrees. Although final dimensions of the open pit would depend upon economic factors and

geologic characteristics, the open pit is expected to have a width of 900 to 1,200 feet, a length of 3,500 feet and a depth of 60 to 100 feet.

3.2.2.4.1 Eagle Mine Ore Stockpiles

The ore mined from the Eagle Mine Open Pit would be stockpiled during the mining season and later hauled by EPM or a subcontractor to the mill throughout the year. Multiple and centralized stockpiles of ore would be located at the southern edge of the Eagle Mine Open Pit in Section 27. These stockpiles would be constructed based upon ore grade and mill requirements. The improved road would extend north from Beede Desert and Hidden Valley to this stockpile area. As operations expand at the Eagle Mine Operations Area, additional stockpile pads may be required. Also, the exact size and number of ore stockpiles would vary from year to year dependant upon the amount of Eagle Mine ore required during a particular mining season. Due to the high moisture content of unoxidized ores, stockpiles constructed at the Eagle Mine Operations Area would be constructed in such a fashion as to aid in evaporation by use of natural air flow and solar heating.

3.2.2.4.2 Eagle Mine Waste Stockpiles

Mine waste generated from the Eagle Mine Operations Area as well as mineral process waste would be deposited in the waste stockpile located in the Eagle mining area. Mining operations would initially commence in the northern portions of the open pit. Once the open pit reached the lower extent of the ore body, mining would advance to the south and west, and mine waste, as well as mineral process waste, would be deposited in the Eagle Mine waste stockpile. This stockpile would fill in the northeast portion of the Eagle Mine Open Pit. Mine waste and mineral process waste would be used to backfill portions of the Eagle Mine Open Pit when practicable.

Lack of ground water and the limited quantity of storm water runoff from this area would make Eagle Mine an ideal location for depositing mine and mineral process waste. When operations commence at the Eagle Mine, mineral process and mine waste would be mixed and placed into the waste stockpile. When mine operations are inactive, only mineral process waste would be deposited into the waste stockpile. EPM would reclaim portions of the waste stockpile as soon as possible to combat fugitive dust emissions.

3.2.2.4.3 Eagle Mine Roads

Numerous haul roads would exist within the Eagle Mine Open Pit. Ramps would connect different benches within the open pit, and would normally be 25 to 50 feet in width, with slopes ranging from zero to 15 percent.

3.2.2.4.4 Eagle Mine Ditches and Surface Water Control

Before mining activities begin at the Eagle Mine, drainage ditches and sediment basins ranging from one to six feet deep and from one to 12 feet wide (large enough to handle a 100-year storm event) would be constructed. Although this area is normally dry, EPM would still take all necessary precautions to prevent storm water from discharging from the disturbed area of Eagle Mine.

3.2.2.4.5 Open Pit Dewatering

No dewatering activities would be planned unless there was a seasonal meteoric water event resulting in excess water in the open pit. The current practice of controlling pit water by evaporation would continue. If evaporation proved not to be sufficient, the water would be pumped into an evaporative sediment basin, and the pH would be monitored as described in Section 3.2.2.2.5.

3.2.2.5 Beede Desert Mine Operations Area

EPM proposes to expand onto BLM-administered land in addition to the block of private land in the Beede Desert Mine Operations Area. EPM proposes no new mine activities for the federal land, however needs the expansion area to gain access to both the Eagle and Hidden Valley Mines (Figure 3.2.6). The block of federal land contains the existing Beede Access Road and a portion of the ore and waste rock stockpile area including a storm water catchment pond that EPM shaped and seeded in 2008.

3.2.3 Bulk Sampling

Once drilling indicates the presence of a sufficient quality and quantity of ore, a bulk sample of the material would need to be excavated and processed to verify marketability of the finished product. Bulk sampling requires removing and stockpiling of topsoil, then removing the overburden with either a dozer or an excavator. This excavated material would be placed on a leveled pad. Once an area has been sufficiently excavated and the top of the ore zone exposed, an excavator would cut a trench approximately 20 to 25 feet deep and ten to 15 feet wide.

The length of the trench is usually determined by the number of geologic anomalies present and the complexity of physical properties the DE exhibits. In some cases, multiple trenches are required to fully understand processing requirements for one or more ore types. In many cases, bulk sampling is limited to less than 1,000 tons; however, if processing issues are encountered, multiple bulk samples could be excavated. Disturbance associated with the proposed bulk sampling activities incorporates 50 acres of federal land.

After the sample is collected and the geologic strata are mapped, the trench would be backfilled with the overburden, contoured to approximately 3H:1V, then covered with topsoil and reseeded with the 2003 BLM-approved seed mix unless mining was scheduled to commence within two years. Interim seeding of stockpiles would be undertaken to reduce potential erosion.

DE resources discovered through test drilling and bulk sampling that lie outside the mine operation areas specifically approved based on this EIS would require appropriate NEPA analysis prior to development.

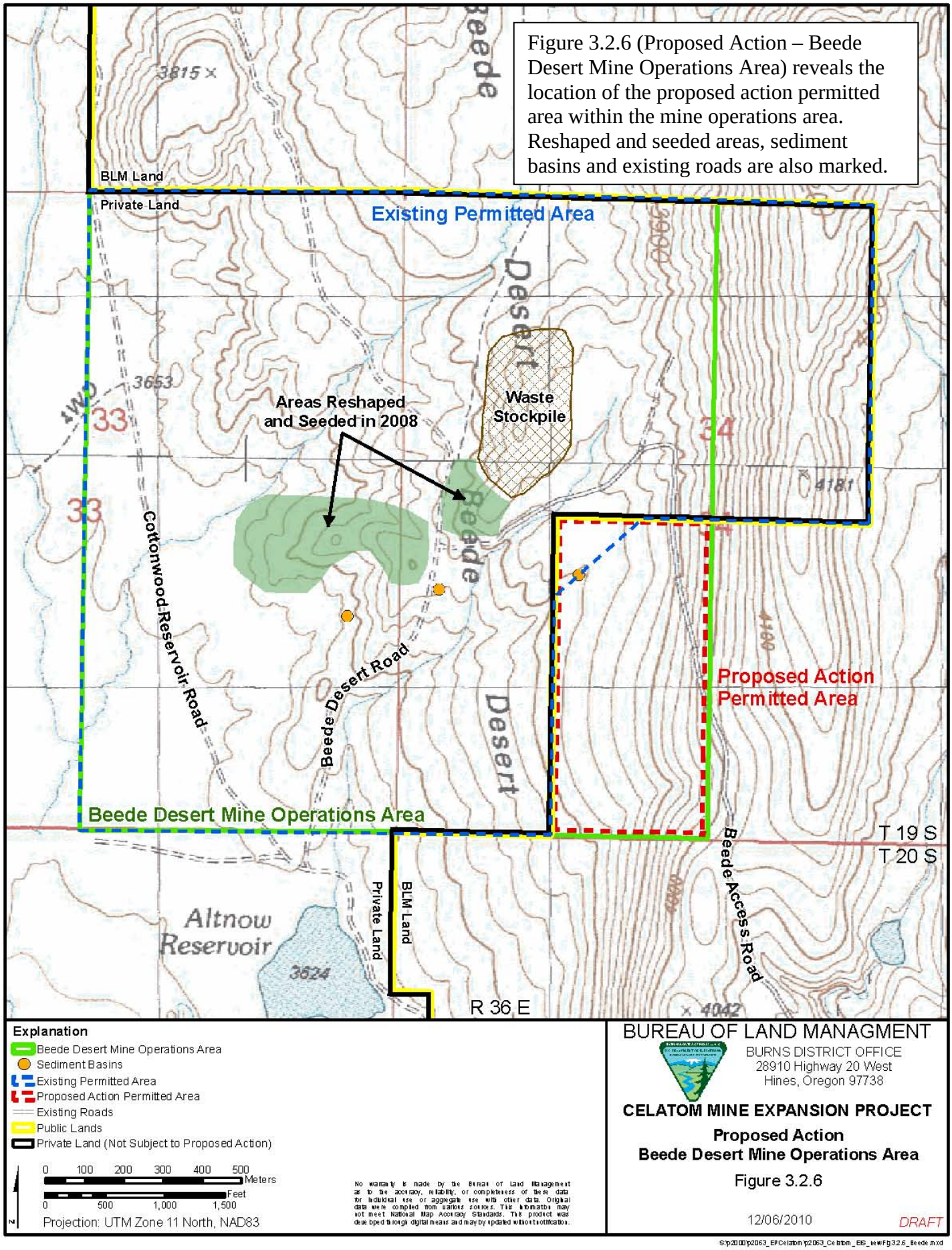
Figure 3.2.6 (Proposed Action – Beede Desert Mine Operations Area) reveals the location of the proposed action permitted area within the mine operations area. Reshaped and seeded areas, sediment basins and existing roads are also marked.
BLM Land
Private Land
Existing Permitted Area
Areas Reshaped and Seeded in 2008
Waste Stockpile
Cottonwood Reservoir Road
Beede Desert Road
Beede Desert
Proposed Action Permitted Area
Beede Desert Mine Operations Area
Beede Access Road
T 19 S
T 20 S
R 36 E
Altnow Reservoir
3624
3653
3815
4181
4190
4042
33
34
Explanation
Beede Desert Mine Operations Area
Sediment Basins
Existing Permitted Area
Proposed Action Permitted Area
Existing Roads
Public Lands
Private Land (Not Subject to Proposed Action)
0 100 200 300 400 500 Meters
0 500 1,000 1,500 Feet
Projection: UTM Zone 11 North, NAD83
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
BUREAU OF LAND MANAGMENT
BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738
CELATOM MINE EXPANSION PROJECT
Proposed Action
Beede Desert Mine Operations Area
Figure 3.2.6
12/06/2010
DRAFT
S:\p2010\p2063_EP\Celatom\p2063_Celatom_EIS_new\Fig 3.2.6_Beede.mxd

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3.2.5 Material and Waste Rock Characterization and Disposal

The Kelly Field Mine expansion area, Hidden Valley and Eagle Mines as well as the East Open Pit of North Kelly Field have pit floor elevations above the water table. The absence of ground water (all monitoring wells in Hidden Valley are dry) makes Hidden Valley an ideal location for the backfill of mine waste (non-ore material) and mineral process waste (a combination of DE, fine particles of rock (basalt), volcanic ash, minor amounts of pyrite, clay, and soda ash). Lack of ground water in the Eagle Mine Area and the limited quantity of storm water runoff make Eagle an ideal location for the backfill of mine and mineral process waste as characterized in Section 2.4. The East Open Pit in North Kelly Field would not be mined below the water table making it suitable for backfilling with mine and mineral process waste. This would result in a final open pit in the western area of North Kelly Field. If mining advances below the water table in West Pit of North Kelly Field, the pit would have an engineered partial backfill that would still allow the pit to act as an evaporative sink so there would be no standing water on the surface of the backfill (i.e., backfilled to a point where evaporation would equal inflow). Ground water would flow toward the open pit eliminating the potential for dissolved constituents to migrate into and impact the ground water system.

3.2.6 Exploration Drilling

EPM has conducted geologic investigations throughout the Project Area. Although several mine areas have been delineated, EPM plans to continue exploration on 200 acres throughout the Project Area in order to develop additional reserves on federal land. In conjunction with exploration drilling, two or more monitoring wells would be drilled upgradient of the proposed North Kelly Field Mine, Eagle Mine, or anywhere needed, prior to development of the mines or potential mines discovered during exploration activities. These wells would be used to provide baseline data prior to and during mining, as well as post reclamation monitoring. Drilling would occur using a reverse circulation or core drill rig, associated water trucks, pipe trucks, service vehicles, and four-wheel drive vehicles for the drill crew and geologist working on site. Prior to conducting drilling activities, EPM would provide the BLM with a site map showing the location and number of the drill sites and access roads.

In the past, exploration drilling has been completed under Notices on BLM-administered land or through exploration plans with the DOGAMI on state or private lands. Historically, exploration drilling has been accomplished using a rotary drill, which drills a 3.5-inch diameter hole. However, core drilling was used in 2008 to allow better analysis and inspection of the ore. The core drill allows the retrieval of 2.5- to six-inch diameter core that is used to interpret structure, ore composition, waste intercepts, and ore quality. Both the rotary and core drills are mobile, but require overland travel or the construction of unimproved roadways to access drill sites. A dozer and motor grader are used to construct these roads. Under the Proposed Action, drilling with a rotary drill would be conducted using overland travel. Where core drills are used, new drill roads would be constructed (to no particular standard) or bladed. Exploration could occur anywhere in the Project Area and may overlap with mine-related disturbance.

Drill pads and drill roads would be constructed along contour to minimize unnecessary disturbance. The drill sites would be approximately 15 feet wide and 50 feet long. Drill hole spacing is influenced by geologic or topographic conditions, but usually occurs on 500-foot centers. Drill hole depth would depend upon either the extent of the ore deposit, or other factors, such as basal rock determination, structural geology, or intercepting a marker bed or structure;

however, the usual range is 100 to 500 feet in depth. If exploration drilling indicates a good potential for resource development, then additional developmental drilling would be required to further define the size and extent of the ore body. When drilling mud, consisting of a slurry of bentonite, is used to stabilize the open drill hole, the slurry would be contained in a sealed tank on a drill support truck. When drilling has been completed, drill fluids (water in this case) would be distributed into one of the sediment basins.

After the hole has been drilled, the hole would be plugged with a conical concrete plug and backfilled with drill cuttings (fine material from the drill hole). In the event that water was encountered, DOGAMI backfill guidelines would be followed. Backfilling drill holes removes the hazard an open hole could pose to livestock or wildlife moving through the mine area. Drill sites and access roads would be reclaimed in the fall of each drill season, weather permitting. Drill sites and access roads would be seeded with the 2003 BLM-approved seed mix shown in Table 2.5-1. Reclamation typically involves using hand tools and small hand-held broadcast seed spreaders.

3.2.7 Development and Production Drilling

At the beginning of each mining season and prior to mining new areas, an extensive developmental drilling program may be conducted to confirm ore grade characteristics. Development drilling could normally occur near, but not within, the open pit operations. Between 20 and 100 developmental drill holes could be drilled each year with a maximum depth of 100 feet.

Production drilling could occur prior to the initiation of mining. Production drilling would be completed with either hand-held augers or small truck-mounted equipment. Production drilling is used to determine the specific quality of ore immediately before the ore is mined. This information would be used by mine employees to stockpile ore according to grade. Production drilling would be conducted within open pit boundaries. Production drill holes would be typically less than 15 feet in depth with 200 to 300 holes drilled each year.

3.2.8 Equipment

EPM would use track excavators/shovels, haul trucks, scrapers, water trucks, exploration and mine drills, track dozers, maintenance service trucks, fuel trucks, motor graders, portable light plants, power generators, portable air compressors, and wheeled tractors during the Project. The number and size of equipment would vary, depending on the scale of activities and if multiple open pits were being mined concurrently.

EPM would take steps to prevent fires by ensuring that each field vehicle carries hand tools and a fire extinguisher. Water trucks at the Project Area would be used in the event of a fire. All portable equipment, including drill rigs, support vehicles and drilling supplies, would either be removed or centrally located in the Project Area during extended periods of non-operation.

3.2.9 Water Use

EPM would continue to use water from the two wells discussed in Section 2.3.4. In addition, it is expected that an additional water well would be needed for the expansion. The new well would be drilled on private land controlled by EPM. It is unknown at this time where that water well would be located.

3.2.10 Work Force

Up to 36 individuals would be employed or contracted by EPM to work at the mine or haul ore from the mine. Additional workers would be associated with contract drilling companies who would conduct exploration programs. The current mine camp can accommodate 12 camp trailers or space for 24 individuals who do not live in the area. It has been a common practice for EPM to hire local ranchers to work at the mine, and these workers return to their residences when they are not on duty. Supervisory staff is expected to remain the same as is currently in place. As the needs of the Project change, so would the number, size, and schedule of the mine crews; however, the mine camp would not need to expand to accommodate the potential increase.

3.2.11 Reclamation Overview

The objective of EPM is to minimize the environmental impacts of their mining operations in the Celatom Mining complex by using BMPs. Over the expected 50-year mine life, knowledge, technologies, or management could change. These changes could result in the need to alter certain practices and this would be coordinated with the BLM. In general, reclamation at the Celatom Mine is based upon the following considerations and is based on the current state of knowledge:

- Minimizing safety hazards to the public;
- Returning the land to productive use after reclamation;
- Reducing adverse visual impacts;
- Controlling soil erosion; and
- Ensuring no degradation of the waters of the state.

In view of these considerations, the plan is to return the land to a condition that promotes plant communities, and other ecological factors, that would further stabilize the site, allow moisture infiltration, compete with noxious and invasive weeds, contribute to habitat for wildlife, and provide other economic and amenity values such as livestock forage and recreational opportunities. Once mining activities have ceased, access to open pits would be limited by the placement of berms or fences, while any remaining haul roads would be revegetated. The open pits would be backfilled where practical and economically feasible, with any remaining high walls left in place. Overburden stockpiles would be recontoured to an average slope of 3H:1V and revegetated. Constructed containment structures would be safely sloped and revegetated.

Any improved roadways on public lands would be transferred to the BLM, while improved roadways on other lands would be transferred to the county. All other roads would be reclaimed. Reclamation techniques developed on site would ensure successful revegetation of the reclaimed areas. The 2003 BLM approved seed mixture outlined in Table 2.5-1 has been used successfully and has demonstrated its effectiveness toward meeting the reclamation standards for closure. Upon completion of part or all of the reclamation process, EPM would notify the BLM regarding

the areas where reclamation has been completed for the BLM inspection and release of any reclaimed areas.

3.2.11.1 Drill Hole Plugging

All exploratory drill holes would be capped in accordance with the DOGAMI drill hole abandonment standards. Drill holes where water is encountered would be filled with cement slurry and then capped with a concreted plug as required by DOGAMI. Dry holes would be backfilled with drill cuttings or sodium bentonite and then capped with a concrete plug. The surface would be covered with growth media and reseeded with the 2003 BLM approved seed mix (Table 2.5-1).

3.2.11.2 Regrading and Recontouring

Prior to reseeding, all areas would be regraded and recontured to match the surrounding topography and to return drainage patterns to their pre-mining configuration, as much as is practicable, to improve stability and mitigate visual impacts. Recontouring would involve the overburden stockpiles, haul roads, containment structures, or open pit backfills. All remaining overburden stockpiles would be recontoured and sloped to an average slope of 3H:1V. The regrading of disturbed areas would be to facilitate the placement of growth media by leveling out the surface and to control drainage and erosion. Recontouring and regrading would typically involve the use of a track dozer, a scraper, or a motor grader.

3.2.11.3 Mine Reclamation and Open Pit Backfilling

There are several different types of waste materials generated during mining and during processing in the plant. The mine waste materials include interbedded waste (volcanic ash, volcanic tuff, opalite, and clay), very poor quality diatomite, and overburden. Disposal of the mine waste would be typically accomplished in one of two ways: either by constructing waste stockpiles or by backfilling mined out pits. Both of these options have been successfully utilized in the past and would continue to be utilized in the future.

The processing of ore at the plant also yields a plant mineral process waste of material composed of clay, sand, basalt fragments, natural diatomite, and a fluxing agent (sodium carbonate $NaCO_3$). Historically, plant mineral process waste has been backhauled to either the Beede Desert Mine or the Kelly Field Mine Operations Areas, blended with overburden, and then backfilled into mined-out pits. The Kelly Field mine expansion area, Hidden Valley and Eagle Mines, as well as the East Open Pit of North Kelly Field have pit floor elevations above the water table making them suitable for backfilling with mine and mineral process waste. The determination of water levels or lack of water was made by drilling subsurface drill holes. This drilling also defined the size and depth of the ore body and the types of material that can be processed. This drilling also determined the depth to ground water or the lack of ground water intercepts. Based on the information obtained, it was determined that ground water would not be intercepted at the bottom of these open pits. If mining does advance below the water table in the final open pit in the western area of North Kelly Field, the pit would have an engineered partial backfill as described in Section 3.2.4.

In addition, it is planned that the open pits in the Hidden Valley Mine Operations Area would be backfilled first, as these areas have very dry conditions, thereby making it a more desirable

storage area for the plant mineral process waste. Whether the plant mineral process waste is backfilled in a pit above the saturation zone or in a pit without a saturation zone, once the area is filled, a minimum of a 12-inch thick layer of either interbedded mine waste or overburden would be used to cover the top of the plant mineral process waste, thereby forming an effective liner.

The backfilling operation is accomplished by the use of trucks, scrapers, dozers, or motor graders. Upon completion of backfilling, the surface would be regraded, covered with available growth media, and then seeded using the recommended BLM seed mix. It is estimated that a total of 250 acres of pit highwall disturbance would remain unreclaimed at the end of mining because the highwall is too steep to reseed and would not hold growth media.

3.2.11.4 Interim Reclamation

Interim reclamation would be completed at the end of each mining season. Interim reclamation would involve creating drainage ditches to ensure all surface runoff reaches sediment basins and not Mill Gulch. Additionally, most roadways or other means of accessing the open pits would be blocked and signs posted, indicating roads are closed. Public access roads would not be closed. In areas where erosion is anticipated, an aggressive, non-invasive, grass species such as crested wheatgrass would be seeded to help prevent erosion and the establishment of noxious weeds. Seeding rates would be dependent upon method of application. If hand seeders or other simple broadcast methods are utilized, 20 pounds per acre of crested wheatgrass would be used. Seeding rates may be reduced if the seed bed has been prepared mechanically prior to seed application.

Should an ore haul truck encounter hazardous conditions that results in a load of DE spilling off of the roadway, the material would be cleaned up when safe access can be afforded by either mechanized or manual means. The area would then be broadcast seeded in the fall with a BLM approved seed mix.

3.2.11.5 Seeding and Growth Media Preparation

After the disturbed area has been prepared by either regrading or recontouring, the area would be covered with a layer of growth media and scarified to a depth of two to six inches to prepare the seedbed. Scarification leaves a roughened surface to provide greater opportunities for successful germination and revegetation. Scarification would be accomplished by use of a dozer (dozer tracks leave a roughened surface), a grader with a scarifying blade, or an off-set disc plow. The scarified surface inhibits runoff, increases infiltration, and produces microclimates conducive to seed germination.

The Project would use the BLM 2003 approved seed mix for all reclamation seeding (recommended by Nora Taylor from the Burns BLM office in 2003 – see Table 2.5-1). EPM has used a variety of methods to apply the seed. Each of these methods has been successful in reestablishing vegetation at various mine sites.

These methods include the following:

- Hand-broadcasting;
- Broadcast seed with hand operated seeder;
- Rangeland Drill or other appropriate seeder; or
- Hydromulching seed and organic mulch.

Fall seeding has been the most successful because the majority of precipitation falls as snow during the fall and winter months.

3.2.11.6 Riparian Mitigation

The Project Area does not contain any perennial streams or bodies of water; however, the Mill Gulch drainage does contain an intermittent stream that is dry most of the year and flows only in response to snow melt from winter precipitation. The Mill Gulch drainage is located in Sections 1, 2, 11, 18, 19, 30, and 36, T19S, R37E.

There are riparian areas located in the southern portion of Section 2, T19S, R37E, but these areas have not been mapped for vegetation communities. Due to the biological importance of high desert riparian areas, any mining-related activities would be performed in such a way as to minimize unnecessary disturbance of the local ecology. The BLM and DOGAMI would be consulted during reclamation to minimize impacts and optimize function and preservation of these two riparian areas. EPM would utilize silt fences, diversion ditches, and gravel to preserve riparian habitat.

Where crossings have been constructed in the Mill Gulch drainage the culverts would be removed, and the banks of the drainage would be contoured to coincide with existing banks above and below the crossing. In the areas where vertical walled channels were cut, these vertical walls would be cut back to a slope appropriate to the surrounding landform and stream channel characteristics. An excavator would be used for this task. Once recontouring is complete, the area would be seeded with the BLM recommended seed mix.

3.2.11.7 Wildlife Habitat Rehabilitation

Water impoundments would be left in place in order to provide habitat for upland game birds, game animals, and waterfowl for part of the year during precipitation events. The Screening-Level Ecological Risk Assessment (SLERA) prepared for the Project (SRK 2010b) evaluated the consumption risk to migratory birds and found that the seasonal meteoric water that accumulates in the open pits in the Project Area represents a low risk to migratory birds or other wildlife.

3.2.11.8 Isolation and Control of Acid-forming Deleterious Material

Based on the results of the material characterization report, the oxidized diatomite contains no sulfides and is essentially inert. The unoxidized diatomite contains sulfide minerals and is considered acid-generating. The remaining material types (i.e. interbedded ash/tuff and basalt) comprise a small percentage of the total material to be mined or would not be encountered or exposed during mining and therefore would not contribute to the overall acid-generating potential of the waste rock or pit walls associated with the Project. Acid generation potential for each mine area is discussed below.

3.2.11.8.1 Kelly Field Mine Operations Area

The Kelly field expansion area has pit floor elevations above the water table. Since both oxidized and unoxidized diatomite would be encountered during mining, seasonal pit meteoric water would be controlled by methods described below for Eagle Mine.

3.2.11.8.2 North Kelly Field Mine Operations Area

1. The North Kelly Field East Open Pit would not be mined below the water table. Since both oxidized and unoxidized diatomite would be encountered during mining, seasonal pit meteoric water would be controlled by methods described below for Eagle Mine.

2. If mining advances below the water table in the North Kelly Field West Open Pit, the final pit would have an engineered partial backfill that would allow the open pit to act as an evaporative sink, but would minimize the potential for water to pond on the backfill (i.e., backfill to a point where evaporation would equal inflow). Under this partial-backfill scenario, evaporation would occur mostly by capillary action (i.e., a phenomenon where liquid spontaneously rises in a narrow space such as a thin tube) so that standing water on the backfill is less likely to occur, but evaporation (and possibly transpiration through vegetation) would continue, and a localized ground water sink would be maintained. Ground water would flow toward the open pit eliminating the potential for dissolved constituents from waters ponding in the open pit to migrate into and impact the ground water system.

3.2.11.8.3 Hidden Valley Mine Operations Area

1. The diatomite in the Hidden Valley Mine Operations Area is unsaturated, and the proposed pit is located above the water table. As a result, any water that may collect in the proposed pit would be limited to seasonal runoff.

2. Unoxidized diatomite does not occur in the Hidden Valley diatomite deposit; oxidized diatomite would be the main rock type exposed in the final Hidden Valley Open Pit. As a result, no potentially acid-generating materials would be exposed during mining, and there is no potential to develop low pH water in the pit.

3.2.11.8.4 Eagle Mine Operations Area

1. Both oxidized and unoxidized diatomite would be encountered during mining of the Eagle Open Pit. The proposed pit is located above the water table and, as a result, any water that may collect in the proposed pit would be limited to seasonal runoff.

2. Sulfides in the unoxidized diatomite that are exposed in the Eagle Open Pit walls would oxidize and may result in the seasonal, temporary accumulation of low pH surface water in the pit. The current practice of controlling pit meteoric water by evaporation would continue. If evaporation proved not to be sufficient, the water would be pumped into an evaporative sediment basin, and the pH would be monitored and corrected to ensure that values are between pH 5 and 7.5.

3.2.11.9 Removal or Stabilization of Buildings, Structures or Support Facilities

In Section 36, T19S, R36E, all structures in the staging area would be removed including the maintenance shop building, petroleum storage facilities, generator house, office trailer, truck scale, water tank and all concrete pads and associated concrete spill containment structures. All gravel would be collected with a grader, placed on top of the BLM road, and crowned. Resulting bare ground would be scarified to a depth of five to 12 inches and seeded with the recommended BLM seed mix.

At the mine camp, all surface structures including the change house, generator house and any associated concrete pads, foundations, or spill containment structures would be removed. All buried utilities would be removed and septic tanks would be pumped and backfilled with sand. All gravel would be collected with a grader, placed on top of the BLM road, and crowned. Resulting bare ground would be scarified to a depth of two to six inches and seeded with the recommended BLM mix.

The fence surrounding the growth media stockpile that was initially used as a test plot would be removed at such time as the growth media pile was used for reclamation. Once removed, the growth media pad would be scarified to a depth of two to six inches and seeded with the BLM recommended seed mix.

In Section 3, T20S, R36E, the only structure is the Beede Desert Well Site. The abandonment of the well is discussed in the drill hole plugging methodology described in Section 3.2.11.1. The generator house, water tank, and associated pads, security fence and concrete spill containment structures would be removed. The gravel would be collected with a grader, placed on top of the BLM road, and crowned. Resulting bare ground would be scarified to a depth of two to six inches and seeded with the BLM recommended seed mix.

The equipment required to reclaim the support facility sites include a backhoe, motor grader and trucks. Hydromulching seed and organic mulch may also be utilized.

3.2.11.10 Post-Closure Management

Following the cessation of mining, all efforts would be directed toward completing reclamation. Final grading, contouring, and revegetation would be completed. The remaining pits would be secured with berms and fencing where required. Drainage would be managed by use of diversion ditches, which would be used to route storm water into settling basins away from the reclaimed areas or pits. The settling basins for storm water management would have any sediment removed, leaving the perimeter banks of the basins cut to an average slope of 3H:1V. The area would then be scarified to a depth of two to six inches and seeded with the 2003 BLM-approved seed mix.

Weather conditions at the mine site would allow reclamation work to take place only during six to seven months per year. With this schedule, it is estimated that reclamation would take three years to complete.
Monitoring by EPM or an agent of EPM of the reclaimed mine site would consist of the following:

- Ensuring that the reclaimed site remains stable, with a focus on controlling erosion;

- Inspecting, repairing, and cleaning out drainage ditches and catch basins to ensure that they are in good shape and remain effective;

- Checking that vegetation is progressing as planned. Reseed areas where necessary;

- Checking for ponding in the open pit areas and adding additional backfill as needed; and

- Sampling of the monitoring wells for Oregon MCLs annually for five years.

This monitoring is expected to last over a ten-year period with on-site visits on a quarterly basis for the first three years and then annually thereafter.

3.2.11.11 Kelly Field Mine Operations Area Reclamation

When mining activities have been completed and the ore body in Kelly Field Mine Operations Area has been mined out, the reclamation process would begin. Due to the nature of the open pits in Kelly Field Mine Operations Area, several permanent pit walls would remain. All other features would be reclaimed in accordance with DOGAMI and BLM specifications.

3.2.11.12 North Kelly Field Mine Operations Area Reclamation

Reclamation of the North Kelly Field Mine Operations Area would follow the same guidelines as in all other working areas of the Project Area. Growth media piles would be seeded to limit erosion. As the North Kelly Field open pits are backfilled, growth media would be put into place and seeded. As backfill was placed in the North Kelly Field East Pit, growth media would be emplaced and seeded. Flat benches and all other areas except the final pit walls left after mining would be covered and seeded. The pit walls would be left in solid rock or consolidated material and would be too steep to seed.

In Section 19, T19S, R37E, where ponderosa pine trees were removed, final reclamation would include seeding with one of the BLM-approved seed mixes. Ponderosa pines would not be planted as part of the reclamation.

3.2.11.13 Hidden Valley Mine Operations Area Reclamation

All areas of the Project Area, with the exception of final pit walls and improved roadways, would be reclaimed when mining activities cease in those working areas. Once the useable ore reserves in the Hidden Valley Mine Operations Area have been mined out, the reclamation process would begin. The two main areas that would require reclamation in Hidden Valley are the ore and waste stockpile areas. The growth media from both of these areas would be removed at the start of mining activity. When mining has ceased, and EPM is no longer using the Hidden Valley waste stockpile for plant waste, both the stockpile site and the waste stockpile areas would be regraded and reclaimed. If any of the slope angles of the waste stockpile or stockpile ore pad do not meet the DOGAMI reclamation specification of an average slope of 3H:1V, they would be corrected. Growth media would be placed on the surface, and then seeded with a BLM approved seed mix.

3.2.11.14 Eagle Mine Operations Area Reclamation

Reclamation of the Eagle Mine Operations Area would follow the same procedure as in all other working areas of the Project Area. Growth media removed at the start of mining would be stockpiled for use in the reclamation process. All slope angles, other than final pit walls, which are too steep to seed, would be reduced to an average slope of 3H:1V or less, covered with growth media, and seeded with the appropriate seed mix. Benches in the final pit walls would be covered with soil and seeded when possible. Haulage roads and other disturbed areas would also be seeded. The improved roadway leading to the Eagle Mine would be transferred to the BLM.

3.2.11.15 Beede Desert Mine Operations Area Reclamation

Reclamation of the Beede Desert Mine Area was scheduled to begin in 2008 and should be completed by 2015. A few small stockpiles could remain on site for five to ten years. Reclamation would ensure that all final stockpile slopes meet DOGAMI specifications (slope angles at an average of 3H:1V or less). Once this has been achieved, growth media would be placed on the working areas and the mine haulage roads, and then the areas would be seeded with a BLM approved seed mix. However, any improved roadways would remain; this is important due to the fact that when EPM proceeds into Section 27, the road currently used to access Beede Desert would be extended to allow access into Section 27.

3.2.12 Proposed Action Project Design Elements for Environmental Protection

EPM would commit to the following project design elements (PDEs) to prevent unnecessary or undue degradation during construction, operation, and reclamation of the Project. The measures are derived from the general requirements established in the BLM's Surface Management Regulations at 43 CFR 3809 and DOGAMI mining reclamation regulations, as well as other water and air quality regulations.

Reclamation

- Reseeding would be consistent with all BLM requirements for mix constituents, application rate, and seeding methods.

- Drill roads, pads, and sumps not needed for future exploration would be reclaimed as soon as practicable after completion of exploration activities.

- Trenches would be reclaimed after the sample is collected and the geology is mapped. The trench would be backfilled with the overburden, contoured to approximately 3V:1H, then covered with topsoil and revegetated.

Public Safety and Access

- Public safety would be maintained throughout the life of the Project. All equipment and other facilities would be maintained in a safe and orderly manner.

- All trenches, sumps, and other small excavations that pose a hazard or nuisance to the public, wildlife, or livestock would be built with a sloped end for easy egress or adequately fenced to preclude access.

- During the seasonal closure (typically between the end of November until the beginning of April), the open pits and mine facilities would be fenced as necessary to preclude entrance by the public and big game species.

- Gates would be installed as specified and would be locked to restrict access.

- When adverse conditions are observed, EPM would take corrective action to prevent environmental degradation and to ensure the safety of all employees. The primary weather hazards at the Project Area are high winds, heavy rainfall, or lightning. During these events, operations would cease, and employees would take shelter until the adverse conditions cease.

- In the event that any existing roads are severely damaged as a result of Project activities, EPM would return the roads to their original condition.

Air

- A Dust Control Plan has been developed and is included as Appendix 32 in the MPO. The plan identifies specific control measures for emissions of fugitive dust and monitoring requirements.

- EPM would minimize the amount of Project-related bare ground by maintaining permanent or short-term vegetation cover to reduce erosion, sedimentation, and fugitive dust.

Water Quality

- EPM would implement water management strategies as well as the Waste Rock Characterization and Handling Plan (Appendix 62 of the MPO), which identify specific control measures and monitoring requirements.

- All exploratory drill holes drilled at or in support of the Project would be capped in accordance with DOGAMI drill hole abandonment standards. All drill holes would be backfilled with drill cuttings or sodium bentonite and then capped with a concrete plug. The area around the drill hole would be covered with topsoil and reseeded. In the event that ground water is encountered and rises to the surface, the hole would be filled with cement slurry as required by DOGAMI. The drill hole would then be capped with a concreted plug, and the surface would be covered with soil and reseeded with the 2003 BLM-approved seed mix. In the event DOGAMI drill hole abandonment standards change, so would the abandonment method utilized by EPM.

- EPM would utilize BMPs to ensure there would be no degradation of the waters of the state as described in the MPO.

- EPM would immediately repair any damage to springs that occurred as a result of road building or maintenance. If BLM roads are damaged, they would be repaired to BLM specifications.

Wastes

- EPM would follow the Spill Prevention and Control Plan included in the MPO (Appendix 31). The plan identifies specific control measures and monitoring requirements.

- Pursuant to 43 CFR 8365.1-1(b)(3), no sewage, petroleum products, or refuse would be dumped from any trailer or vehicle.

- Regulated wastes would be removed from the Project Area and disposed of in a state, federal, or local designated area.

Cultural Resources

- EPM would avoid all National Register of Historic Places eligible or unevaluated sites.

- All eligible or unevaluated cultural sites would be avoided. If eligible sites cannot be avoided, they would be mitigated through a data recovery plan approved by the BLM in consultation with the State Historic Preservation Office (SHPO).

- Pursuant to 43 CFR 10.4(g), EPM would notify the BLM authorized officer by telephone and with written confirmation, immediately upon the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further pursuant to 43 CFR 10.4 (c) and (d), the operator would immediately stop all activities in the vicinity of the discovery and not commence work again for 30 days or until notified to proceed by the BLM authorized officer.

- Pursuant to 43 CFR 3809.420(b)(8)(ii): Operators will immediately bring to the attention of the authorized officer any cultural and/or paleontological resources that might be altered or destroyed on federal lands by his/her operations, and will leave such discovery intact until told to proceed by the authorized officer. The authorized officer will evaluate the discoveries brought to his/her attention, take action to protect or remove the resource, and allow operations to proceed within ten working days after notification to the authorized officer of such discovery.

Survey Monuments

- Any survey monuments, witness corners, or reference monuments would be protected to the extent economically and technically feasible.

Invasive, Nonnative Species

- EPM would inspect for noxious weeds throughout the Project Area during the spring and fall of each field season. Herbicides would be applied by a state-certified technician during the spring and fall to limit the spread of noxious weeds and to eradicate those already established. EPM state-certified technicians would coordinate efforts with Harney County and the BLM. EPM would submit Pesticide Use Proposals, when necessary. Pesticide Application Records would be submitted annually to the BLM. The BLM approved herbicides would be applied on BLM-administered lands. Small amounts of herbicide concentrates may be stored at the mine site during the field season; however, the majority of the time the herbicide would be transported to the mine from the mill on an as-needed basis.

- EPM would minimize the amount of Project related-bare ground by maintaining permanent or short-term vegetation cover to help control noxious and invasive weed spread including but not limited to barrow pits, drainage control ditches, berms, unused mine roads, unused stockpiles, and the edges of developed areas.

- Noxious weed populations would be treated in accordance with the Noxious Weed Management Program EA OR-020-9805 if new noxious weed infestations were found.

- The introduction and spread of noxious weeds would be minimized through implementation of the following: (a) only certified weed-free seed would be used for reclamation seeding; and; (b) all reclamation would be monitored for infestations of noxious weeds.

Special Status Species and Wildlife

- EPM would avoid conducting surface-disturbing activities within two miles of any greater sage-grouse lek between March 1st and June 15th or until a qualified biologist has conducted a minimum of three lek surveys and determined that the lek is no longer being utilized for breeding and that no nests occur in the area. A report of the survey results would be submitted to the BLM wildlife biologist for clearance before surface-disturbing activities could commence within two miles of the lek. After June 15th, surveys would not be necessary and surface disturbing activities could commence.

- EPM would avoid impacts to nesting raptors during the avian breeding season, which varies by species but is generally between March 1 and mid-May. Measures to avoid nesting raptors would be the same as the measures to avoid nesting migratory birds, which are discussed below.

Migratory Birds

- Project activities would be conducted outside of the avian breeding season. If this is not possible, a qualified biologist acceptable to the BLM and ODFW would survey the area to be cleared prior to surface disturbance. If active nests are identified, or if other evidence of nesting (mated pairs, territorial defense, carrying nest material, transporting food) is observed during the survey, a protective buffer (the size of which would depend on the requirements of the species) would be delineated and the delineated protective buffer avoided to prevent destruction or disturbance to nests until the nests are no longer active or nesting activities are no longer observed.

Erosion and Sediment Control

- Drill sites, sumps, and trenches would be reclaimed as soon as practicable after completion of logging and sampling.

- Sediment control structures would be used and could include, but not be limited to berms, downgradient drainage channels, and sedimentation basins.

Vegetation

- If a unique plant community cannot be avoided, vegetation would be replaced with seeding of similar shrub and grass species.

- Riparian areas mapped in the Project Area would be avoided by exploration activities.

3.3 Alternative 3 - Proposed Action with Additional Design Elements

The Proposed Action includes environmental protection measures incorporated by EPM as design features. During preparation of this EIS, the BLM identified resource-specific measures as additional environmental protection measures. Alternative 3 is the same as the Proposed Action except as modified by the following design and operations changes as well as additional or modified design elements for environmental protection. These additional elements include fenced mine areas, one additional access road, a locked gate, removal of a sediment basin, maintenance of an existing stock water pond, and installation of new stock watering ponds. Individual components and locations are discussed in the following section.

3.3.1 Mining Operations Areas

3.3.1.1 Kelly Field Mine Operations Area Expansion

Under Alternative 3, the Kelly Field Mine Operations Area would be fenced with a total of approximately 8,353 feet of three-strand fence (two strands of barbed-wire and one smooth bottom wire) (BLM Standard Fencing) (Figure 3.3.1).

Figure 3.3.1 (Alternative 3 Mine Operations Areas and Facilities in the Project Area) shows the location of existing and proposed cattle guards, gates, fences, and roads within the project boundary.

Explanation

- Proposed Cattle Guard
- Removed under Alternative 3
- Existing Cattle Guard
- Proposed Gate
- Proposed Locked Gate
- Project Boundary
- Excluded Area within Project Boundary
- Proposed Roads
- Existing Fence
- Proposed Fence
- Fence to be Removed
- Proposed Mine Operations Areas
- Approved Mine Operations Areas

Existing Roads

- County
- Other
- Public Lands
- State Land
- Private Land
- Split Estate with Federal Minerals (SRHA) on Private Land
- Split Estate with Federal Minerals (SRHA) on EPM Land
- Split Estate with Federal Minerals (Not SRHA)

0 500 1,000 1,500 2,000 Meters

0 2,000 4,000 6,000 8,000 Feet

Projection: UTM Zone 11 North, NAD83

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may by updated without notification.

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Alternative 3 Mine Operations Areas and Facilities in the Project Area

Figure 3.3.1

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3.3.1.2 North Kelly Field Mine Operations Area

Under Alternative 3, the North Kelly Field Mine Operations Area would be fenced with a total of approximately 11,865 feet of three-strand fence (two strands of barbed-wire and one smooth bottom wire) (BLM Standard Fencing), and EPM would provide signage for the public passing through the mine area (Figure 3.3.1).

3.3.1.3 Hidden Valley Mine Operations Area

Under Alternative 3, the Hidden Valley Mine Operations Area would be fenced with a total of approximately 16,559 feet of three strand fence (two strands of barbed-wire and one smooth bottom wire) (BLM Standard Fencing), the sediment basin in Hidden Valley would be removed, and EPM would be required to maintain the stockwater pond in Hidden Valley by removing sediment as needed (Figure 3.3.2).

3.3.1.4 Eagle Mine Operations Area

Under Alternative 3, the Eagle Mine Operations Area would be fenced with a total of approximately 19,772 feet of three-strand fence (two strands of barbed-wire and one smooth bottom wire) (BLM Standard Fencing) (Figure 3.3.1).

3.3.1.5 Puma Claims Area

EPM would install stock watering tanks at the Puma Claims Area and maintain water in the tanks throughout the BLM designated grazing period.

3.3.1.6 Beede Desert Mine Operations Area

Under Alternative 3, the Beede Access Road would have a locked gate at the Altnow/Buelah intersection. The cattleguards located in Section 21 and 28, T19S, R36E and shown on Figure 3.3.1 would not be installed.

3.3.2 Additional Road

Under Alternative 3 one additional road, the Eagle Cutoff Road, would be constructed, disturbing 1.4 acres. This road would connect the Cottonwood Reservoir Road with a BLM road north of the Eagle Mine Area (Figure 3.3.1).

3.3.3 Reclamation

Under Alternative 3, it is expected that ore mining activities in the Celatom Mining complex would be reclaimed in a manner that is based on the reclamation activities outlined in Section 3.2.11 of the Proposed Action, except as identified below.

3.3.3.1 Seeding

New BLM formulated seed mixes would be used for reclamation. Areas with lesser amounts of DE would be planted with the seed mix shown in Table 3.3-1. Areas with greater amounts of DE would be planted with the seed mix shown in Table 3.3-2.

Table 3.3-1: BLM 2010 Seed Mix 1 – Lesser Diatomaceous Earth Content

Common Name	Scientific Name	Pounds PLS*/Acre
Sandberg bluegrass	*Poa secunda*	6
Goldar bluebunch wheatgrass	*Pseudoroegneria spicata*	6
Idaho fescue	*Festuca idahoensis*	4
Therber's needlegrass	*Achnatherum thurberianum (Stipa thurberianum)*	4
	Total	**20**
1 forb – annual or perennial (preferably native)		-
1 legume – native or nonnative		-
Potentially 1 Artemesia (e.g., Artrwy, Arar, Artrva)		-

* Pure Live Seed

Table 3.3-2: BLM 2010 Seed Mix 2 – Greater Diatomaceous Earth Content

Common Name	Scientific Name	Pounds PLS*/Acre
Sandberg bluegrass	*Poa secunda*	6
Goldar bluebunch wheatgrass	*Pseudoroegneria spicata*	6
Western Wheatgrass	*Pascopyrum smithii*	4
Therber's needlegrass	*Achnatherum thurberianum (Stipa thurberianum)*	4
	Total	**20**
1 forb – annual or perennial (preferably native)		-
1 legume – native or nonnative		-
Potentially 1 Artemesia (e.g., Artrwy, Arar, Artrva)		-

* Pure Live Seed

3.3.3.2 Other Reclamation

3.3.3.2.1 Mine Areas Fence Removal

When mining and reclamation are completed in each of the Eagle, Hidden Valley, Kelly Field, and North Kelly Field Areas, the fences that were installed as part of Alternative 3 would be removed. All fence materials would be removed from BLM lands and appropriately disposed of at EPM's discretion.

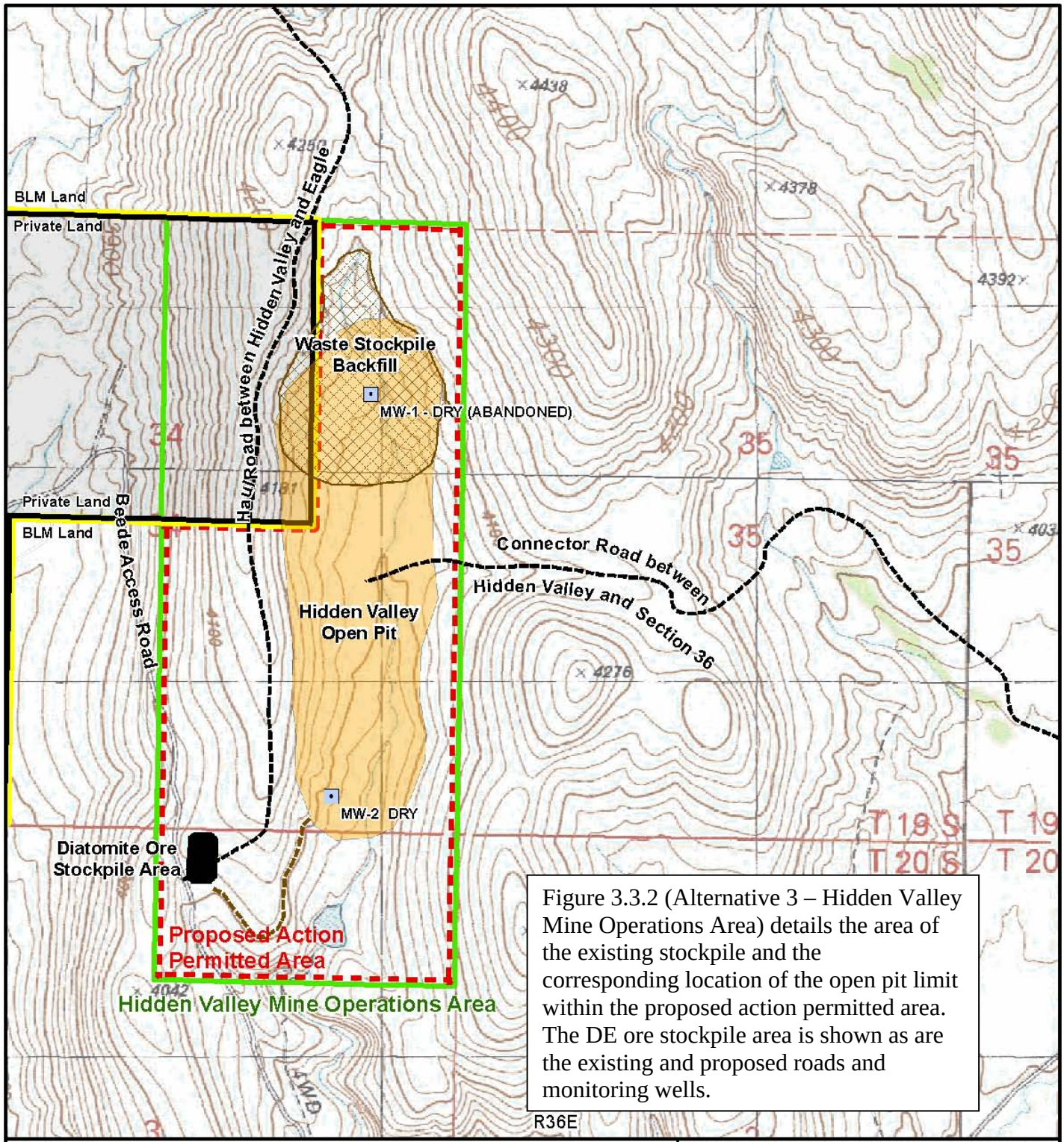

Figure 3.3.2 (Alternative 3 – Hidden Valley Mine Operations Area) details the area of the existing stockpile and the corresponding location of the open pit limit within the proposed action permitted area. The DE ore stockpile area is shown as are the existing and proposed roads and monitoring wells.

Explanation

- Hidden Valley Mine Operations Area
- Hidden Valley Open Pit Limit
- Hidden Valley Existing Waste Stockpile
- Diatomite Ore Stockpile Area
- Ground Water Monitoring Wells
- Proposed Roads
- Existing Bladed Road
- Existing Roads
- Proposed Action Permitted Area
- Public Lands
- Private Land (Not Subject to Proposed Action)

0 100 200 300 400 500 Meters

0 500 1,000 1,500 2,000 Feet

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Alternative 3
Hidden Valley Mine Operations Area

Figure 3.3.2

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3.4 Alternatives Considered but Eliminated from Detailed Study

3.4.1 Project Scope Alternatives

EPM considered various operational and project scope alternatives during feasibility studies for the proposed mine expansion. These alternatives were considered relative to their technological and economic feasibility, as well as their potential to reduce environmental impacts. The operational alternatives included mining green ore at Beede Desert Mine, rerouting Mill Gulch drainage, and creating a central ore stockpile area for Kelly Field and Section 36 mines. These alternatives were considered but eliminated from detailed analysis in the EIS for technical, economic, or environmental impact reasons and because they would have substantially similar effects as Alternative 2, the Proposed Action, which is thoroughly analyzed in this EIS.

Three Project scope alternatives were considered to reduce the size of the Project Area. They were eliminated from detailed analysis in this EIS because the Mining Law provides EPM with reasonable access to obtain and develop mineral resources on all public lands not withdrawn from mineral entry. In addition, the "Proposed 3-Rivers RMP & Final EIS," September 1991, contains Map M-3 "Major Locatable Minerals Potential". Page 3-22 states, "Several locatable or solid leaseable minerals are known to occur in the Resource Area. Primary among these are diatomite, with an active mining operation northeast of Drewsey; ..." The Celatom mining area is mapped on Map M-3. Also stated in the RMP on page 2-162, EM 3 is "Provide maximum opportunity on Federal mineral estate in areas identified as open to operation of mining laws for the exploration and location of locateable minerals."

One of the Project scope alternatives considered would have eliminated the portion of the Project Area that was within the BLM's Rocky Basin Wilderness Inventory Maintenance (WIM) unit, which contained 11,360 acres and was found to have wilderness characteristics. The proposed Project Area is located in the southern 4,338 acres of the Rocky Basin WIM unit. These lands have existing valid mining claims controlled by EPM. Most of the proposed new mining areas lie within this area. As a result, this alternative was not brought forward for analysis in detail. Additionally, if the 4,338 acres in the proposed Project Area are approved and developed for mining, the Rocky Basin WIM unit would still total 7,022 acres, which is larger than the 5,000-acre wilderness threshold.

The second Project scope alternative would have eliminated the portion of the Project Area that is south of the Puma Claims Area and thus eliminated exploration activities in the Sagebrush Flat area. The third Project scope alternative would have eliminated the portion of the Project Area that is outside existing and proposed mine areas. These three Project scope alternatives would have substantially similar effects to Alternative 1, the No Action alternative, which is thoroughly analyzed in this EIS.

3.4.2 Alternative Access Routes

Several alternative access routes were considered but eliminated from detailed analysis. Two road alternatives were considered: 1) Box Springs Extension and 2) Rocky Basin Road. The construction of new roads, other than those required for mine operations was not recommended by the BLM for the following reasons: 1) construction of temporary service roads rather than permanent roads to BLM standards would save the company money; 2) the roads would not improve public access or safety; 3) the alternative access routes would cause undue or

unnecessary degradation; and 4) the public would likely continue to use the existing roads regardless of signage.

3.4.2.1 Box Springs Extension

The Box Springs road would require a 1.75 mile extension and would be used to replace the Hart Road in the Kelly Field Operations Area. This road would be constructed to BLM standards by EPM. The road would not be graveled. This road would follow the crest of Agency Mountain north prior to turning west and dipping into the Mill Gulch drainage where it would connect with the Mill Gulch road. Due to the terrain, this road would have one or two steep portions with grades exceeding 20 percent. This route was rejected because the public would be more likely to travel through Mill Gulch, which has a lesser grade and a better serviced and maintained road. This route was rejected because of the construction and maintenance costs. In addition, it would result in undue or uneccessary degradation because additional impacts would occur as a result of the steep grades.

3.4.2.2 Short Rocky Basin Road

The Short Rocky Basin Road would be constructed as a replacement for the Hart Road and the Mill Gulch Road through Section 36 and the Kelly Field and North Kelly Field Operations Areas, both of which would be closed to the public. Mill Gulch would be used solely by EPM. The Rocky Basin Road would result in the construction of 2.1 miles of new road that would connect with a 4WD road near a stock water reservoir in Section 26. The road would be constructed to BLM specifications but would not be graveled. The road would be maintained by the BLM. This route was rejected because of the construction and maintenance costs and would result in undue or uneccessary degradation because additional impacts would occur to vegetation and soils.

4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

Primary access to and within the Project area within Harney and Malheur Counties is along state highways, county roads, and public access types of roads. The majority of public lands are accessible to the general public via one of these roads. U.S. Highway 20 is the primary east-west highway in central Oregon. The Project Area is accessed from U.S. Highway 20 by traveling approximately 45 miles east from Burns and then seven miles north on Juntura Cutoff Road. The Project Area can also be reached from Vale on U.S. Highway 20 by traveling approximately 50 miles west to Juntura Cutoff Road.

The Project Area is located within the Malheur River Basin. The climate is characterized as semi-arid with hot and dry summer temperatures and cold winter temperatures. The high temperature during the summer months averages between 85 to 100 degrees Fahrenheit (°F). During winter, the temperatures can drop between 20°F to below 0°F. Temperature data from the Project Area shows ranges from a low of 40°F to a high of 90°F during the summer. Precipitation is higher during the winter months and sparser during the remainder of the year. Most surface runoff within the Project Area results from snowmelt or rainfall at higher elevations, producing peak discharges in the spring. The average monthly high precipitation for Beulah, Oregon is 9.6 inches during the month of January. The average low precipitation for the same station is 0.4 inch in August. The average annual precipitation varies in relation to elevation.

The Project Area is located within the Columbia River Plateau Major Land Resource Area (MLRA) as described in the Three Rivers RMP/ROD (BLM 1992). The Columbia River Plateau MLRA is in the Owyhee Desert Section of the Basin and Range geologic province. This area is dominated by northwest trending block-faulted mountains and soils of volcanic and sedimentary rock origin. Locally, the Project Area lies in the southeastern portion of the state east of Drewsey, southeast of Cottonwood Reservoir, southwest of Beulah Reservoir, and north of State Highway 20 in Harney and Malheur Counties, Oregon. Topographically, the Project Area is bounded by the larger terrain features of the Blue Mountains to the west and north, the Harney Basin to the southwest, and the Columbia Plateau to the east, that runs from north to south. The terrain includes many elevation changes from valleys to tall buttes.

Based on the soil chemistry, elevation and plant communities in the Project Area, and field observations from other areas within the District, the Project Area is unlikely to have well-developed high cover or high species diversity biological soil crust communities. Total biological soil crust cover (all biotic components) is greatest at inland elevations under 3,281 feet. Lichen and moss components generally increase with elevation until vascular plant cover dominates the site. Biological soil crust cover is inversely related to vascular plant cover. However, at higher elevations the interspaces (between vascular plants) while smaller in area often have greater cover of biological soil crusts. The elevation in Project Area ranges from 3,600 feet to 4,300 feet. Soil chemistry (particularly absence of gypsum) is likely more of an influence than elevation on plant community type in the low amount of biological soil crust cover expected within the Project Area.

Overall, the prehistory of the northern Great Basin and the Columbia Plateau regions reflect a long continuity and adaptive change to distinctive ecosystems with a changing climate. The

persistence of lithic and textile traditions and subsistence patterns during these chronological periods supports the theory of cultural continuity throughout the northern Great Basin. Cultural inventories have been conducted on all lands within the Project Area, and no sites are expected to be impacted by the Proposed Action.

The BLM has conducted consultation with the Burns Paiute Tribal Council and other agencies. The Burns Paiute Tribal Council has been contacted on a regular basis 19 times by email, letter, and telephone advising them of Project activities, tours, and an invitation to become a cooperating agency. To date, the Burns Paiute Tribal Council has not identified any specific issues or concerns with the proposed Project.

BLM's NEPA Handbook (H-1790-1 Appendix 1) identifies Supplemental Authorities that are subject to requirements specified by statute or executive order. Table 4.1-1 lists the Supplemental Authorities and their status in the Project Area. Supplemental Authorities that may be affected by the Proposed Action are further described in this EIS.

Table 4.1-1: Supplemental Authorities

Resource/Issue	Not Present	Present, Not Affected	Present/ Potentially Affected	Reference Section
Air Quality and Atmospheric Values			X	See Section 4.2.
Cultural Resources		X		No effects to Cultural Resources have been identified and design features are in place to avoid any impacts to Cultural Resources already documented if discovered during mining operations.
Environmental Justice	X			The Proposed Action is not expected to have disproportionately high and adverse human health or environmental effects on minority and low-income populations as such populations do not exist within the Project Area.
Fish Habitat	X			Resource is not present
Flood Plains	X			Resource is not present.
Forests and Rangelands			X	Forests and Woodland resources are discussed in Section 4.13. Rangelands are discussed in Section 4.4.
Migratory Birds			X	See Section 4.5.
Native American Religious Concerns	X			No effects to Native American Religious Concerns have been identified.

Resource/Issue	Not Present	Present, Not Affected	Present/ Potentially Affected	Reference Section
Threatened or Endangered Species Special Status Species			X	See Section 4.11.
Wastes, Hazardous or Solid	X			Resource is not present
Water Quality (Drinking and Ground)			X	See Section 4.15.
Wetlands and Riparian Zones		X		No effects to Wetlands or Riparian Zones have been identified within the Project Area. There are no wetlands and because of the ephemeral nature of the streams, riparian zones have not been identified.
Wild and Scenic Rivers	X			Resource is not present.
Wilderness	X			Resource is not present.

The following resources or uses, which are not Supplemental Authorities as defined by BLM's Handbook H-1790-1 Appendix 1, are present in the area. BLM specialists have evaluated the potential impact of the Proposed Action on these resources and documented their findings in Table 4.1-2. Resources or uses that may be affected by the Proposed Action are further described in this EIS.

Table 4.1-2: Additional Analyzed Resources

Other Resources	Present, Potentially Affected	Reference Section
Geology and Minerals	X	See Section 4.3
Rangelands (Grazing Management)	X	See Section 4.4
Noise	X	See Section 4.6
Paleontology	X	See Section 4.8
Recreation	X	See Section 4.9
Soils	X	See Section 4.10
Transportation and Roads	X	See Section 4.12
Vegetation	X	See Section 4.13
Visual Resources	X	See Section 4.14
Wilderness Characteristics	X	See Section 4.16
Wildlife	X	See Section 4.17
Woodlands	X	See Section 4.13

4.2 Air Quality

4.2.1 Regulatory Framework

Ambient air quality and the emissions of air pollutants are regulated under both federal and state laws and regulations. Regulations potentially applicable to the Proposed Action and alternative include the following: National Ambient Air Quality Standards (NAAQS); Oregon State Ambient Air Quality Standards (OSAAQS); Prevention of Significant Deterioration (PSD); New Source Performance Standards (NSPS); and the Oregon Department of Environmental Quality (ODEQ) air quality regulations (OAR Division 200).

4.2.1.1 Federal Clean Air Act

The Federal Clean Air Act (CAA), and the subsequent Clean Air Act Amendments of 1990 (CAAA), require the EPA to identify NAAQS to protect the public health and welfare. The CAA and the CAAA established NAAQS for six pollutants, known as "criteria" pollutants because the ambient standards set for these pollutants satisfy "criteria" specified in the CAA. A list of the criteria pollutants regulated by the CAA and their currently applicable NAAQS set by the EPA are listed in Table 4.2-1. The list of criteria pollutants was amended by the EPA on July 18, 1997, and now includes two new standards for particulate matter of aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), and revised standards for particulate matter of aerodynamic diameter less than ten micrometers (PM_{10}) and ozone (O_3) (see 62 *Federal Register* 38652-38760 [$PM_{2.5}$ and PM_{10}]; 62 *Federal Register* 38856-38896 [O_3]). On February 9, 2010, EPA amended the list of criteria pollutants to include an additional standard for nitrogen dioxide (NO_2) (see 75 *Federal Register* 6474-6537). EPA accepted monitoring networks for $PM_{2.5}$ and NO_2 are still being installed and initial data are still being collected. The EPA has yet to make determinations on attainment status designations based on the $PM_{2.5}$ and NO_2 measurements currently being collected.

4.2.1.2 Attainment and Non-Attainment Areas

Pursuant to the CAA, the EPA has developed classifications for distinct geographic regions known as air quality management areas. Under these classifications, for each federal criteria pollutant, each air basin (or portion) of an air quality management area (or "planning area") is classified as in "attainment" if the air quality management area (or planning area) has "attained" compliance with the adopted NAAQS for that pollutant, or is classified as "maintenance" if the monitored pollutants have fallen from nonattainment levels to attainment levels. Air Quality management areas for which sufficient ambient monitoring data are not available are designated as "attainment-unclassifiable" for those particular pollutants until actual monitoring data support formal "attainment" or "non-attainment" classification.

In addition to the designations relative to attainment of conformance with the NAAQS, the CAA requires the EPA to place each planning area within the United States into one of three classes, which are designed to limit the deterioration of air quality when it is "better than" the NAAQS. "Class I" is the most restrictive air quality category, and was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness Areas of a given size, which were in existence prior to 1977 or those additional areas that have since been designated Class I under federal regulation (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II planning areas, which allow a relatively greater

deterioration of air quality once the Minor Source Baseline Date has been set. No Class III areas have been designated. Regardless of the class of the planning area, the air quality cannot exceed the NAAQS. The nearest Class I planning area to the Project, the Strawberry Mountain Wilderness Area located within Grant County, is approximately 28 miles northwest of the Project Area.

Table 4.2-1: Federal and State Ambient Air Quality Standards for Criteria Pollutants

Criteria Pollutant	Averaging Period	Oregon Standards Concentration[a]	Federal Standards	
			Primary[a]	Secondary[a]
Carbon Monoxide (CO)	1-hour	35 ppm	35 ppm (40 mg/m^3)	---
	8-hour	9 ppm	9 ppm (10 mg/m^3)	---
Lead	Calendar Quarter	1.5 µg/m^3	1.5 µg/m^3	Same as Primary Standard
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm	0.053 ppm (100 µg/m^3)	Same as Primary Standard
	1-hour		0.100 ppm (188 µg/m^3)	---
Ozone (O_3)	1-hour	---	0.12 ppm (235µg/m^3)	Same as Primary Standard
	8-hour	0.08 ppm	0.08 ppm (157µg/m^3)	Same as Primary Standard
Particulate Matter ≤ 2.5 microns in aerodynamic diameter ($PM_{2.5}$)	24-hour	---	35µg/m^3	Same as Primary Standard
	Annual	---	15 µg/m^3	Same as Primary Standard
Particulate Matter ≤ 10 microns in aerodynamic diameter (PM_{10})	24-hour	150 µg/m^3	150 µg/m^3	Same as Primary Standard
	Annual	50 µg/m^3	50 µg/m^3	Same as Primary Standard
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	0.02 ppm	0.03 ppm (80µg/m^3)	---
	24-hour	0.10 ppm	0.14 ppm (140 µg/m^3)	---
	1-hour	(3-hour = 0.50 ppm)	75ppb	3-hour = 0.5 ppm

[a] Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm mercury. Measurements of air quality are corrected to a reference temperature of 25°C and a reference pressure of 760 mm mercury (1,013.2 millibar); ppm in this table refer to parts per million, or micro-moles of pollutant per mole of gas. µg/m^3 = micrograms per cubic meter.

4.2.1.3 Prevention of Significant Deterioration

Federal PSD regulations limit the maximum allowable increase in ambient particulate matter in the Class I planning area resulting from the major or minor stationary source to four µg/m^3 (micrograms per cubic meter) (annual geometric mean) and eight µg/m^3 (24-hour average). Increases in other criteria pollutants are similarly limited. Specific types of facilities that emit or have the potential to emit 250 tons per year or more of PM_{10} or other criteria air pollutants are considered major stationary sources.

Most fugitive emissions are not counted as part of the calculation of emissions for PSD. Major stationary sources are required to notify federal land managers of Class I planning areas within

approximately 62 miles of the major stationary source. As stated above, the nearest Class I planning area to the Project is the Strawberry Mountain Wilderness Area. The Project's air emission sources under the Proposed Action and alternative emission sources are not major stationary sources subject to PSD regulatory requirements.

4.2.1.4 New Source Performance Standards

NSPS were established by the CAA. The standards, which are for new or modified stationary sources, require the sources to achieve the best demonstrated emissions control technology. The NSPS apply to specific types of processes, which in the case of the Proposed Action may include certain units used for support of general operation. The requirements that may be applicable to these existing units are found in 40 CFR Part 60, Subpart JJJJ (Standards of Stationary Spark Ignition Internal Combustion Engines).

4.2.1.5 Federal Operating Permit Program

As part of the CAA and its subsequent amendments, a facility-wide permitting program was established for larger sources of pollution. This program, known as the Title V program, requires that these "major sources" of air pollutants submit a Title V permit application. To be classified as a "major source", a facility must emit more than 100 tons per year (tpy) of any regulated pollutant, ten tpy of any single hazardous air pollutant (HAP), or 25 tpy or more of any combination of HAPs, from applicable sources.

4.2.1.6 Oregon Department of Environmental Quality's Air Quality Division

The EPA, through the authority under the CAA, delegates primary responsibility for air pollution control to state governments, which in turn often delegates this responsibility to local or regional organizations. The state implementation plan (SIP) was originally the mechanism by which a state set emission limits and allocated pollution control responsibility to meet the NAAQS. The function of a SIP broadened after passage of the CAAA and now includes the implementation of specific technology-based emission standards, permitting of sources, collection of fees, coordination of air quality planning, and prevention of significant deterioration of air quality within regional planning areas and statewide. Section 176 of the CAAA requires that federal agencies must not engage in, approve, or support in any way any action that does not conform to a SIP for the purpose of attaining ambient air quality standards.

The ODEQ's Air Quality Division (AQD) is the agency in the State of Oregon which has been delegated the responsibility for implementing a SIP (Oregon Clean Air Act Implementation Plan). Included in a SIP are the State of Oregon air quality permit programs (Division 216 through 218). The OSAAQS are also part of a SIP (see Table 4.2-1). The OSAAQS are generally identical to the NAAQS, with the exception of the following: (a) slightly lower SO_2 standards for the annual and 24-hour averaging periods; (b) there is no standard for the recently promulgated NAAQS for $PM_{2.5}$ or the one-hour NO_2 standard; and (c) Oregon has yet to adopt the new and revised standards for the O_3 1-hour averaging period. In addition to establishing the OSAAQS, the AQD, which includes five Air Quality Sections in the regional divisions, is responsible for permit and enforcement activities throughout the State of Oregon.

The Proposed Action and Alternative Action are located in Harney and Malheur Counties, Oregon. The applicable permitting authority for the county is the ODEQ-AQD's Eastern Region.

Before any construction of a potential source of air pollution can occur, consultation with the AQD Eastern Region office has to be conducted to determine any permit and regulatory issues.

4.2.2 Affected Environment

4.2.2.1 Study Methods

The existing meteorological and air quality conditions in the air quality study area were obtained from the sources discussed in the following sections. Limited meteorological and no air quality data have been collected at the Project Area. Baseline air quality and meteorological conditions representative of the Project Area were assessed using data from the nearby monitoring stations in eastern Oregon. Meteorological data were obtained from the Western Regional Climate Center for Beulah, Oregon meteorological station (350723), located approximately three miles northeast of the project for climate characterization. The Beulah Monitoring Station, at an elevation of approximately 3,270 feet amsl, measures ambient temperature and precipitation. On-site wind speed and wind direction data, limited to the mine season, and climate data from the National Oceanic and Atmospheric Station were also utilized to characterize existing weather conditions.

The Project Area emission sources would be located in the Eastern Oregon Air Quality Control Region (AQCR). Topographically, the Project Area is bounded by the larger terrain features of the Blue Mountains to the west and north, the Harney Basin to the southwest, and the north-south trending Columbia Plateau to the east. The terrain includes many elevation changes from valleys to tall buttes.

4.2.2.2 Existing Conditions

The Project Area is not included in any of the source categories listed in the Federal PSD Regulations, and the PSD applicable emissions from the Project are below the 250 tpy PSD threshhold. Therefore, the Proposed Project is not in a PSD triggered planning area, increment is not being consumed, and the Project is not subject to PSD regulation.

4.2.2.2.1 Climate and Meteorology

The climate is characterized as semi-arid with hot and dry summer temperatures and cold winter temperatures. The high temperature during the summer months averages between 85°F and 100°F. During winter, the temperatures can drop to between 20°F and below 0°F. On-site Project Area temperature data ranged from a low of 40°F to a high of 90°F during the summer.

Synoptic winds in the region from spring to summer are generally westerly when a Pacific high pressure system becomes stagnant off the coast of the northwestern United States. A summertime low pressure system usually develops over the Columbia Plateau that can bring in humid marine air via the Columbia Gorge. During the fall and winter, the retreat of the Pacific high pressure system, in addition to the development of an interior high pressure system to the east of the region, would result in easterly gradient synoptic wind patterns. These wind patterns are steered by terrain changes and would vary from surface to upper level wind patterns as the wind travels along valleys or is lifted by mountainous terrain. Site specific data indicated summer winds from the southwest with average speeds from nine miles per hour (mph) to in excess of 40 mph.

The lifting of air masses due to elevation changes drives precipitation events in this region. Precipitation is higher during the winter months and sparser during the remainder of the year. The average monthly high precipitation, as snow, for Beulah, Oregon is 9.6 inches during the month of January. The average low precipitation for the same station is 0.4 inch in August.

A key component of assessing meteorological effects on an airshed is through atmospheric dispersion. It is influenced by several parameters, including wind speed, temperature inversions (mixing heights), and atmospheric stability. Prevailing winds at the Project Area's meteorological station were typically from the southwest, with average annual wind speeds as high as 40 mph. These higher wind speeds tend to promote atmospheric mixing and generally transport locally generated air emissions away from the area. Beneficial air movement that vents an airshed is defined as an "unstable" atmospheric condition.

In "stable" atmospheric conditions, inversions would restrict vertical movement of the air in the lower atmosphere. Atmospheric pollutants are prevented from mixing with the air above the inversion layer. The resulting lower mixing heights produce higher pollutant concentrations since the volume of air with which the pollutants can mix is limited. In cold night/hot day weather patterns, mixing heights can be quite high in the afternoon versus low mixing heights at night and early morning, due to nighttime cooling.

Mixing heights in the Project Area are estimated to be highest during the afternoon of summer months at 1,600 meters (annual average), which is conducive for good air dispersion. In the late afternoon, unstable atmospheric conditions that vent and disperse the air are favorable. Adequate mixing of air is needed during summer months when temperatures are higher and pollutants are more reactive on a local scale. During the winter months the opposite occurs. Mixing heights are much lower than approximately 300 meters (annual average), resulting in poor air dispersion. Cooler temperatures, however, effectively slow pollutant reactivity. In addition, the Project is typically not active during the winter months.

4.2.2.3 Air Quality

Air quality in the Project Area is governed by both factors of pollutant emissions and meteorological conditions. As discussed above, wind speeds, mixing heights, and stability all affect the circulation and dilution of emissions in the area.

The Project Area is located within an AQCR that is currently in "attainment-unclassifiable" for all pollutants having an air quality standard (40 CFR 81.329). No nitrogen dioxide NO_2, SO_2, or lead non-attainment areas are located within the State of Oregon. All of the current PM_{10}, CO, and O_3 non-attainment areas are located greater than 100 miles to the west of the Project Area, over the Cascade Mountain Range.

At present, the ODEQ does not conduct ambient air quality monitoring in the vicinity of the Project Area. The closest station is located in Buelah, Oregon, approximately three miles northeast of the Project Area. The site measures for $PM_{2.5}$ and PM_{10}. The "2007 Oregon Air Quality Data Summaries Report" showed the highest 24-hour ambient PM_{10} concentration to be 136 $\mu g/m^3$ measured in 2002. The mean concentration measured for a 24-hour period for PM_{10} during 2002 was only 24.1 $\mu g/m^3$ (Table 4.2-2).

Although the ODEQ does not have a state standard exceedance level for $PM_{2.5}$, data were collected at the Buelah site. The highest 24-hour ambient $PM_{2.5}$ concentration measured was 39 $\mu g/m^3$ measured in 2001. The mean concentration measured for a 24-hour period for $PM_{2.5}$ during 2001 was only 9.1 $\mu g/m^3$.

Table 4.2-2: Ambient Monitoring Data from the Buelah Site for a 24-Hour Averaging Period

Year	$PM_{2.5}$ Concentration ($\mu g/m^3$)			PM_{10} Concentration ($\mu g/m^3$)		
	Arithmetic Mean	Maximum	98th Percentile	Arithmetic Mean	Maximum	98th Percentile
1998	---	---	---	24.7	81	58
1999	---	---	---	25.2	62	61
2000	9.3	38	38	21.9	54	54
2001	9.1	39	31	20.8	64	54
2002	9.7	36	30	24.1	136	64
2003	---	---	---	17.4	38	36
2004	---	---	---	18.4	52	49
2007	**9.5**	**37**	**36**	---	---	---

4.2.2.4 Climate Change

Greenhouse gas (GHG) emissions from anthropogenic (human-induced) activities contribute to the phenomena of climate change. The four principal GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and halocarbons affect climate by altering incoming solar radiation and outgoing infrared (thermal) radiation that are part of the Earth's energy balance.

According to the BLM's Instruction Memorandum (IM) No. OR-2010-012, "Analysis of Greenhouse Gas Emissions and Consideration of Climate Change in NEPA Documents," dated January 13, 2010, GHG emissions and changing climate conditions should be acknowledged in EIS or EA documents. The following information comes directly from the IM and does not take into consideration other viewpoints from the scientific community. The IM indicates that GHG will be an issue requiring analysis when the emissions would constitute a significant impact or when analysis is necessary to determine whether the impact would be significant. The analysis of the effect of the Proposed Action is performed according to the guidance provided in the IM.

Direct effects: The Proposed Action will incorporate use of mining equipment, on-site vehicles and stationary generators that emit GHGs as a result of combustion processes during their operations. Table 4.2-3 shows the quantification of direct GHG emissions as a result of energy use (e.g., fuel consumption in vehicles or equipment) during the actual operating scenario starting April through November. In total, the Proposed Action would result in the emission of 2,980 metric tons of carbon dioxide equivalent.

The analysis also provides a conservative estimate of GHG emissions from the Proposed Action by incorporating maximum/potential operating scenario of 365 days and 8,760 hours of operation. However, the evaluation of this scenario does not represent the existing and future

operating scenarios. Table 4.2-4 shows the quantification of direct GHG emissions as a result of energy use (e.g., fuel consumption in vehicles or equipment) during maximum operating scenario throughout a year. In total, the Proposed Action would result in the emission of 10,456 metric tons of carbon dioxide equivalent per year.

Table 4.2-3: Greenhouse Gas Emissions from Actual Operating Scenario

Emission Unit Description Emission Unit Group: Mining Equipment	Pollutants	Emissions (pounds per year)	Emissions (tons per year)
Excavator- Combustion	CO_2	1,136,244	568
Dozer- Combustion	CO_2	1,963,878	982
Scrapper- Combustion	CO_2	2,244,432	1,122
Grader- Combustion	CO_2	575,136	288
Emission Unit Group: On-site Vehicles			
Haul Truck- Combustion	CO_2	96,247	48
Service Truck- Combustion	CO_2	48,123	24
Pickup Truck- Combustion	CO_2	21,388	11
Water Truck - Combustion	CO_2	51,332	26
Emission Unit Group: Generators			
Diesel Fired Generator Unit 1 (35kw)	CO_2	161,934	81
Diesel Fired Generator Unit 2 (45kw)	CO2	191,958	96
Diesel Fired Generator Unit 3 (45kw)	CO_2	59,064	30
Total Annual GHG		**6,549,735**	**3,275**
Total CO_2 equivalent (metric tons)			**2,980**

Table 4.2-4: Greenhouse Gas Emissions from Maximum Operating Scenario

Emission Unit Description Emission Unit Group: Mining Equipment	Pollutants	Emissions (pounds per year)	Emissions (tons per year)
Excavator- Combustion	CO_2	3,875,972	1,938
Dozer- Combustion	CO_2	6,699,210	3,350
Scrapper- Combustion	CO_2	7,656,240	3,828
Grader- Combustion	CO_2	1,961,912	981
Emission Unit Group: On-site Vehicles			
Haul Truck- Combustion	CO_2	328,319	164
Service Truck- Combustion	CO_2	164,159	82
Pickup Truck- Combustion	CO_2	437,759	219
Water Truck - Combustion	CO_2	175,103	88
Emission Unit Group: Generators			
Diesel Fired Generator Unit 1 (35kw)	CO_2	473,478	237
Diesel Fired Generator Unit 2 (45kw)	CO2	604,440	302
Diesel Fired Generator Unit 3 (45kw)	CO_2	604,440	302
Total Annual GHG		**22,981,031**	**11,491**
Total CO_2 equivalent (metric tons)			**10,456**

Indirect effects: The Proposed Action is not expected to cause indirect effects on GHG levels that result in change in net emissions or net storage of GHGs.

Cumulative effects: GHG emissions resulting from the Proposed Action would total 2,980 metric tons of carbon dioxide equivalent. According to the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008 (EPA, April 2010), current U.S. emissions of GHGs total 6,957 million metric tons of carbon dioxide equivalent. Current global emissions of all GHGs total 25 billion metric tons of carbon dioxide equivalent (Denman et al. 2007, p. 513). Therefore, the emissions from the Proposed Action would constitute 0.00004 percent of current U.S. emissions and 0.00001 percent of current global emissions.

Analysis of the direct, indirect, and cumulative effects of the Proposed Action on GHG levels provides a meaningful context for describing the challenging task of quantifying, describing and comparing the emissions from the Proposed Action to national and global GHG emissions.

4.2.3 Environmental Consequences

The Project would not require an Air Contaminant Discharge Permit from the ODEQ-AQD. The Proposed Action would not increase emissions of regulated pollutants from PSD applicable sources and add sources applicable to the NSPS regulations. The Proposed Action would not increase emissions of any regulated pollutant from PSD applicable sources above 250 tpy, subjecting the Project to PSD regulations or Title V application requirements.

4.2.3.1 Assessment Methodology

Assessment of impacts from the Proposed Action was based on available air quality data. The air quality analysis quantified the emissions of the applicable criteria pollutants from the mining and related potential increases in equipment usage, road traffic, and storage stockpiles of the Proposed Action.

Analysis of regional air quality data, meteorology, existing pollutant sources, and potential emissions from the Proposed Action do not indicate a long-term impact to air quality in the Project Area. Short-term impacts that could adversely affect local air quality, especially during high wind events, include increased fugitive dust from road traffic, storage stockpiles, and open pit areas. All of these operations can be mitigated through dust control and dust suppression measures.

A Fugitive Dust Control Plan for the Project Area was developed July 12, 2007, and submitted to the ODEQ-AQD. Examples of physical control measures of fugitive dust in the Dust Control Plan include utilization of watering trucks, graveling or paving roadways, limiting speeds on the roadways, and utilizing berms, tarps or surfactants to reduce wind-blown dust from active mining operations and stockpiling areas. When dust control methods are not sufficient, mining operations would be suspended in the affected area and during high wind events. The plan would be updated as necessary to control emissions or as requested by ODEQ-AQD.

4.2.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, additional air quality impacts associated with this Project would not occur. EPM would not be authorized to conduct or expand operations or conduct exploration within the Project Area as outlined in the Proposed Action. Existing operations would continue. Air quality impacts from the No Action Alternative would be associated with

the ongoing permitted mining and exploration activities. The existing mining operations, as described in Chapter 2, would expand to their permitted limits of up to 1,633.7 acres.

4.2.3.3 Alternative 2 - Proposed Action

The Proposed Action consists of mining activities and actions, which may have the potential to emit air pollutants. Division 208, 340-208-0010(3) defines an "emission" as "…a release into the outdoor atmosphere of air contaminants". Division 208, 340-208-0010(5) further defines "fugitive emissions" as "...emissions of any air contaminant that escapes to the atmosphere from any point or area not identifiable as a stack, vent, duct or equivalent opening." Existing sources of air pollutant emissions that are not expected to change as a result of the Proposed Action are presented in Table 4.2-3.

4.2.3.3.1 PM_{10} and $PM_{2.5}$ Emissions

PM_{10} emissions are generated by all of the sources listed in Table 4.2-5. The major sources of PM_{10} and $PM_{2.5}$ emissions include fugitive dust from wind erosion of the ore and waste storage stockpiles and the mine haul roads. Emission controls such as watering, use of tarps to cover trucks, and speed limitations on haul roads help minimize emissions from the stockpiles and roads.

Fugitive dust (PM_{10} and $PM_{2.5}$) would be generated by numerous processes as a result of the Proposed Action, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to moving ore. These activities are inherent to the mining process and would be ongoing throughout the life of the proposed action. The PM_{10} and $PM_{2.5}$ concentrations are expected to be below the OSAAQS and NAAQS, which are presented in Table 4.2-1 above. The actual quantitative amount is not known.

4.2.3.3.2 Combustion Emissions

Combustion of diesel in the haul trucks and mobile equipment, such as graders, dozers, etc., and the combustion of fuel oil or diesel in units such as generators can produce elevated ambient levels of $PM_{2.5}$, CO, NO_2, SO_2, and O_3 (from volatile organic compounds [VOC] emissions). In most cases, combustion emissions are generally uncontrolled for the emissions units. Despite the lack of tailpipe emissions control technology for combustion sources throughout the Project Area, the $PM_{2.5}$, CO, NO_2, and SO_2 concentrations are expected to be well below either the OSAAQS or the NAAQS, which are presented in Table 4.2-1,. The actual quantitative amount is not known.

4.2.3.3.3 Residual Adverse Impacts

The residual adverse impacts of the Proposed Action include fugitive PM_{10} emissions from vehicular traffic, mining, and material handling. Other impacts associated with the Proposed Action include combustion emissions of PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and VOC generated by diesel engines; and burning propane, fuel oil, or diesel in various process equipment.

4.2.3.4 Alternative 3 - Proposed Action with Additional Design Elements

The air quality impacts associated with Alternative 3 would be the same as under the Proposed Action. This is due to the fact that the additional design elements do not modify any of the Proposed Action activities that result in air pollutant emissions.

Table 4.2-5: List of Emission Sources for the Proposed Project

Emission Unit Description	Pollutants
Track Excavator/ Shovels- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Haul Trucks- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Scrapers- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Water Trucks- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Exploration and Mine Drilling	PM_{10}, $PM_{2.5}$
Track Dozers- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Maintenance Service Trucks- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Fuel Trucks- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Motor Graders- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Portable Light Plants	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Generators	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Wheeled Tractors- *Combustion*	CO, NOx, PM_{10}, $PM_{2.5}$, SO_2, VOC
Wind Erosion- Section 25 Mine Ore Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Section 25 Mine Waste Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion-Section 25 Mine Haul Roads	PM_{10}, $PM_{2.5}$
Wind Erosion- Kelly Field Ore Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Kelly Field Mine and Mill Waste Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Kelly Field Mine Haul Roads	PM_{10}, $PM_{2.5}$
Wind Erosion- Hidden Valley Ore Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Hidden Valley Mine Waste Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Hidden Valley Haul Roads	PM_{10}, $PM_{2.5}$
Wind Erosion- Eagle Mine Ore Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Eagle Mine Waste Stockpiles	PM_{10}, $PM_{2.5}$
Wind Erosion- Eagle Mine Haul Roads	PM_{10}, $PM_{2.5}$

4.3 Geology and Minerals

4.3.1 Regulatory Framework

Mine facility construction permits for Malheur and Harney Counties follow the standards of the Oregon Structural Specialty Code (OSSC). Oregon currently uses the 2007 version of the OSSC.

4.3.2 Affected Environment

4.3.2.1 Study Methods

Study methods are presented throughout this part in conjunction with the specific topic or report. The assessment methodology for geology and mineral resources included a review of published

papers and geologic mapping in the area. Specific analysis of the ore and waste mined by EPM was conducted by SRK (SRK 2010a). Seismic hazards were assessed through research on the U.S. Geological Survey (USGS) website (http://eqint.cr.usgs.gov/eqprob/2002/index.php).

The assessment methodology also includes a characterization of the geologic materials that are anticipated to be exposed during future mining activities and assesses the potential for these materials to affect ground water and surface water sources within the hydrologic study area. In order to accomplish this objective, field work (including logging and field testing) and laboratory geochemical characterization tests were conducted on waste materials and potentially exposed pit wall materials (SRK 2010a). This information has been summarized in this section and used to characterize potential impacts from existing and proposed mining operations. Details of the characterization have been included in Appendix A for readers whose specialty is geochemistry.

The two main issues addressed by the baseline geochemical characterization program were:

- Acid generation due to oxidation of sulfide minerals, which can potentially lead to development of acid rock drainage (ARD); and

- Potential for leaching of metals (e.g., arsenic and manganese) and salts (e.g., sulfate).

The processes of acid generation and metals/salts leaching can operate independently from each other, although the development of acidic conditions enhances the leachability of many metals. Characterization activities included the following:

- Review of existing data from the previous ARD assessment;

- Collection of core samples from drill holes within disturbed and undisturbed areas;

- Screening assessment using field contact tests to select samples for static testing;

- Collection of in-situ backfilled waste in the existing Kelly Field and Beede Desert Mine Operation Areas;

- Collection of mineral process waste from the Vale Plant that is hauled to the site for disposal; and

- Static laboratory testing of core samples, backfilled waste and mineral process waste.

The static data collected for the Project included total acid generating or neutralizing potential of the samples, concentration of constituents in leachates derived from the material, and mineralogical characteristics. Static testing was accomplished using the following methodologies:

- Bulk geochemical analysis using the CHEMEX MEMS-61 four acid digest to determine total metal, metalloid and cation chemistry for 27 elements on each sample;

- Net acid generating (NAG) test reporting final NAG pH and final NAG value after a two-stage hydrogen peroxide digest;

- Acid based accounting (ABA) using the BCAMDTF modified Sobek with LECO sulfur speciation analysis; and

- MWMP - ASTM E2242-02) and analysis of leachate.

4.3.2.2 Existing Conditions

4.3.2.2.1 Regional Geology

The Project is located at the north end of the Basin and Range physiographic province. This area is characterized by gently sloping plateau highlands separated by river valleys and basins. The geology of the area was mapped and described by Bowen (1956), Gray (1956), Shotwell et al. (1963) and mapped by Greene et al. (1972). The Project Area is located within the Juntura and Otis basins where lacustrine sediments were deposited during late Miocene and early Pliocene. Basalt flows of the Columbia River Basalt Group disrupted drainage systems, resulting in the development of locally expansive, diatom-bearing freshwater lakes.

These lake sediments were deposited on an irregular erosional surface of a volcanic rock complex emplaced during the Miocene. During this period of time, significant volcanic activity in the area resulted in favorable conditions for the proliferation of diatoms. Diatomite deposits formed as a result of the accumulation of the skeletal remains (i.e., frustules) of diatoms, which are unicellular aquatic plants related to algae. Diatomite deposits range in thickness from a few inches to hundreds of feet and are interbedded with volcanic ash and, to a lesser extent, sedimentary deposits associated with lacustrine deposits (e.g., clay, sandstone). The thickness of the diatomite deposit varies significantly depending upon the topography of the underlying formations, conditions within the lake that controlled the proliferation of diatoms, and post depositional erosion (Brittain 1986).

Tertiary lake sedimentation in this area is represented by the Juntura Formation and Drewsey Formation. The Juntura Formation consists of three distinct members: an upper, middle, and lower member. The lower member of the Juntura Formation consists of thick ash beds, indicating volcanic activity was prevalent during the early filling of the basin. Tuffaceous agglomerate and basalt flows occur within the upper part of the lower member, and a thin palagonite basalt flow marks the transition to the middle member of the Juntura Formation. The middle member of the Juntura Formation is comprised mainly of a thick sequence of diatomite with minor ash seams, indicating that large freshwater lakes were stable during a period of decreased volcanic activity. As a result, thick deposits of ore-grade diatomite were deposited in the center of the basin. It is this unit that is the main source of diatomite ore being mined by EPM. The upper member of the Juntura Formation marks an increase in volcanic activity and disappearance of a stable lacustrine environment as evidenced by the significant ash content that characterizes this member. The ash-dominated diatomite beds are replaced by poorly consolidated tuffaceous material and volcanic sands higher in the section, indicating deposition within a predominantly fluvial environment.

The Drewsey Formation overlies the Juntura Formation and consists of a mixture of volcanic tuff, agglomerates, ash and basalt flows and sedimentary units, some of which were derived from reworking of the underlying Juntura Formation. The Drewsey Formation was deposited in a northwest trending syncline that lies east of the town of Drewsey. Where exposed, the contact between the Drewsey and Juntura Formations is an angular unconformity.

According to Shotwell (1963), a cap of nearly horizontal olivine basalt, the Drinkwater Basalt, overlies the sediments of the Juntura Formation and Drewsey Formation. The Drinkwater Basalt was deposited during the late Pliocene to early Pleistocene on an erosional surface that developed on the Juntura and Drewsey formations (Shotwell 1963). The Drinkwater Basalt consists of a single basalt flow that covered the area as a continuous blanket at one time. Following deposition, the basalt cap was dissected by a series of northwest trending faults with little displacement. In areas where the basalt has been intersected by running water the soft underlying formations are exposed resulting in the topography that exists today. The geologic map prepared by Shotwell (1963) shows the Drinkwater Basalt partially covering the Project Area; however, according to mapping completed by Green (1972), the Drinkwater Basalt does not occur within the Project Area.

4.3.2.2.2 Structural Geology

Faults within the Project Area were mapped by Greene (1972). As described by Shotwell et al. (1963), two major faulting events are evident throughout the area. First, faulting of the basement volcanic complex occurred before deposition of the Juntura Formation. The resulting normal faults trend northwest and are consistent with faulting patterns observed throughout eastern Oregon. Development of the Juntura Basin is attributed to this faulting event. Following deposition of the Juntura Formation, but prior to deposition of the Drinkwater Basalt, another faulting event produced a series of north-south oriented faults. The resulting normal faults displaced sedimentary rocks of the Juntura Formation and resulted in significant scarp development on the west side of the Beulah Reservoir. The trace of a large fault attributed to this event is located along the Mill Gulch drainage. The youngest of the faulting events is superimposed on the two major fault trends in a repeating northwest trending fault pattern that cuts the Drinkwater Basalt. However, this faulting event did not result in any significant displacement of the rock units.

4.3.2.2.3 Seismiscity

The probability of a magnitude 5.0 earthquake or greater occurring within 32 miles (50 km) of the Project Area within the next 50 years is 0.10 to 0.20 (http://eqint.cr.usgs.gov/eqprob/2002/index.php). The probability of a magnitude 5.0 earthquake or greater occurring within 32 miles of the Project Area within the next ten years is 0.03 to 0.04.

4.3.2.2.4 Slope Failures

Slope failures have occurred in an area previously analyzed and permitted. Full remediation of the slope failures requires surface disturbance outside of the permitted boundary and is therefore included in the Proposed Action.

The first large slope failure as a result of mining occurred in the Kelly Field Open Pit in the early spring of 2003. This slope failure was preceded by mining activities the previous year along the toe of Agency Mountain. Spring runoff, in combination with the presence of an undetected clay seam along the contact zone between the DE and the underlying basalt, allowed the relatively weak DE material to separate away from the basalt backwall and slide westward. All ground movement was slow (less than one foot per day), and the failure took several weeks to reach equilibrium.

A second failure occurred in June 2008. This failure was preceded by the construction of mine benches in a stair step formation up the slope in an attempt to locate the zone of contact between the basalt backwall and the DE ore deposit in order to mitigate the slope failure. Again, a clay seam was intersected, and ground movement began shortly thereafter. Within two weeks, the failure had reached equilibrium, and movement slowed to a creep. In both slope failures, the competent basalt backwall remained stable and has shown no indication of movement.

A geotechnical study using seismic refraction was completed in 2004. Due to the inability of DE to transfer energy, the results were inconclusive. EPM has drilled numerous holes at the toe, along the slope, and near the crest of Agency Mountain to ascertain the location of the underlying basalt backwall and to establish the exact location of the hanging wall. The results of this drilling were combined with outcrop data to provide the necessary data in determining where benches need to be established to create both a stable highwall and safe working conditions at the Kelly Field mine. The work of remediating the 2003 slide was completed in 2009. Plans are in place to continue benching Agency Mountain and, in so doing, prevent a slope failure in the area that has not yet failed and remediate the 2008 slide. The 2008 slide cannot be remediated until the MPO amendment is approved by the BLM, as the work to remediate the slide would occur outside of the currently permitted boundary.

In 2006, nine monitoring stations were installed along the slope of Agency Mountain. These monitoring stations are surveyed using a GPS survey system once per month while work is occurring on the highwall. Some of these monitoring stations have been removed by the remediation process. Also, extension-meters have been installed along cracks or other areas of movement to allow for quick and easy monitoring of ground conditions. These extension-meters are checked weekly unless ground conditions dictate more frequent measurements.

In the summer of 2009, four extension-meters were installed at various locations along Agency Mountain. Monitoring of these extension-meters, as well as GPS surveys, has continued throughout 2010. Additional extension-meters would be installed if necessary. The upper benches in the Agency Mountain highwall are stable and in their final configuration. The benches would be seeded during reclamation, but the highwall would remain. The lower portions of the highwall would be covered with mine waste rock and would then be recontoured to the DOGAMI 3:1 standard and seeded. Testing conducted in 2010 indicates the benches have remained stable.

4.3.2.2.5 Simplified Summary of Geochemistry Results

Geochemical analyses were conducted on samples collected from a variety of representative rock types that are anticipated to be encountered during drilling activities (Appendix A). The following text is a summary of these analyses and corresponding results. In general, the data showed that fluid interaction with the unoxidized diatomite has a tendency to become acidic, while a fluid interaction with the oxidized diatomite may be buffered or remain unaffected in pH.

The MWMP was performed on an assortment of different samples in order to determine the likelihood of toxic release via mine waste drainage. The results are highly conservative (i.e., worst case) due to idealistic laboratory conditions, which favor metal mobility and thus acid production, more than would likely occur under normal field conditions. The metals analyzed that exceeded Oregon MCLs (drinking water standards) were aluminum, antimony, arsenic, beryllium, cadmium, chromium, fluoride, iron, lead, manganese, pH, selenium, silver, sulfate,

total dissolved solids, and vanadium. The Oregon MCL exceedences identified during the analysis should only be considered as a potential area of concern, and not a conclusive result.

Whole rock analysis was conducted on several samples and the results were combined with the MWMP results to determine the likelihood of potential leaching for the selected elements of aluminum, arsenic, cadmium, iron, lead, and manganese, according to material type. The results of this analysis state that arsenic, cadmium, and manganese have a potential for mobilization.

ABA testing resulted in the determination that the unoxidized diatomite is predicted to be acid generating and the oxidized diatomite is not predicted to generate acid. Samples representing the volcanic and ash/tuff rock units as well as the waste stream samples had the greatest neutralizing potentials. The NAG testing was conducted to determine the potential for a weathered material to produce acid. Unoxidized diatomite had moderate to high potential for acid generation.

Characteristics of the Celatom Diatomite Deposit

The chemical content of the diatomite is dominated by the siliceous composition of the diatom rigid cell walls called frustules. Chemical analysis indicates amorphous silica can comprise almost 90 percent of the diatomite. Other elements that occur within the diatomite include aluminum, carbon and iron. Minor percentages of calcium, sulfur, magnesium, potassium, and sodium are also observed. A study to determine potential acid rock drainage (ARD) was performed by SRK (2010). A summary of the ARD assessment by material types is included in Appendix A.

The Celatom DE deposit is composed of a variety of lacustrine sediments, with the majority of the material comprised of centric diatom frustules. Other components of the deposit consist of clastic sediments, such as siltstone, mudstone, clay, and sandstone, from the weathering of the surrounding volcanic terrain. These sediments occur as thin interbeds within the deposit. Air-fall volcanic ash and tuff seams are also common interbeds within the diatomite deposit. Minerals commonly associated with the diatomite include iron sulfides (e.g., pyrite, mackinawite), gypsum, and iron oxide minerals (e.g., goethite). However, these minerals are sparsely distributed throughout the deposit and comprise a very small percentage of the total volume. These minerals are commonly found as a coating on fractures, interstitial coatings, or as finely disseminated mineral grains within the deposit.

The majority of the iron sulfide in the Celatom diatomite deposit is most likely biological in origin. The same lake environment that supported the prolific population of diatoms would have supported iron-fixing bacteria and sulfur-reducing bacteria that actively collected iron and sulfides in the anaerobic environment at the lake bottom. This process resulted in bacterial iron sulfide grains being deposited along with the diatoms and sediments during deposition. Sulfide minerals commonly associated with lake sediments consist of iron monosulfides, such as amorphous iron sulfide (FeS) and mackinawite, that oxidize rapidly when exposed to oxygen. These minerals are often referred to as acid volatile sulfides (AVS). Alteration products produced by the oxidation of iron sulfide (e.g., goethite) are commonly found in the upper portions of the deposits that have been oxidized. Near the oxidation boundary, iron sulfide nodules demonstrate alteration halos.

The Celatom diatomite deposit contains different species of diatoms as well as various levels of natural weathering. The upper portion of the diatomite deposit contains oxidized diatomite that

has undergone substantial weathering. The lower portion of the deposit contains unoxidized diatomite that has undergone little to no weathering. Separating the upper and lower portions of the deposit is the transitional diatomite that has undergone moderate levels of weathering. These zones of weathering do not correlate with changes in the diatom speciation.

The oxidized diatomite is found in the upper portions of the deposit, is bright white in color, and typically contains little moisture. Decomposed ash and clay seams are common throughout the oxidized zone. Very little sulfur or iron is found in the oxidized diatomite, although trace amounts of minerals such as iron pyrite (FeS_2), gypsum ($CaSO_4 \cdot 2H_2O$), goethite ($FeO(OH)$), and disseminated amorphous ferric hydroxide ($Fe(OH)_3$) do occur.

The transition diatomite zone is normally tan in color and contains mild to moderate iron staining. Higher concentrations of iron, sulfur, and gypsum are typical of the transitional diatomite strata; moreover, decomposed ash and clay seams are found within this zone.

Unoxidized diatomite commonly is found in the lower portions of the deposit and is dark green or nearly black in color due to the higher level of organics. In the unoxidized diatomite, sulfide speciation is dominated by monosulfides (i.e., AVS) with a general chemistry of FeS_x, where x is less than 2. The unoxidized diatomite also contains organic sulfur that can be identified from the odor emitted from a broken fresh face. The carbon, iron, calcium, and sulfur present in the unoxidized diatomite have undergone little alteration since their deposition. Gypsum has migrated with the meteoric water flow and is found as micro-coatings in the fault zones of the underlying strata. Iron sulfide has agglomerated into random nodules that are sparsely distributed throughout the unoxidized diatomite. The iron sulfide minerals have also coated some of the high angle fault surfaces and, on rare occasions, have formed small nodules around fossil nuclei. Near the transitional diatomite boundary, the sulfide nodules contain halos of alteration of varying degrees, ranging from goethite to amorphous hydrous ferric hydroxide. The unoxidized diatomite retains much of the organic material from the diatoms and, as a result, contains much higher moisture content than either the oxidized or transition diatomite zones. Ash seams are also a very common feature in the unoxidized diatomite zone.

4.3.3 Environmental Consequences

4.3.3.1 Assessment Methodology

Potential effects on geologic or mineral resources are described as direct or indirect, during the life of the Project (50 years) and long term (post-Project). Direct impacts are those that would result in the damage to the facilities or permanent restriction to the mineral resources in the Project Area. Indirect impacts include the degradation of geologic formations. Life of the Project impacts are those that could occur during implementation of the Project and until reclamation is complete. Long-term impacts are those occurring after reclamation is complete.

A detailed analysis of the geochemical characteristics of the rocks encountered during mining was performed by SRK and documented in a report (SRK 2010a). The geochemical analysis in the EIS has been written to be understood by a wide, non-technical audience.

4.3.3.2 Alternative 1 - No Action Alternative

4.3.3.2.1 Mineral Resources

Direct impacts of the No Action Alternative on geologic and mineral resources would include the permanent continued removal of diatomite ore in accordance with current approvals.

4.3.3.2.2 Geologic Hazards

Under the No Action Alternative, the slope failures that have occurred in the Kelly Field Mine Area could not be completely stabilized and continued impacts would occur because EPM cannot extend beyond the current Project boundary to mitigate the slope failures without approval of an expanded boundary under the Proposed Action.

4.3.3.2.3 Geochemical Characteristics

The majority of the waste rock associated with the existing operations and final pit walls in the Kelly Field pits would consist of either oxidized diatomite or unoxidized diatomite. Based on the results of the material characterization (Appendix A), the oxidized diatomite contains no sulfides and is essentially inert. The unoxidized diatomite contains sulfide minerals and is considered acid generating based on NAG and MWMP data. The waste backfilled in the Kelly Field pits consists of a mixture of oxidized and unoxidized diatomite as well as mineral process waste; the acid generating potential of this material falls between being inert and acid generating. The remaining materials types of interbedded ash-fall tuff and basalt either comprise less than 25 percent of the total material to be mined, would not be encountered, or would not be exposed during mining; therefore, these materials would not contribute to the overall acid generating potential of the waste rock or pit walls associated with the Project.

4.3.3.3 Alternative 2 - Proposed Action

4.3.3.3.1 Mineral Resources

Direct impacts of the Proposed Action on geologic and mineral resources would include the permanent continued removal of diatomite ore in accordance with current approvals.

4.3.3.3.2 Geologic Hazards

Seismic events or, in the case of the Kelly Field Mine, slope failures between stable (basalt) and unstable (clay layers) rock units could occur. The statistical probability of a seismic event is very low and would be unlikely to impact any structures or cause slope failures. The current slope failures are currently being mitigated and monitored through the Kelly Field Highwall Management Plan Phase I through Phase III and under the Proposed Action would be completely mitigated and would, therefore, have no direct impact (i.e., covering up economic material) on geologic resources or to public safety. No residual impacts are expected.

4.3.3.3.3 Geochemical Characteristics

The majority of the waste rock associated with the existing operations and final pit walls in the Kelly Field pits would consist of either oxidized diatomite or unoxidized diatomite. Based on

the results of the material characterization (specific rock types are detailed in Appendix A), the oxidized diatomite contains no sulfides and is essentially inert. The unoxidized diatomite contains sulfide minerals and is considered acid generating based on NAG and MWMP data. The waste backfilled in the Kelly Field pits consists of a mixture of oxidized and unoxidized diatomite as well as mineral process waste; the acid generating potential of this material falls between being inert and being acid generating. The remaining materials types of interbedded ash-fall tuff and basalt either comprise less than 25 percent of the total material to be mined, would not be encountered, or would not be exposed during mining; therefore, these materials would not contribute to the overall acid generating potential of the waste rock or pit walls associated with the project. The geochemical characteristics of the ore and waste associated with the Proposed Action would be the same as the No Action. This information is discussed in Section 4.3.2.2.5.

4.3.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Alternative 3 would have the same impacts as the Proposed Action because there are no additional design elements associated with geology and minerals.

4.4 Grazing Management

4.4.1 Regulatory Framework

4.4.1.1 BLM Standards and Guidelines for Livestock Grazing

The Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the States of Oregon and Washington were approved by the Secretary of the Interior on August 12, 1997. The purpose of these Standards and Guidelines is to ensure that the BLM's management of grazing helps preserve or restore rangeland function and health (43 CFR 4180).

4.4.2 Affected Environment

4.4.2.1 Study Methods

This section includes a discussion of existing grazing allotments, active grazing preferences, the current grazing practices, and management strategies within the Project Area. The existing condition of the allotments was determined by utilizing the BLM Burns District GIS data.

4.4.2.2 Existing Conditions

The Project Area has a long history of domestic livestock grazing. A series of land disposal legislation acts in the mid- to late 1800s helped to encourage the development of the western livestock industry. The Homestead Act (1862), Enlarged Homestead Act (1909), and Stock-raising Homestead Act (1916) granted land to homesteaders theoretically large enough to support a family. The last Homestead Act granted each homesteader 640 acres, enough to support 50 head of cattle. However, acre allocations were based on the productivity of midwestern farms and not the arid and semi-arid western United States. These land disposal acts set the stage for grazing management in the 20th and 21st centuries.

The Project Area was traditionally used as spring and summer range for cattle in the late 19th and early 20th centuries. Domestic livestock grazing occurred unrestricted until the passage of the Taylor Grazing Act (TGA) in 1934. This act was passed to help reduce the degradation caused by unrestricted livestock grazing.

The Taylor Grazing Act established a system for the allotment of grazing privileges to livestock operators based on grazing capacity and priority of use. The act also established allotment boundaries, standards for rangeland improvement, and implementation of grazing fees. This Act was amended by the FLPMA (1976). Later legislation, the Public Rangeland Improvement Act (PRIA) (1978) established a national policy to improve the conditionns on public rangelands, and provided funds for range improvement projects. The PRIA also amended the Wild Free-Roaming Horses and Burros Act and the FLPMA (1976) (43 U.S.C. §§ 1901-1908).

4.4.2.2.1 Grazing Authorization

Livestock grazing is administered on five allotments present in the Project Area: Rocky Basin; Cottonwood Creek; Tub Springs-Hart; Mill Gulch; and Chalk Hills (Figure 4.4.1). Three permittees are authorized to graze livestock on 9,871 acres within the Project Area. Currently, permittees are authorized to graze within and adjacent to the Project Area. The Animal Unit Months (AUMs) allocated to large wildlife herbivores are 152 AUMs in the five allotments. An AUM is the amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month (43 CFR 4100.0-5). A total of 4,927 AUMs are allocated to livestock in the five allotments.

All five allotments have developed and implemented grazing systems primarily through Allotment Management Plans (AMPs) and agreements with the permittees. Acreage and AUM allotment information for the five allotments are detailed in Table 4.4-1.

Table 4.4-1: Grazing Allotment Information

Allotment Number	Allotment Name	Management Categories	Public Acres	Private Acres	Other Federal Acres	Total Acres	Livestock AUMs	Wildlife AUMs
05521	Rocky Basin	Maintain	3,755	3	0	3,758	467	20
05522	Cottonwood Creek	Maintain	8,196	1,197	0	9,393	1,182	78
05523	Tub Springs-Hart	Improve	5,335	231	0	5,566	1,055	0
05525	Mill Gulch	Maintain	2,285	333	637	3,255	525	0
05526	Chalk Hills	Maintain	8,935	753	0	9,688	1,698	54
		Total	**28,506**	**2,517**	**637**	**31,660**	**4,927**	**152**

Source: Burns District GIS Database

4.4.2.2.2 Grazing Allotments

Allotments are evaluated for achievement of RMP and AMP objectives and rangeland health utilizing the Oregon BLM's five Standards for Rangeland Health. Field indicators have been developed for each of the five standards. The qualitative thresholds for these indicators vary

Figure 4.4.1 (Grazing Allotments within the Project Area) sets out the grazing allotments within the project boundary.

Explanation

Grazing Allotments

- CHALK HILLS (2447.3 acres)
- COTTONWOOD CREEK (11.3 acres)
- MILL GULCH (2698.6 acres)
- ROCKY BASIN (2425.8 acres)
- TUB SPRINGS-HART (1785.5 Acres)

- Project Boundary
- Excluded Area within Project Boundary

0 5,000 Feet

0 2,000 Meters

Projection: UTM Zone 11 North, NAD83

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BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Grazing Allotments within the Project Area

Figure 4.4.1

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according to soils, climate, and landform. An interdisciplinary team (ID Team) with participation from permittees conducts assessments to evaluate the standards according to field indicators. The authorizing official develops appropriate grazing management actions to meet the guidelines for grazing management based on the five standards. If standards are determined not to be achieved with livestock as a casual factor, change in management must occur as soon as practicable or prior to the beginning of the next grazing season.

The Rocky Basin Allotment includes 3,758 acres that are divided into three pastures. There are 467 permitted livestock AUMs, with 20 AUMs allocated to wildlife. The domestic livestock period of use is April 1 through June 20 under a graze/rest rotation treatment. Management objectives are primarily developed for mountain big sagebrush/bluebunch wheatgrass, Wyoming big sagebrush/Sandberg bluegrass, and stiff sagebrush/bluebunch wheatgrass vegetation communities. An AMP for this allotment was implemented in 2001.

The Cottonwood Creek Allotment includes 9,393 acres that are divided into four pastures. One of the pastures is not grazed by livestock. There are 1,182 permitted livestock AUMs with 78 AUMs allocated to wildlife, resulting in approximately 7.5 acres per AUM. The domestic livestock period of use is April 16 through October 31 under an early/graze/defer treatment. Management objectives are primarily developed for mountain big sagebrush/bluebunch wheatgrass, mountain big sagebrush/Sandberg bluegrass and stiff sagebrush/Sandberg bluegrass vegetation communities. An AMP for this allotment was implemented in 1994.

The Tub Springs-Hart Allotment includes 5,566 acres that are divided into four pastures. There are 1,055 permitted livestock AUMs, with no AUMs allocated to wildlife. This results in approximately 5.3 acres per AUM. The domestic livestock period of use is April 16 through September 24 under an early/graze/defer treatment. Management objectives are primarily developed for big sagebrush/bluebunch wheatgrass, big sagebrush/Idaho fescue, big sagebrush/crested wheatgrass, and big sagebrush/Sandberg bluegrass vegetation communities. An AMP for this allotment was implemented in 1998.

The Mill Gulch Allotment includes 3,255 acres that are divided into two pastures. There are 525 permitted livestock AUMs, with no AUMs allocated to wildlife, resulting in approximately 10.6 acres per AUM. The domestic livestock period of use is April 1 through May 15 under an early/graze treatment in the Mill Gulch Pasture and October 1 through February 28 under a defer/early treatment. Management objectives are primarily developed for Wyoming big sagebrush/Sandberg bluegrass and three-tip sagebrush/crested wheatgrass vegetation communities. An AMP for this allotment was implemented in 1983.

The Chalk Hills Allotment includes 9,688 acres that are divided into five pastures. There are 1,698 permitted livestock AUMs, with 54 AUMs allocated to wildlife. This results in approximately 5.5 acres per AUM. The domestic livestock period of use is April 16 through October 31 under an early/graze-defer rotation treatment, except in one pasture which is an early-early/graze rotation treatment. Management objectives are primarily developed for Wyoming big sagebrush/bluebunch wheatgrass, mountain big sagebrush/bluebunch wheatgrass, low sagebrush/bluebunch wheatgrass, fringed sagebrush/bluebunch wheatgrass/crested wheatgrass, and Wyoming big sagebrush/Sandberg bluegrass vegetation communities. An AMP for this allotment was implemented in 2010.

As shown in Table 4.4-1 the total number of acres in the five allotments is 31,660 acres, and the total number of livestock and wildlife AUMs is 5,079. Although the number of acres per AUM differs by allotment, the average number is 6.2 acres. This is the number used in the analysis of impacts associated with the Proposed Action and Alternative #3 as detailed in Section 4.4.3.

4.4.3 Environmental Consequences

4.4.3.1 Assessment Methodology

Potential effects on grazing resources are described as direct or indirect, during the life of the Project (50 years) and long term (post Project). Direct impacts are those that would result in the loss of forage and water resources. Indirect impacts include the degradation of grazing allotments to the extent that the allotment cannot support the authorized AUMs. Life of Project impacts are those that could occur during implementation of the Project and until reclamation is complete. Long-term impacts are those occurring after reclamation is complete.

4.4.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative impacts to livestock grazing would be limited to those resulting from existing and ongoing permitted mining and exploration activities previously evaluated in the 1985 EA and decision record (BLM 1985). Areas assessed in the 1985 EA would remain unfenced allowing for livestock to move outside of the management areas. Any damage to fences or other structures that support livestock grazing management in the area would continue to be repaired based on specifications set forth in the 1985 EA. Any damage to existing fences resulting from mine operations would be promptly repaired by EPM, meeting BLM fence specifications.

4.4.3.3 Alternative 2 - Proposed Action

Under the Proposed Action, damage to existing fences associated with mining operations would be promptly repaired by EPM in accordance with BLM fence specifications to maintain appropriate active grazing preference and proper forage utilization.

Construction of the proposed Hart Road in the North Kelly Field Area would avoid the Box Springs development. This water source currently provides water for three pastures within the Tub Springs-Hart Allotment, allowing even distribution of resources throughout the allotment. This development currently has an exclosure fence around the spring, which runs parallel to the existing road. The new road would remain within the footprint of the original road, and construction equipment would stay outside of the existing fence. Under the Proposed Action any unintended damage done to the water source itself, the spring development, or any associated project elements (i.e., exclosure fence, pipes, troughs, etc.) would be repaired immediately.

Any new or improved roads with increased Project-related traffic or potential for increased traffic would require placement of cattle guards where the road crosses a fence line. Improved roads subject to increased amounts of traffic would replace gates with cattle guards because of the potential for these gates to be left open by either Project-related activities or public travel in the Project Area.

Mining activities would result in 1,144.5 acres of disturbance over five allotments. This would represent a loss of 185 AUMs over the 50-year life of the Project or 3.6 percent of the total AUMs that are currently managed in the five allotments. This loss would not happen at the same time, but would occur over a 50-year time period. Interim and final reclamation to areas no longer needed for mining would reduce the number of AUMs affected because it is expected that revegetation of disturbed areas would provide forage within three to five years of seeding; therefore, the affects to grazing would be temporary. A total of 40 AUMs would be permanently lost due to pit walls and benches that would not be reclaimed. This represents a permanent loss of 0.8 percent of the AUMs currently managed.

Exploration activities could occur anywhere on the 8,080 acres of public land within the Project Area and within the five allotments. A total of 250 acres of disturbance is proposed and would occur over the 50-year life of the Project. Over the 50-year life of the Project this would have a temporary impact on 40 AUMs because disturbance would be dispersed and reclaimed once exploration activities were completed. Vegetation success would be expected to take three to five years. There would be no AUMs permanently lost from exploration activities. The total number of AUMs that would be temporarily impacted over the 50-year life of the Project would be 185 or 3.6 percent of the AUMs currently managed in the five allotments.

4.4.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Alternative 3 includes the installation of perimeter fences around the mining operations in the Kelly Field, North Kelly Field, Hidden Valley, and Eagle Mine Operations Areas (Figure 3.3.1) prior to the beginning of mining in each of the areas. The fences would remain for the 50-year life of the Project. Figure 4.4.2 shows the fences and range improvements associated with Alternative 3. These fences would meet with existing fences and would exclude livestock grazing from each mining operations area during mining and reclamation. This would result in 3,756 acres in the mining operations areas being excluded from grazing over the life of the Project. A total of 55,565 feet of fence would be constructed and would result in a loss of approximately 164 AUMs from the Mill Gulch Allotment, approximately 75 AUMs from the Rocky Basin Allotment, and approximately 196 AUMs from the Tub Springs-Hart Allotment for a total loss of 435 AUMs or 8.6 percent of AUMs currently managed in these allotments. This would be a direct impact that would occur over the 50-year life of the Project and until reclamation was considered successful. The fences would be constructed around the mining operations upon the beginning of mining for each mine area. Alternative 3 would impact 250 more AUMs than the Proposed Action over the 50-year life of the Project. A total of 40 AUMs would be permanently lost due to pit walls and benches that would not be reclaimed. The impact to AUMs from exploration under Alternative 3 would be the same as the Proposed Action.

Under Alternative 3, EPM would use the stock pond on the south end of the Hidden Valley Mine Operations Area as a settling pond. In exchange, EPM would routinely clean the pond so it would also serve as a stock water source. EPM would install stock water tanks and maintain water in the tanks through the grazing period at the Puma Claims Operation Area. EPM would install one locked gate at the Beede Desert Mine Operations Area instead of a cattle guard (Figure 3.3.1), and the BLM would determine who would have keys to the locks.

4.5 Migratory Birds

4.5.1 Regulatory Framework

This section discusses the laws, regulations, guidelines, and procedures that apply to management of migratory bird resources potentially affected by the Project.

4.5.1.1 Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA) of 1918 expressly forbids any party, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird." (16 U.S.C. 703) The Bald and Golden Eagle Protection Act affords additional protection to all bald and golden eagles. In total, 836 bird species are protected by the MBTA, 58 of which are currently legally hunted as game birds (CFR 10.13). A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.

4.5.1.2 Executive Order 13186

The USFWS is the lead federal agency for managing and conserving migratory birds in the United States; however, under Executive Order (EO) 13186 all other federal agencies are charged with the conservation and protection of migratory birds. In response to this order, the BLM has implemented management guidelines that require migratory birds to be addressed in every NEPA analysis of actions that has the potential to negatively or positively affect migratory bird species of concern.

4.5.2 Affected Environment

4.5.2.1 Study Methods

The existing condition for migratory bird resources in the Project Area was determined utilizing GIS data collected by the BLM, data from the Decision Record, Rationale, and Environmental Assessment EA-OR-020-5-2 associated with the 1985 MPO, and data detailed in the vegetation section (Section 4.13) of this document.

4.5.2.2 Existing Conditions

The Project is located within the Great Basin subregion (Bird Conservation Region [BCR] 9) of the Intermountain West Bird Conservation Region as defined by Partners In Flight and represents the center of distribution for many migratory western birds. Over half of the biome's species of continental importance have 75 percent or more of their population in the Intermountain West (Beidleman 2000).

Figure 4.4.2 (Alternative 3 Range Improvements within the Project Area) illustrates the existing range improvements including cattle guards, reservoirs, wells and fences. Proposed range improvements and grazing allotments are also displayed within the project boundary.

Explanation

Proposed Range Improvements

- Proposed Gate
- Proposed Locked Gate
- Proposed Cattle Guard
- Removed under Alternative 3
- Proposed Fence
- Fence to be Removed

Existing Range Improvements

- CATTLE GUARD
- RESERVOIR
- SPRING (spring development)
- WELL
- FENCE

Grazing Allotments

- CHALK HILLS (2447.3 acres)
- COTTONWOOD CREEK (11.3 acres)
- MILL GULCH (2698.6 acres)
- ROCKY BASIN (2425.8 acres)
- TUB SPRINGS-HART (1785.5 Acres)
- Project Boundary
- Excluded Area within Project Boundary

0 5,000 Feet

0 2,000 Meters

Projection: UTM Zone 11 North, NAD83

N

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Alternative 3
Range Improvements
within the Project Area

Figure 4.4.2

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4.5.2.2.1 Migratory Bird Habitat

Vegetation in the Project Area is generally sparse as a result of the soils and minerals in the area. Vegetation community types identified within the Project Area that provide habitat for many species of migratory birds include the following: big sagebrush/annual grassland; big sagebrush/crested wheatgrass; big sagebrush/perennial grassland; juniper/big sagebrush; low sagebrush/grassland; mountain big sagebrush/grassland; stiff sagebrush; and riparian. A small stand of ponderosa pine (*Pinus ponderosa*) occurs in an area adjacent to Mill Gulch. Surface water within the Project Area consists of several seeps and springs, ephemeral drainages, and intermittent drainages which may provide a water source for migratory birds. In addition, seasonal meteoric water accumulates in stock water ponds and in the existing open pit areas, which may be utilized by migratory birds. The diversity and structure of the native plant communities and presence of seasonal water within the Project Area provide foraging and nesting habitat for numerous migratory bird species.

Habitat in the Project Area is influenced by anthropogenic disturbances. Three active open pit mines are located in the north end of the Project Area. Depleted areas of some of the active pits have been reclaimed, and contain sparse, early seral vegetative cover. Other surface disturbances in the Project Area include approximately forty-five miles of roads and thirty-one miles of barbed wire fence delineating pasture boundaries of five allotments. The only paved road in the Project Area is a three mile section of Juntura Cutoff Road that connects the south end of the mine to Highway 20. The remaining roads in the Project Area are a mixture of improved and unimproved natural surface roads. The roads connecting the Juntura Cutoff Road to the open pit areas are frequently maintained to facilitate travel between the mine and a processing site in Vale.

Common migratory birds that have been observed within the Project Area or are expected to occur include the red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), common raven (*Corvus corax*), mountain bluebird (*Sialia currucoides*), Townsend's solitaire (*Myadestes townsendi*), western meadowlark (*Sturnella neglecta*), and lark sparrow (*Chondestes grammacus*).

4.5.2.2.2 Bird Species of Conservation Concern

There are several migratory bird species of conservation concern identified by the USFWS for BCR 9 that either occur or have potential habitat (nesting, foraging, or transitory use) within the Project Area including Lewis' woodpecker (*Melanerpes lewis*), white-headed woodpecker (*Picoides albolarvatus*), Swainson's hawk (*Buteo swainsonii*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), flammulated owl (*Otus flammeolus*), Williamson's sapsucker (*Sphyrapicus thyroideus*), loggerhead shrike (*Lanius ludovicianus*), Brewer's sparrow (*Spizella breweri*), and sage sparrow (*Amphispiza belli*) (USFWS 2002a). Lewis's woodpecker and white-headed woodpecker are BLM special status species and are addressed in Section 4.11.

4.5.3 Environmental Consequences

4.5.3.1 Assessment Methodology

Potential effects on migratory birds are described as direct or indirect, during the 50-year life of the Project and long term (post Project). Direct impacts are those that would result in the death or injury of a migratory bird. Indirect impacts include the degradation of migratory bird habitat to the extent that population numbers decline. Long-term impacts are those occurring after reclamation is complete.

4.5.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, and associated impacts to migratory birds would not occur. Under the No Action Alternative the BLM would not approve EPM's MPO, and EPM would not expand mining operations on BLM-administered lands or conduct additional exploratory drilling operations on BLM-administered land outside of the boundary approved by the BLM in 1985. EPM would continue to expand operations on federal land as previously approved under the 1985 DR (BLM 1985) or permitted by BLM under a subsequent Notice. The total existing disturbance associated with the No Action Alternative is 465 acres.

4.5.3.3 Alternative 2 - Proposed Action

The Proposed Action would directly and indirectly affect migratory bird habitat through removal of vegetation in areas proposed for surface disturbance. Under the Proposed Action, approximately 1,394.5 acres of potential migratory bird habitat would be directly impacted over the course of 50 years; however, this disturbance would not all occur at the same time and would vary in intensity, e.g., disturbance associated with mining and road building (1,144.5 acres) would be different than short-term, dispersed exploration activities (250 acres). Although habitat would be disturbed under the Proposed Action, similar habitat occurs adjacent to site-specific disturbance areas and on thousands of acres outside of the Project Area. Migratory birds would likely utilize that habitat during Project-related activities.

Migratory birds could be impacted by the noise created as a result of mining activities in new areas away from existing open pits. The birds would either become acclimated, or they would seek areas away from mining activities to forage and nest. Effects of noise would diminish as the distance from mining operations increases and noise levels generated begin to blend in with ambient background noise levels.

Migratory birds may utilize the seasonal meteoric water that accumulates in the open pits in the Project Area for short periods during their journeys to and from more suitable feeding and breeding grounds. The SLERA prepared for the Project evaluated the risk to migratory birds (SRK 2010b) and found that the seasonal meteoric water that accumulates in the open pits in the Project Area represents a low risk to migratory birds.

Approximately 250 acres would not be reclaimed and would be left in the form of pit walls and benches. Although the vegetation would be removed, the steepest portions may provide nesting areas not readily accessible to terrestrial predators. Effects of vegetation removal, noise production, and other potential disturbances associated with the Proposed Action would be the

same as the No Action Alternative, except the area of impact would be larger and affect more migratory bird habitat. All proposed surface disturbance (with the exception of exploration activities) would occur in close proximity to existing mining activity, concentrating impacts near previously disturbed areas.

It is unlikely that implementing the Proposed Action would result in a decline in local or regional migratory bird populations. Potential disturbance to nesting birds would be addressed if design elements listed in Section 3.2.12, including conducting nest surveys prior to starting surface-disturbing activities during the avian nesting season, are followed. The Proposed Action would result in a net loss of potential habitat, but would not contribute to a loss of viability for any migratory bird species because most mining activity would be concentrated near areas already disturbed (existing pits), extensive similar habitat is available adjacent to the Project Area, and depleted areas would be reclaimed and restored.

4.5.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to migratory bird species from Alternative 3 would be the same as those described in the Proposed Action except that approximately 10.5 miles of fence and an additional half mile of road would be constructed. Fences may alter bird distribution in an area, especially landscapes with low vegetation and limited tall perches. Fences increase the number of potential singing and hunting perches for migratory birds, and may also increase the use of some areas by avian predators, such as Cooper's hawks, and brood parasites, such as brown-headed cowbirds (Molothrus ater). Fences are also potential hazards to flying birds (Allen 1990). Constructing new fence would increase the potential risk of injury or death to migratory birds due to collisions. The fence-to-area ratio in the Project Area would increase to two miles of fence per square mile, compared to the existing one and a half miles of fence per square mile.

4.6 Noise

4.6.1 Regulatory Framework

Federal recommendations for acceptable noise levels at residential receivers are generally in the range of 55 decibel day-night levels (dB $L_{dn)}$ to 65 dB L_{dn}, based upon the recommendations contained in the U.S. EPA "Levels Document" and upon the 65 dB L_{dn} criterion applied by the U.S. Department of Housing and Urban Development and other federal agencies. These criteria are typically applied to noise from transportation noise sources, but may be used to assess the compatibility of other noise sources relative to residential land uses, provided that consideration is given to potential disturbances due to impulsive sound, tonal content (whistles, music, etc.), and the prevalence of nighttime activities.

For other noise sources, especially those that may occur over short periods of the day or night, it is common to apply noise criteria based upon hourly noise levels, making a distinction between noise levels produced during daytime and nighttime hours. Acceptable hourly noise levels in residential areas are usually considered to be in the range of 50 to 55 dB (average) during daytime hours and 45 to 50 dB (average) during nighttime hours. (The lower noise level limits would be appropriate in areas that currently have low ambient noise levels.) Hourly noise standards are usually expressed in terms of average (L_{eq}) or median (L_{50}) noise levels, and they often are corrected for the presence of impulsive sounds and tonal content.

4.6.1.1 Construction Noise Levels

The following general parameters acknowledge that people are not as likely to be annoyed by activities that are perceived as being necessary for normal commerce, so long as the inconveniences due to noise are of relatively short duration and so long as all practical measures are being implemented to reduce the impacts of noise-producing activities:

- The construction activity is temporary;
- The use of heavy equipment and noisy activities is limited to daytime hours;
- No pile driving or surface blasting is planned; and
- All industry-standard noise abatement measures are implemented for noise-producing equipment.

4.6.1.2 Local Standards

The OAR, Division 35, Noise Control Regulations, contain noise standards for new industrial uses located on previously unused sites. The pertinent sections are cited below:

340-035-0035 Noise Control Regulations for Industry and Commerce

(1) Standards and Regulations:

(a) Existing Noise Sources. No person owning or controlling an existing industrial or commercial noise source shall cause or permit the operation of that noise source if the statistical noise levels generated by that source and measured at an appropriate measurement point, specified in subsection (3)(b) of this rule, exceed the levels specified in Table 4.6-8, except as otherwise provided in these rules.

(b) New Noise Sources:

(A) New Sources Located on Previously Used Sites. No person owning or controlling a new industrial or commercial noise source located on a previously used industrial or commercial site shall cause or permit the operation of that noise source if the statistical noise levels generated by that new source and measured at an appropriate measurement point, specified in subsection (3)(b) of this rule, exceed the levels specified in Table 4.12-1, except as otherwise provided in these rules.

(B) New Sources Located on Previously Unused Site:

(i) No person owning or controlling a new industrial or commercial noise source located on a previously unused industrial or commercial site shall cause or permit the operation of that noise source if the noise levels generated or indirectly caused by that noise source increase the ambient statistical noise levels, L10 or L50, by more than 10 dBA in any one hour, or exceed the levels specified in Table 4.12-1, as measured at an appropriate measurement point, as specified in subsection (3)(b) of this rule, except as specified in subparagraph (1)(b)(B)(iii).

(ii) The ambient statistical noise level of a new industrial or commercial noise source on a previously unused industrial or commercial site shall include all noises generated or indirectly caused by or attributable to that source including all of its related activities. Sources exempted from the requirements of section (1) of this rule, which are identified in subsections (5)(b) - (f), (j), and (k) of this rule, shall not be excluded from this ambient measurement.

Although the limits described by Table 4.6-2 were based upon human response to transportation noise sources, it is reasonable to assume that they would be applicable to noise associated with mining equipment, which is expected to be relatively constant during the work day and includes sources such as diesel engines.

There are no data to indicate that wildlife is adversely affected by the changes in ambient noise levels that would be noticeable to people. Therefore, the thresholds listed in Table 4.6-2 should only be applied to assessing the impacts of changes in noise levels affecting places where people live, within the noise sensitive land uses as defined below.

For purposes of this report, the term "noise sensitive land use" is defined in accordance with the OAR: "'Noise Sensitive Property' means real property normally used for sleeping or normally used as schools, churches, hospitals or public libraries. Property used in industrial or agricultural activities is not Noise Sensitive Property unless it meets the above criteria in more than an incidental manner." (OAR 34-035-15(38))

Table 4.6-1: Oregon Administrative Rules New and Existing Industrial and Commercial Noise Source Standards

Allowable Statistical Noise Levels in Any One Hour	
7 am – 10 pm	**10 pm – 7am**
L50 – 55 dBA	L50 – 50 dBA
L10 – 60 dBA	L 10 – 55 dBA
L1 - 75 dBA	L 1 – 60 dBA

4.6.1.3 Other Measures of Changes in Ambient Noise Levels for Noise Sensitive Land Uses

For non-transportation noise sources affecting noise sensitive land uses, many jurisdictions consider an increase in ambient noise levels of greater than 5 dBA to be potentially significant. This amount of change in environmental noise levels is considered to be noticeable by most people and has the potential to result in annoyance when people notice increases in noise levels where they live. Increases of less than 3 dBA are generally imperceptible by most people.

Additional criteria for acceptable changes in noise exposures have recently been developed, notably by the Federal Transit Administration (FTA). These criteria assume that the potential for annoyance is greater when a new noise source adds to an already elevated (and presumably less acceptable) ambient noise level, than when a new, quiet, source is introduced to a quieter area. Table 4.6-2 lists the changes in L_{eq} and L_{dn} in the range of the ambient hourly noise levels of concern to this report that are considered by the FTA to result in "No Impact" for noise sensitive land uses, including both residential uses and "lands set aside for serenity and quiet."

Table 4.6-2: Federal Transit Administration Upper Noise Level Limits for "No Impact" at Noise Sensitive Land Uses within the Range of Ambient Hourly Noise Levels

Existing Noise Exposure	Allowable Project Noise Exposure	Allowable Combined Total Noise Exposure	Allowable Noise Exposure Increase
<43	Ambient + 10	52	10
43	52	53	10
44	52	53	9
45	52	53	8
46	53	54	8
47	53	54	7
48	53	54	6
49	54	55	6
50	54	56	6
51	54	56	5
52	55	57	5
53	55	57	4
54	55	58	4
55	56	59	4

Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, FTA-VA-90-1003-06, May 2006.
Note: (Leq) or Ldn dBA (rounded to nearest whole decibel).

Some additional guidance as to the significance of changes in ambient noise levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON findings are based upon studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment.

The rationale for the FICON findings is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn} or cumulative noise exposure level (CNEL). The changes in transportation-caused noise exposure that are shown in Table 4.6-3 are expected to result in equal changes in annoyance at sensitive land uses.

Table 4.6-3: Potentially Significant Increases in Cumulative Noise Exposure for Transportation Noise Sources

Ambient Noise Level Without Project (L_{dn} or CNEL)	Change in Ambient Noise Level Due to Project
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON), 1992, as applied by Brown-Buntin Associates, Inc.

4.6.2 Affected Environment

4.6.2.1 Study Methods

A noise analysis has been prepared to assess the potential noise impacts of the Proposed Project. The proposed open pit mining operations would be located in close proximity or adjacent to

existing mining operations. Mining would introduce several noise sources to the newly-developed mine areas, including heavy trucks on access roads, drill rigs, scrapers, generators, bulldozers, loaders, and excavators. These same sources are used at the current permitted mine sites. No blasting or processing would occur on the Project Area.

The Project noise impact analysis for the Project applied measured noise levels and frequency content of representative noise sources to the Environmental Noise Model (ENM). The ENM is a commercially-available noise propagation model that accepts input of noise levels and frequency content for a number of sources, located on an appropriate base map. In this case, a generalized model was used that assumed a level ground situation, thus the modeling did not account for topography in the project vicinity. The ENM predicts noise propagation in terms of noise levels at selected receivers, or in terms of noise contours, accounting for the atmospheric effects and ground absorption of sound.

Noise level data representative of the sources expected to be used at the Project were obtained from noise measurements conducted by Brown-Buntin Associates, Inc. (BBA) at aggregate mining operations in California and Nevada.

The equipment used for most of the noise measurements was a Larson Davis Model 824 precision integrating sound level meter and frequency analyzer fitted with a Larson Davis Model 2541 free-field microphone, meeting the specifications of the American National Standards Institute (ANSI) for Type 1 sound measurement systems. The noise measurement system was calibrated before use with a Larson Davis Model CA-250 acoustical calibrator certified by its manufacturer to be consistent with reference values maintained by the National Bureau of Standards.

To prepare the data for use in the ENM, the measured noise levels were entered into the ENM in terms of octave band sound pressure levels, referring to the measurement distance. The ENM was then calibrated for each source to predict the same values as were measured in the field. For most noise sources, the data were entered as L_{eq}. For sound sources that were not continuous in nature, such as passing trucks, the data were entered as Sound Exposure levels (SEL), and adjustments were made to derive the L_{eq} based upon the assumed numbers of operations per hour at the Project.

The noise sources were placed on the ENM base map at representative heights above the ground surface, based upon the equipment observed at similar projects. The receiver sites selected for this analysis describe the nearest noise sensitive land uses.

The ENM accounts for atmospheric absorption of sound, considering the factors of temperature, relative humidity, and absorption of sound by the ground

The noise level predictions made for this project assume a uniform atmosphere with no wind. It is recognized that variations in atmospheric conditions may cause the actual project noise levels to be either higher or lower than predicted by the ENM.

The variations in predicted noise levels within the range of temperature and relative humidity found in the Project Area would not be affected by changes in temperature and humidity upon sound propagation.

Winds can affect sound propagation, generally by increasing noise levels downwind, and decreasing noise levels upwind. However, wind effects are difficult to predict reliably, as the range of wind speeds and directions experienced during even one night can be quite broad.

In the noise modeling process, the mining noise sources (drill rigs, scrapers, generators, bulldozers, excavator, trucks and loaders) were placed in a 50-foot circle at the approximate center of the assumed mining area at the Eagle mine site. The modeling assumed a flat earth scenario, where all equipment was placed at appropriate heights above the existing grade and where no topographic shielding (by topography or excavations) was present. It is recognized that the topographic relief in the project area would provide shielding of most, if not all, mining noise sources from the perspective of the nearest ranches and that the predicted noise levels are therefore 5 to 10 dB higher than may actually be expected at the receiving noise sensitive uses.

Since the Hidden Valley mine site is located in a valley that would provide shielding of the noise sources for receivers outside the valley, the noise levels that would be received at the nearest ranches when mining occurred in Hidden Valley would be reduced by at least 10 dB as compared to the levels that would be expected when mining occurs at the Eagle site.

It is also recognized that the mining equipment may be placed at any point in the mining area, and would therefore be either closer to, or farther from, any given sensitive receiver location at different times during the mine development. As a result, the predicted noise levels would increase or decrease as a function of distance. Similarly, the equipment may be placed closer to, or farther from, the sides of the excavation, which would either enhance or reduce the insertion loss (shielding) and consequent noise level reduction provided by topographic barriers. Preparation of detailed noise models for all possible configurations of mining is impractical and was not attempted.

The noise modeling assumptions provide a generalized depiction of mining noise levels, based upon the available source noise emission data. The modeled noise levels provide a conservative basis for judging the potential noise impacts of this Project.

4.6.2.1.1 Ambient Noise

Short-term noise measurements as defined in Table 4.6-4 were performed at two locations near the Project on February 4, 2009, to characterize ambient noise levels. Site 1 was approximately 100 feet from a paved access road (Figure 3.2.1). At this site, one car passed during the measurement period as shown in Table 4.6-4 (under Site 1; time 0832; duration etc.). There were no other apparent noise sources other than wildlife, except for occasional flights by general aviation aircraft in the distance. Table 4.6-4 summarizes the ambient noise measurement results.

Site 2 was approximately 0.4 mile from the current mine entrance, approximately 50 feet from the paved access road. No cars passed during the measurement period. There was no mining activity at the current mine, but mine workers were testing a bulldozer nearby that had just been returned from servicing. Although it was not visible, the bulldozer and its backup warning horn (beeper) were occasionally audible during the second monitoring period. Table 4.6-4 summarizes the ambient noise measurement results.

Table 4.6-4: Ambient Noise Measurement Results February 4, 2009

Site	Time	Duration (seconds)	Sound Level, dBA					Notes
			Leq	Lmax	L10	L50	L90	
1	0832	775	24.4	45	24	21	19	Quiet
1	0845	900	41.7	63	36	20	19	Car passage
2	0950	549	25.0	41	27	25	20	Quiet
2	1000	900	31.4	42	34	29	24	Bulldozer audible
2	1015	367	34.0	45	36	31	26	

The residences associated with the nearest ranches are exposed to some noise from the current mining activity in the Beede Desert Mine Area. These activities occur up to 12 hours per day during the mining season, which is from approximately April to November but may run year-round depending on market demand. Although it was not possible to obtain noise measurements for typical mining activity at the current mines, the values obtained during the time from 10:00 a.m. to approximately 10:21 a.m. at Site 2 may reasonably represent daytime ambient noise levels at the nearest ranches when the noise from heavy equipment is audible. Ambient noise levels at the ranches would also depend upon the activity that is occurring at those ranches, such as vehicle movements and use of farming equipment.

In September 2007, BBA conducted long-term (one week) continuous noise measurements at two remote ranches in Nevada that may be considered typical of ambient noise levels in remote western desert areas. Those data indicated that ambient noise levels in terms of the hourly daytime median values were typically in the range of 20 to 35 dB at both ranches, which may be considered to be very quiet (BBA 2007). Noise levels were elevated at times when it appeared that ranch workers were present and active near the nearby houses.

The noise measurement equipment used for all of the noise measurements cited above consisted of Larson Davis Model 820 precision integrating sound level meters fitted with B&K Type 4176 or PCB Model 377B02 microphones and random incidence correctors. The microphones were placed on tripods approximately five feet above ground, and windscreens were placed over the microphones.

For the purposes of this report, it is assumed that the ambient median daytime noise level is approximately 26 dBA. This value is consistent with the ambient noise level measurements cited above, as well as with the assumptions used by the Oregon DEQ to assess the potential noise impacts of wind energy projects in remote areas.

4.6.2.1.2 Traffic Noise

The Project Area is served by a paved access road that joins with State Highway 20 at Milepost 181.

Noise levels due to traffic on State Highway 20 were predicted using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model is an analytical method that has long been favored for traffic noise prediction by state and local agencies and has been applied to numerous federal and state roadway projects by the Oregon Department of Transportation. The model is based upon the CALVENO

(California/Nevada) noise emission factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions and is considered to be accurate within 1.5 dB. To predict L_{dn} values, it is necessary to determine the day/night distribution of traffic and to adjust the traffic volume input data to yield an equivalent hourly traffic volume.

For the traffic noise impact analysis, it was assumed that a representative noise exposure would occur at a reference distance of 50 feet from the centerline of Highway 20, which roughly corresponds to the nearest possible residential receivers. The Annual Average Daily Traffic (AADT) volume for existing conditions (Year 2007) was 1,200 vehicles. Truck mix was estimated to be five percent medium trucks and 15 percent heavy trucks. Day-night distribution of traffic noise was assumed to be 87 percent/13 percent for existing conditions, based on data collected in California for rural highways. Average vehicle speed was assumed to be 55 mph.

Table 4.6-5 lists the traffic noise modeling results for existing conditions in terms of the Day-Night Level (L_{dn}).

Table 4.6-5: State Highway 20 Traffic Noise Levels Existing Conditions

Roadway	Predicted L_{dn}, dB, at 50 feet from Centerline				Distances from Centerline to L_{dn} Contours, feet		
	Autos	Medium Trucks	Heavy Trucks	Total	60 dB	65 dB	70 dB
OR20	58.1	53.2	61.9	63.8	90	42	19

The predicted distances to the L_{dn} 60 dB contours indicate that the noise from traffic on Highway 20 dominates the noise environment at receivers located within approximately 50 feet of the roadway centerline. Existing traffic noise exposures at noise sensitive land uses adjacent to the highway would be approximately 65 dB L_{dn} or less.

4.6.2.2 Existing Conditions

The Project is located in a rural area that is remote from residential uses. Oregon State Highway 20 is approximately five miles south of the Project. The nearest residences to the mining complex are the ranches located approximately one mile southwest of the Beede Desert Mine. In general, the proposed mining activities would occur farther from these ranches than the currently permitted mine operations. In general, the noise environment in the project vicinity is very quiet, as little local traffic is present, and the nearest major roadway (State Highway 20) is approximately five miles distant.

4.6.2.2.1 Average Hourly Noise Levels Associated with the Project

The ENM was run to predict hourly noise levels, assuming that the mining and processing equipment was in continuous use at the working face of the mine. This would occur for approximately 12 hours of the day, seven days a week, during the mining season (typically, April to November but may run year-round depending on market demand).

Table 4.6-6 lists the predicted average Project-related noise levels at the selected noise receptor monitoring locations.

Table 4.6-6: Predicted and Ambient Hourly Noise Levels

Receiver	Description	Project L_{eq}, dB	Ambient L50, dB	Project + Ambient, dB	Change, dB
South Ranch	Cottonwood Road near Altnow Beulah Lane	26	26	29	+3
West Ranch	East of Otis Valley Road in Sec. 32	26	26	29	+3

4.6.2.2.2 Day-Night Levels Associated with the Project

For assessment of noise levels in terms of the L_{dn}, it was necessary to make certain assumptions of the approximate hours of operation for the Celatom Mining Complex project. For this analysis, it was assumed that the project would be in operation 12 hours on any given day, during daytime hours (7 a.m. to 7 p.m.). Given this assumption, the L_{dn} values would be 3 dB lower than the L_{eq} values shown in Table 4.12-7. Similarly, 3 dB should be subtracted from the L_{eq} noise contours, so that, for example, the 45 dB L_{eq} contour represents 42 dB L_{dn}.

The ambient L_{dn} value was the energy-average of the daily L_{dn} values observed during the continuous noise measurement periods at the two remote ranches in Nevada.

Table 4.6-7 lists the predicted L_{dn} values for the proposed Celatom Mining Complex project operations, and provides a comparison to the average measured ambient L_{dn} values.

Table 4.6-7: Predicted and Ambient Day-Night Levels

Receiver	Description	Project L_{dn}, dB	Ambient L_{dn}, dB	Project + Ambient, dB	Change, dB
South Ranch	Cottonwood Road near Altnow Beulah Lane	23	44	44	0
West Ranch	East of Otis Valley Road in Sec. 32	23	44	44	0

4.6.2.2.3 Traffic Noise

An existing noise source in the Project Area is traffic on Highway 20. Noise levels due to traffic on Highway 20 were predicted using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108).

4.6.2.2.4 Construction Noise

Construction of the new mining sites would require use of a variety of engine-powered equipment on the sites primarily to remove overburden. Construction is expected to occur prior to mining. Construction would occur during daylight hours (7 a.m. to 7 p.m.).

The noise levels associated with typical construction equipment are shown in Table 4.6-8. During the construction phase of the project, noise from construction equipment would dominate the noise environment in the immediate area.

Maximum noise levels from different types of equipment under different operating conditions could range from 70 dB to 90 dB at a distance of 50 feet. The actual noise effects at any given sensitive receiver location near the Project Area would be the result of a series of construction tasks. For example, bulldozers would rough out the roadway and loading pads. Bulldozers and loaders would move the loose materials to haul trucks, which would either leave the site or transfer materials to areas needing fill. Other equipment would deliver and install materials and utilities. Compressors and generators could be used at any time.

Table 4.6-8: Reference Noise Emission Levels and Usage Factors for Representative Construction Equipment

Equipment Description	Impact Device	Typical Use Factor %	Predicted Lmax @ 50 ft (dBA, slow)	Average Measured Lmax @ 50 ft (dBA, slow)	No. of Data Samples
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Compressor (air)	No	40	80	78	18
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader 19	No	40	85	-- N/A --	0
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Tractor	No	40	84	-- N/A --	0
Ventilation Fan	No	100	85	79	13
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

4.6.3 Environmental Consequences

4.6.3.1 Assessment Methodology

The following standards were used to assess potential noise impacts:

- The standards for noise-sensitive land uses are hourly median noise levels of 55 dB during daytime hours, and 50 dB during nighttime hours;

- The standard for noise-sensitive land uses is 55 dB L_{dn}. The cumulative noise levels associated with a project may create an impact if they exceed normally acceptable limits. The basic test is whether the resulting noise levels would be expected to annoy a reasonable person of normal sensitivity; and

- For non-transportation noise sources affecting noise sensitive land uses, an increase in median ambient noise levels of 10 dBA is considered an impact. Since the assumed median ambient noise level is 26 dBA, the threshold of an impact is a project-caused noise level of 36 dBA. Changes in traffic noise levels exceeding the values listed in Table 4.12-5 are also considered an impact.

4.6.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, current noise levels would continue through ongoing permitted Mining.

4.6.3.3 Alternative 2 - Proposed Action

4.6.3.3.1 Average Hourly Noise Levels

The predicted Project-related noise levels are less than 55 dB L_{eq}. Therefore, the Project-related noise levels in terms of the hourly noise level standards applied by the Oregon DEQ would not create an impact. The predicted change in hourly ambient noise levels at the nearest ranch houses is approximately 3 dB.

4.6.3.3.2 Day-Night Levels

The predicted Project-related noise levels are less than 55 dB L_{dn}. No increases in ambient noise levels in terms of L_{dn} are predicted for the nearest ranch houses.

4.6.3.3.3 Traffic Noise

For the traffic noise impact analysis, it was assumed that there would be no changes in Project-related traffic on Highway 20 or the mine access road. Therefore, there would be no changes in Project-related traffic noise levels.

4.6.3.3.4 Construction Noise

The maximum noise levels received at the nearest ranch house, approximately one mile away from the nearest areas where grading would occur, would be reduced by approximately 40 dB as compared to the values shown in Table 4.6.8, ignoring sound absorption or any shielding provided by topography. Therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 25 to 45 dB.

In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by 5 to 10 dB or more..

4.6.3.4 Alternative 3 - Proposed Action with Additional Design Elements

The impacts associated with Alternative 3 would be the same as the Proposed Action.

4.7 Noxious Weeds

4.7.1 Regulatory Framework

For the purpose of this EIS, invasive, nonnative species are introduced plants and animals that are mandated to be prevented or controlled because of their potential to cause economic harm (e.g., affect the quality of forage on rangelands, affect cropland, or forest land productivity) or environmental harm (e.g., displace native plants and natural habitats) or harm human and animal health. Prevention, control, or eradication of these species may be legally mandated by state, federal, or other laws and regulations. Therefore, this analysis focuses on invasive plant species or weeds.

Legal requirements for invasive plant management come from the following:

- Plant species listed or considered federal noxious weeds by the United States Department of Agriculture (USDA); and

- Plant species listed as noxious by the State of Oregon Department of Agriculture (ODOA) (ORS 570.505).

4.7.1.1 Executive Order 11312: Prevention and Control of Invasive Species

Executive Order (EO) 11312 (February 3, 1999) directs all federal agencies to prevent and control introduction of invasive, nonnative species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. EO 11312 established a national Invasive Species Council made up of federal agencies and departments and a supporting Invasive Species Advisory Council composed of state, local, and private entities. The Invasive Species Council and Advisory Committee oversees and facilitates implementation of the EO, including preparation of a National Invasive Species Management Plan.

4.7.1.2 Federal Noxious and Invasive Weed Laws

A number of federal laws pertain to noxious and invasive weeds, including the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 USC 4701 et seq.), Lacey Act, as amended (18 USC 42), Federal Plant Pest Act (7 USC 150aa et seq.), Federal Noxious Weed Act of 1974, as amended by the Food, Agriculture, Conservation, and Trade Act of 1990 (Section 1453 "Management of Undesirable Plants on Federal Lands" USC 2801 et seq.), the Carlson-Foley Act of 1968 (Public Law 90-583), and Federal EO 11312 released February 3, 1999. The BLM and other federal, state, and local agencies are also concerned about weed infestation and dispersal on private and public lands. The BLM and USDA maintain lists of pest plants of economic or ecological concern.

4.7.1.3 Oregon Noxious Weed Laws

Chapter 570 of the ORS pertains to noxious weeds. The ODOA has responsibility for jurisdiction, management, and enforcement of the state's noxious weed law. Plants on Oregon's noxious weeds list are to be controlled on private and public land. The law indicates "steps leading to eradication, where possible, and intensive control are necessary". The ODOA maintains online lists of state-listed noxious weeds (http://oregon.gov/ODA/PLANT/WEEDS/docs/weed_policy.pdf).

4.7.2 Affected Environment

4.7.2.1 Study Methods

The type and location of noxious weeds in the Project Area were obtained from the BLM GIS data.

4.7.2.2 Existing Conditions

Five species of noxious weeds, listed by the ODOA, have been documented within the Project Area. All species of noxious weeds in the Project Area are on the ODOA List B. List B designated weeds are weeds of economic importance which are regionally abundant; however, these weeds may have limited distribution in some counties. Two species are also List T weeds. List T weeds are target species for which the ODOA plans to develop and implement a statewide management plan. Table 4.7-1 lists the noxious weeds within the Project Area and the locations of the noxious weed infestations are shown on Figure 4.7.1.

Approximately 0.8 acre of whitetop was detected in the Project Area. As shown on Figure 4.7.1, the whitetop occurs along an existing road in the southeastern portion of the Project Area. Approximately 5.1 acres of Canada thistle occur in the Project Area. The Canada thistle infestations are located in the central portion of the Project Area and in three locations in the northeastern portion of the Project Area along existing roads. Approximately 0.5 acre of bull thistle was detected in the Project Area. The bull thistle infestation is located in the northeastern portion of the Project Area along existing roads. Approximately 42 acres of Scotch thistle occurs in the Project Area. Scotch thistle is distributed throughout the central and northeastern portions of the Project Area and is located near existing roads and drainages. Approximately five acres of Medusahead rye occurs in the Project Area. Medusahead rye is located along existing roads in

the central portion of the Project Area just north of the excluded area, and in the northeastern portion of the Project Area as shown on Figure 4.7.1.

EPM has a noxious weed control plan (Section 20.4 of the MPO) and is currently treating the noxious weed infestations within the Project Area. Environmental protection measures in the weed control plan include monitoring the infestations and spraying herbicides primarily in the spring and fall; however, some herbicide application occurs throughout the growing season as necessary.

Additionally, areas where noxious weeds have been eradicated continue to be monitored. Approximately seven acres of Scotch thistle and Canada thistle were treated with herbicides by EPM in Section 33, T19N, R36E and Section 24, T19N, R36E on June 25, 2008. Approximately seven acres of Scotch thistle and Canada thistle were treated with herbicides by EPM in Sections 19 and 30, T19N, R37E and Section 36, T19N, R36E on August 7, 2008.

Table 4.7-1: Noxious Weed Species that Occur in the Project Area

Species Name	Common Name	Oregon Department of Agriculture List	Habitat
Cardaria draba	Whitetop	B	Found in distributed sites with alkaline soils.
Cirsium arvense	Canada thistle	B, T	Found in cultivated fields, riparian areas, pastures, rangeland, forests, lawns, gardens, roadsides, and waste areas
Cirsium vulgare	Bull thistle	B, T	Found in pastures, rangeland, and newly logged sites.
Onopordum acanthium	Scotch thistle	B	Found at roadsides, fence rows, ditch banks, in waste areas and pastures.
Taeniatherum caput-medusa	Medusahead rye	B	Found in distributed sites with clayey soils.

4.7.3 Environmental Consequences

4.7.3.1 Assessment Methodology

The assessment of the effects of the Project on noxious weed management is based on the results of the risk assessment prepared as part of the noxious weed monitoring and control plan.

4.7.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative EPM would continue operations at the Project, as previously approved under the 1985 DR (BLM 1985) or other permits and as outlined in Chapter 2, which would result in 465 acres of disturbance, and current noxious weed abatement measures would continue.

4.7.3.3 Alternative 2 - Proposed Action

Five species of noxious weeds were identified in the Project Area: whitetop, Canada thistle, bull thistle, Scotch thistle, and Medusahead rye. Noxious species readily invade areas that have been subject to surface disturbance, which typically lack or have minimal vegetation cover.

Figure 4.7.1 (Noxious Weeds that Occur in the Project Area) indicates the types and locations of noxious weeds occurring in the project area.

Explanation

- Project Boundary
- Excluded Area within Project Boundary

Noxious Weeds

- Cardaria draba
- Cirsium arvense
- Cirsium vulgare
- Onopordum acanthium
- Taeniatherum caput-medusa

0 5,000 Feet

0 2,000 Meters

Projection: UTM Zone 11 North, NAD83

N

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Noxious Weeds That Occur in the Project Area

Figure 4.7.1

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Development and operation of the Project would remove or disturb 1,394.5 acres of vegetation over the 50-year life of the Project.

The supplementary mine activities outlined in MPO (Section 20.4) and Design Elements for Environmental Protection discussed in Section 3.2.12 would reduce the introduction and spread of noxious weeds. The supplementary mine activities and Design Elements for Environmental Protection include the implementation of noxious weed surveys throughout the Project Area during the spring and fall of each field season and application of herbicide by a certified technician to limit the spread of noxious weeds and to kill those already established.

Implementation of this plan would be coordinated with the Harney County weed specialists and the BLM weed control agent.

Reclamation would likely reduce the establishment of noxious weeds in the Project Area in the long term (post Project); however, minor populations of weedy annual species may become established in localized areas for short periods of time, such as during the summer growing season. Growth media stockpiles would be reclaimed with an interim seed mix to stabilize the growth media, reduce soil erosion, and minimize the potential for the establishment of noxious weeds. Successful reclamation of mine-related surface disturbance areas would result in the establishment of a permanent vegetative cover, which would minimize the potential establishment of noxious weeds in the long term (post Project). Weed control practices would be implemented in coordination with Harney County and the BLM to limit the spread of noxious weeds in the Project Area.

The Proposed Action would result in the incremental disturbance of up to 1,394.5 acres of vegetation over the 50-year life of the Project, which could produce habitat conducive to supporting noxious weeds. Implementation of reclamation and the supplementary mine activities pertaining to noxious weeds would reduce or eliminate the chance of noxious weed establishment and control infestations that did occur.

4.7.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to noxious weeds from Alternative 3 are generally the same as those described in the Proposed Action. The difference is that under Alternative 3, additional summer inspections for noxious weeds would occur within the Project Area annually and post reclamation noxious weed inspections would occur three times per year. Alternative 3 would not otherwise result in additional impacts from noxious weeds.

4.8 Paleontology

4.8.1 Regulatory Framework

The BLM manages paleontological resources under a number of federal laws including: FLPMA Sections 310 and 302(b), which direct the BLM to manage public lands to protect the quality of scientific and other values; 43 CFR 8365.1-5, which prohibits the willful disturbance, removal, and destruction of scientific resources or natural objects; 43 CFR 3622, which regulates the amount of petrified wood that can be collected for personal, noncommercial purposes without a permit; and 43 CFR 3809.420 (b)(8), which stipulates that a mining operator "shall not

knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archaeological site, structure, building or object on Federal lands."

4.8.1.1 The Federal Land Policy and Management Act

Included in the many charges given to the BLM by the FLPMA are the following items: (a) to manage the public lands in such a manner that protects the quality of scientific and other values; (b) to see that these lands and resources are periodically and systematically inventoried; (c) to use such inventory data in developing plans for the management of these lands; and (d) to manage the use of such lands and resources through easements, licenses, and permits. Management actions on public lands would be inventoried for paleontological resources prior to ground disturbing activity.

4.8.1.2 BLM Regulations 43 CFR 8365.1-5

Subject to the provisions of this regulation, common invertebrate and paleo-botanical fossils may be collected in reasonable amounts for noncommercial purposes without a permit. However, in order to protect significant localities, areas may be closed to the collection of invertebrate and paleo-botanical fossils except under permit. Vertebrate fossils such as extinct mammal bones, fish, footprints, etc., may only be collected under a permit. The BLM issues permits to qualified paleontologists who agree to put their collections into repositories where they remain the property of the federal government and are accessible for study, education, and public enjoyment.

4.8.1.3 BLM Policy

IM No. 2008-009, effective October 15, 2007, defines the BLM classification system for paleontological resources on public lands. The classification system is based on the potential for the occurrence of significant paleontological resources in a geologic unit and the associated risk for impacts to the resource based on federal management actions. This classification system for paleontological resources is intended to provide a more uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts. The system uses geologic units as base data, which are more readily available to all users, and is intended to be applied in a broad approach for planning efforts and as an intermediate step in evaluating specific projects.

The descriptions for the classes used in the Potential Fossil Yield Classification (PFYC) system are intended to serve as guidelines rather than strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment. The following descriptions summarize the PFYC classes.

- Class 1 - Very Low. Geologic units that are not likely to contain recognizable fossil remains include units that are igneous or metamorphic (excluding reworked volcanic ash units) and units that are Precambrian in age or older.

- Class 2 - Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. These include the following: 1) vertebrate or significant invertebrate or plant fossils not present or very rare; 2) units

that are generally younger than 10,000 years before present; 3) recent aeolian deposits; and 4) sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

- Class 3 - Moderate or Unknown. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential. These rock units are often marine in origin with sporadic known occurrences of vertebrate fossils. Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently and predictability is known to be low. The units may also be poorly studied or poorly documented.

- Class 3a - Moderate. Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

- Class 3b - Unknown. Fossiliferous sedimentary units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this class may eventually be placed in another class when sufficient survey and research is performed.

- Class 4 - High. Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.

- Class 4a - Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.

- Class 4b - Areas underlain by geologic units with high potential but have lowered risk of human-caused adverse impacts or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity. These areas include extensive soil or vegetative cover, where bedrock exposures are limited or not expected to be impacted and where areas of exposed outcrop are smaller than two contiguous acres. Areas where outcrops form cliffs of sufficient height and slope such that impacts are minimized by topographic conditions and other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

- Class 5 - Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils and that are at risk of human-caused adverse impacts or natural degradation.

- Class 5a - Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

- Class 5b - These are areas underlain by geologic units with very high potential but have lowered risk of human-caused adverse impacts or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity. These areas have extensive soil or vegetative cover and bedrock exposures are limited or not expected to be impacted. The areas of exposed outcrop are smaller than two contiguous acres. Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions. Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

In addition, IM No. 2009-011, effective October 10, 2008, provides guidelines for assessing potential impacts to paleontological resources in order to determine mitigation steps for federal actions on public lands under the FLPMA and the NEPA. These guidelines also apply where a federal action impacts split-estate lands. This IM provides for field survey and monitoring procedures to help minimize impacts to paleontological resources from federal actions in cases where it is determined that significant paleontological resources would be adversely affected by a federal action.

Together, these two IMs with the PFYC system, provide guidance for the assessment of potential impacts to paleontological resources, field survey and monitoring procedures, and recommended mitigation measures that protect paleontological resources impacted by federal actions.

It is the policy of the BLM that potential impacts from federal actions on public lands, including land tenure adjustments, be identified and assessed and proper mitigation actions be implemented when necessary to protect scientifically significant paleontological resources. This policy also applies to federal actions impacting split-estate lands and is subject to the right of landowners to preclude evaluation and mitigation of paleontological resources on their land. The removal of a significant paleontological resource from public land requires a Paleontological Resources Use permit for collection. Significant paleontological resources collected from public lands are federal property and must be deposited in an approved repository. Paleontological resources collected from split-estate lands are the property of the surface-estate owner, and their disposition would be in accordance with the surface agreement between the landowner and the permittee.

Surface disturbing activities may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils or loss of valuable scientific information by the disturbance of the stratigraphic context in which fossils are found. Indirect adverse impacts may be created by increased accessibility to important paleontological resources, leading to looting or vandalism. Land tenure adjustments may result in the loss of significant paleontological resources to the public if paleontological resources pass from public ownership. Generally, the Project proponent is responsible for the cost of implementing mitigation measures including the costs of investigation, salvage, and curation of paleontological resources.

4.8.2 Affected Environment

4.8.2.1 Study Methods

Study methods to determine the presence of fossils included reviewing geologic maps.

4.8.2.2 Existing Conditions

Fossil localities generally are found in erosional environments where fossil-bearing rock is exposed. Fossils are then released from their matrix and, through water and wind erosion, deposited as lag on erosional outwash surfaces. In a real sense, paleontologists would not make new discoveries if erosion was not present in the environment. Collection of vertebrate fossils such as fish, amphibians, reptiles, and mammals is prohibited except by permit. Other types of fossils such as petrified wood, leaves, and shells of invertebrate animals are subject to rock hounding regulations.

Subject to the provisions of this regulation, persons may collect up to 25 pounds plus one piece per person per day of petrified wood, up to a maximum of 250 pounds in one calendar year, for personal noncommercial purposes without a permit.

There are several recorded paleontological localities in the vicinity of the Project Area, but it appears these occurrences are in geologic formations which would not be affected by the proposed project operations. To the southwest of the Project Area near Drewsey a new species of fossil squirrel (*Citellus shotwelli*) has been discovered. The Bartlett Mountain assemblages (Stinkingwater Flora and Fauna) are also reported to occur in the Drewsey Formation and in some units interbedded with basalt flows. Fossils found in this formation include various species of antelope, horses, mammoth, mastodons, rhinos, camels, rabbits, mountain beaver, squirrels, moles, and rodents, as well as a large variety of plant fossils indicative of temperate forests.

There is a possibility the diatomite beds to be mined may contain some fossils, although there is presently no evidence to support this contention. Fossil fish would be the most likely fossils to be found, because the diatomite is laid down in a lacustrine environment. Martin (1998, p. 3; Shotwell 1963) refers to the possibility that diatomite found in the middle member of the Drewsey Formation may contain vertebrate fossils.

4.8.3 Environmental Consequences

4.8.3.1 Assessment Methodology

Impacts of the Proposed Action and Project Alternatives were assessed based on review of geologic maps and reports that have been completed in the Project Area. The impact was evaluated through analysis based on IM Nos. 2008-009 and 2009-011. The units that would be disturbed and mined are Class 3a - Moderate. There are units in the general area that are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered and none have been identified in the Project Area by the BLM.

4.8.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue permitted operations and expansions. The total existing disturbance associated with the No Action is 465 acres.

4.8.3.3 Alternative 2 - Proposed Action

Surface disturbing activities may cause direct adverse impacts to paleontological resources through the damage or loss of valuable scientific information by the disturbance of the stratigraphic context in which fossils are found. Indirect adverse effects could be created by increased accessibility to important paleontological resources, leading to looting or vandalism.

Since fossils are usually buried, their locations cannot be confirmed unless excavation occurs in those geologic units. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for the Project to be sited on or impact a scientifically important fossil locality is unlikely; however, common fossils may be exposed through mining activities.

4.8.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Impacts associated with the Alternative 3 would be the same as the Proposed Action.

4.9 Recreation

4.9.1 Regulatory Framework

Federal agencies including the BLM, United States Forest Service (USFS), USFWS, administer over 51 percent of the lands in Oregon and 70 percent of the lands in southeast Oregon (Harney, Malheur, and Lake Counties), making them the largest managers of outdoor recreation and land facilities in the state. Therefore, these agencies play a major role in providing dispersed recreation opportunities as well as resource protection of some of the state's most unique and important scenic, natural, and cultural resources.

Hunting, sightseeing, driving for pleasure, and fishing are among the most popular types of dispersed recreation, according to the Southeast Oregon Recreation Plan for Harney, Lake, and Malheur Counties. Non-motorized boating, horseback riding, camping, hiking, wildlife viewing, and off highway vehicle (OHV) use are also popular activities in the Planning Area. Fishing activities are common at Cottonwood and Beulah Reservoirs. From October 2000 through September 2001, the Planning Area had 259,797 visitor days, up from 247,002 the previous year. Specific activities such as hunting, hiking, and camping, as well as sites visited are discussed below:

Two of the recreation management objectives for the Planning Area that are relevant to the Project Area are outlined in the Three Rivers RMP/ROD as follows:

- Provide opportunities for unstructured outdoor recreation activities with the necessary facilities and services; and

- Establish and maintain intensive use areas where the presence of high quality natural resources and the current or potential demand warrants intensive use practices to protect the areas for their scientific, educational, or recreational values.

4.9.2 Affected Environment

4.9.2.1 Study Methods

Data regarding existing and potential recreational uses within the Project Area were obtained from the Three Rivers RMP/ROD and in consultation with federal, state and county agencies.

4.9.2.2 Existing Conditions

The Project Area is within portions of the Malheur River and the Owyhee and Whitehorse ODFW hunt units. Deer, chukar, wild turkeys, pronghorn antelope, mountain lions, and elk are hunted with rifle, muzzleloader, and bow in this area. The Project Area is used for hunting and other dispersed recreation. Hikers and other recreationists value the solitude in the sparsely populated area and the scenic vistas, as viewed from remote areas.

4.9.3 Environmental Consequences

4.9.3.1 Assessment Methodology

The Proposed Action and alternatives were compared to the recreational planning information obtained from the Southeast Oregon Recreation Plan for Harney, Lake, and Malheur Counties to determine the potential for and expected impacts from conflicts with existing and planned recreational uses (dispersed recreation). Potential effects on recreational resources can be categorized as those occurring during the 50-year life of the Project and long term (those impacts occurring beyond the life of the Project). Loss of dispersed recreation, including hunting, would occur in areas subject to surface disturbance and subsequent reclamation. Long-term (after the life of the Project) loss of recreation would occur in areas where pit walls and benches are not reclaimed.

4.9.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative EPM would continue operations at the Project, as previously approved under the 1985 DR (BLM 1985) or other permits and as outlined in Chapter 2. The area covered by the Proposed Action would remain available for future DE processing or for other purposes, including dispersed recreation as approved by the BLM. The subject lands have not been withdrawn from mineral entry nor designated as any type of special management area. Recreational uses would be expected to continue unchanged if the No Action Alternative were selected.

4.9.3.3 Alternative 2 - Proposed Action

Implementation of the Proposed Action would result in the disturbance of 1,144 acres due to mining-related activities, and 250 acres due to dispersed exploration activities on public lands managed for multiple uses. The disturbance would occur incrementally over approximately 50 years (the life of the Project), which includes the mining and reclamation phases of the Project. The locations of the proposed disturbances at the end of mining are identified on Figure 3.2.1.The locations of the proposed disturbance for surface acreage by mine facility component is identified in Table 3.2-1. The Proposed Action would result in an incremental and temporary loss of up to 1,394.5 acres of public land from use for dispersed recreation activities (including hunting). A total of 250 acres would be permanently impacted because pit walls and benches would not be reclaimed.

The Proposed Action would not result in increased employment in the local region, and there would not be an associated increase in demand for recreational opportunities. Dispersed and developed recreation areas would not be impacted by increased use and demand from implementation of the Proposed Action.

Solitude could be impacted in those areas where there has been limited mining or mining has not occurred, such as Eagle and Hidden Valley; however, there are numerous areas nearby with similar attributes outside of the Project Area that can be accessed by recreationists.
The effects of mining can be observed from the various roads and dispersed recreation locations in the area and may impact the dispersed recreationist for short periods of time depending on their activities. The mining activities expose the DE and are expressed as white areas devoid of vegetation during active mining and prior to completed reclamation. The visual effect of the mines varies with distance and is dependent on topography.

4.9.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Impacts associated with the Alternative 3 would be the same as the Proposed Action.

4.10 Soils

4.10.1 Regulatory Framework

4.10.1.1 Bureau of Land Management, 43 CFR Part 3800

Under 43 CFR Part 3800, the BLM has defined its final rule regarding Mining Claims under the General Mining Laws: Surface Management to include performance standards that govern the operation and reclamation of surface mining projects. Section 3809.420(6)(b)(3) stipulates that the operator must initiate reclamation at the earliest feasible time and that reclamation shall include, but not be limited to, the following: “saving of topsoil for final application after reshaping of disturbed areas have been completed; measures to control erosion, landslides, and water runoff; measures to isolate, remove, or control toxic materials; [and] reshaping the area disturbed, application of the topsoil, and revegetation of disturbed areas, where reasonably practicable...” When reclamation has been completed, the authorized officer shall be notified such that an inspection of the reclaimed areas can be made.

Figure 4.10.1 (Soils in the Project Area) displays the various types and locations of soils in the project area.

Explanation

Soil

- 18 Ateron gravelly loam, 2-20% slopes (1339.8 acres)
- 51 Bucklake-Mahoon-Rubble land complex, 20-40% slopes (1483.5 acres)
- 80 Doyn very stony loam, 2-20% slopes (7.1 acres)
- 136 Gumble-Mahoon-Cagle complex, 2-40% slopes (1689.3 acres)
- 161 Lambranch gravelly loam, 2-8% slopes (113.5 acres)
- 173 Legler silty clay loam, 0-3% slopes (295.7 acres)
- 186 Mahoon very cobbly loam, 2-20% slopes (114.9 acres)
- 201 Merlin-Rubble land complex, 2-15% slopes (19.6 acres)
- 209 Minam silt loam, 0-2% slopes (2.0 acres)
- 239 Nuss-Rock outcrop complex, 20-40% south slopes (882.4 acres)
- 262 Poall-Gumble complex, 2-20% slopes (1458.7 acres)
- 265 Porterfield loam, 2-20% slopes (208.2 acres)
- 285 Risley-Gumble complex, 2-20% slopes (1626.2 acres)
- 284 Risley-Gumble-Torriorthents complex, 2-25% slopes (544.0 acres)
- 322 Teguro very stony loam, thin surface, 2-20% slopes (350.3) acres
- 333 Torriorthents-Gumble complex, 2-35% slopes (1390.5 acres)
- 365 Westbutte-Lambring-Rock outcrop assoc., 20-60% slopes (724.1 acres)
- 364 Westbutte-Rock outcrop complex, 20-60% south slopes (164.7 acres)

Project Boundary
Excluded Area within Project Boundary
Existing Roads

N

Projection: UTM Zone 11 North, NAD83

0 5,000 Feet

0 2,000 Meters

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Soils in the Project Area

Figure 4.10.1

12/07/2010 *DRAFT*

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4.10.2 Affected Environment

4.10.2.1 Study Methods

GIS data from the BLM were reviewed to obtain existing soil data for the Project Area. The Natural Resource Conservation Service (NRCS) web soil survey was reviewed for the soil associations and complexes found within the Project Area (NRCS 2009). The soil survey includes a description of physical soil characteristics, soil formation descriptions, and qualitative ratings for various soil use and management properties.

4.10.2.2 Existing Conditions

The Project Area is located within the Columbia River Plateau MLRA as described in the Three Rivers RMP/ROD (BLM 1992). The Columbia River Plateau MLRA is in the Owyhee Desert Section of the Basin and Range geologic province. This area is dominated by northwest trending block-faulted mountains and soils of rhyolite and sedimentary rock origin. Eighteen soil units were identified within the Project Area from the BLM GIS data analysis (Figure 4.10.1). Table 4.10-1 summarizes the soil characteristics and the acreage of each soil type within the Project Area.

The soils in the mountainous central part of the Project Area are typically very stony to very gravelly loams found on two to 50 percent slopes intermixed with rubble. The soils are moderately deep over lithic and paralithic bedrock and derive from residuum and colluvium from basalt, andesite, tuffaceous sedimentary rock, and diatomaceous earth. These soils are found on hills, plateaus, and mountainous terrain. The central portion of the Project Area has intermittent drainages that follow a north-south trend.

The Beede Desert is located in the northwestern portion of the Project Area. The soils in the Beede Desert are typically loams, clay loams, and slit clay loams found on zero to 50 percent slopes on the mountainsides, foothills, hills, fans, and incised floodplains. The soils are shallow to moderately deep over lithic and paralithic bedrock and derive from residuum and colluvium from basalt, andesite, tuffaceous sedimentary rock, and diatomaceous earth. A portion of the soils are on the fan and floodplains and contain mixed alluvium derived from igneous rock. This area contains several intermittent drainages that follow a northeast-southwest trend.

Mill Gulch trends north to south in the northeastern portion of the Project Area. Soils on the mountainsides, hills, plateaus, and benches consist of gravelly loams, silt loams, or very gravelly silt loams and are found on zero to 90 percent slopes. The soils are shallow over lithic and paralithic bedrock and derive from residuum and colluvium weathered from basalt, andesite, rhyolite, tuffaceous sedimentary rock, and DE.

The soils in the east-central portion of the Project Area occur on gentle sloping hills with two to 12 percent slopes. The soils consist of very gravelly silt loams that are shallow to moderately deep over paralithic bedrock from residuum and colluvium derived from tuffaceous sedimentary rock. Mill Gulch traverses this area in a northeast-southwest trend.

The soils in the southeastern portion of the Project Area occur on hills that transition into gentle slopes toward the eastern boundary of the Project Area. The soils consist of very gravelly silt loams that are shallow to moderately deep over lithic and paralithic bedrock from residuum and

colluvium derived from tuffaceous sedimentary rock and diatomaceous earth. A portion of the soils contain mixed alluvium derived from igneous rock along Mill Creek that traverses the topography in a northwest-southeast trend.

Table 4.10-1: Summary of Soil Mapping Units and Characteristics

ID No.	Mapping Unit	Soil Series	Acreage within the Project Area	Soil Depth in Inches (Restrictive Feature)	Hydrological Characteristics	Soil Erosion Hazard	
						By Water	By Wind
18	Ateron 18	Ateron (85%);	1339.81	10-20 (lithic bedrock)	Well drained; slow permeability	Moderate	Low
51	Bucklake-Mahoon-Rubble 51	Bucklake (35%); Mahoon (35%); Rubble (20%)	1483.52	20-40 (lithic bedrock)	Well drained; slow permeability	Low	Low
80	Doyn 80	Doyn (85%)	7.07	4-10 (lithic bedrock)	Well drained; moderate permeability	Moderate	Low
136	Gumble-Mahoon-Cagle 136	Gumble (35%); Mahoon (30%); Cagle (25%)	1689.32	14-20 (lithic bedrock)	Well drained; slow permeability	Low to Moderate	Low
161	Lambranch 161	Lambranch (60%)	113.46	80+ (unknown)	Well drained; slow permeability	Low	Low
173	Legler 173	Goosel (90%)	295.65	21 to 40 (lithic bedrock)	Well drained; slow permeability	Severe	Low
186	Mahoon 186	Mahoon (85%)	114.91	20-40 (paralithic bedrock)	Well drained; slow permeability	Low	Low
201	Merlin-Rubble 201	Merlin (70%); Rubble (15%)	19.62	10 to 20 (lithic bedrock)	Well drained; very slow permeability	Low	Low
209	Minam 209	Minam (85%)	1.98	80+ (unknown)	Well drained; moderate permeability	Low	Low
239	Nuss-Rock outcrop 239	Nuss (20%); Rock outcrop (40%)	882.41	10-20 (lithic bedrock)	Well drained; moderate permeability	Very high	Low
262	Poall-Gumble 262	Poall (50%); Gumble (35%)	1458.72	80+ (unknown)	Well drained; moderate to slow permeability	Low to Moderate	Low
265	Porterfield 265	Porterfield (85%)	208.22	14-20 (paralithic bedrock)	Well drained; moderate permeability	Moderate	Low
284	Risley-Gumble 284	Risley (45%); Gumble (40%)	1626.16	20-40 (paralithic bedrock)	Well drained; moderate permeability	Low to Moderate	Low
285	Risley-Gumble-	Risley (40%); Gumble	544.02	20-40 (paralithic	Well drained; slow	Moderate to Low	Low

ID No.	Mapping Unit	Soil Series	Acreage within the Project Area	Soil Depth in Inches (Restrictive Feature)	Hydrological Characteristics	Soil Erosion Hazard	
						By Water	By Wind
	Torriorthents 285	(25%); Torriorthents (20%)		bedrock)	permeability		
322	Teguro 322	Teguro (90%)	350.26	14-20 (lithic bedrock)	Well drained; moderately slow permeability	Moderate	Low
333	Torriorthents-Gumble 333	Torriorthents (45%); Gumble (40%)	1390.53	4-14 (paralithic bedrock)	Well drained; slow permeability	Low to Moderate	Low
364	Westbutte-Rock outcrop 364	Westbutte (65%); Rock outcrop (20%)	164.66	20-40 (lithic bedrock)	Well drained; moderate permeability	Moderate	Low
365	Westbutte-Lambring-Rock outcrop 365	Westbutte (40%); Lambring (35%); Rock outcrop (15%)	724.08	20-40 (lithic bedrock)	Well drained; moderate permeability	Moderate to Low	Low

The soils in the southwestern portion of the Project Area occur on mountains, hills, plateaus, and rock pediments. The soils are typically stony clay loams, very cobbly loams, and very gravelly sandy loams and are found on two to 75 percent slopes. The soils range from shallow to very deep over lithic and paralithic bedrock and derive from residuum and colluvium from basalt, andesite, tuffaceous sedimentary rock, shale, and sandstone. Within this area are several intermittent drainages that follow a northeast-southwest trend.

4.10.3 Environmental Consequences

4.10.3.1 Assessment Methodology

Potential effects on soil can be categorized as direct and indirect, over the 50-year life of the Project and long term (following mining and reclamation). Direct effects on soil resources could include temporary or permanent removal of soil through grading, excavation, or erosion. Indirect effects could include the degradation of soil from soil compaction, off-road activities, increased soil erosion, and the introduction of noxious weeds.

In general, the extent of impacts to the soil resources would be influenced by the success of reclamation efforts. Reclamation success, in part, depends on the amount of surface area disturbed, quality of salvaged topsoil, stockpile redistribution methods in disturbed areas, precipitation, soil type, and moisture availability.

4.10.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue to expand operations on federal land as previously approved under the 1985 DR (BLM 1985) or permitted by BLM under a subsequent Notice. EPM would be held to the soil management and reclamation standards contained in the 1984 MPO. The total existing disturbance associated with the No Action Alternative is 465 acres.

4.10.3.3 Alternative 2 - Proposed Action

The following impacts are addressed in the Project Area: 1) impacts from increased erosion (water and wind); 2) impacts to soils from a chemical spill (storage tanks or mobile equipment); or 3) impacts to the quality of soils for restoring wildlife and habitat values. Direct impacts to soil resources within the Project Area would result from the incremental disturbance of 1,394.5 acres under the Proposed Action over the 50-year life of the Project. Table 4.10-2 shows the acres of each type of soil impacted within the Project Area. Reclamation activities would include redistributing growth media over the stabilized surface of these features prior to revegetation efforts.

Soil material would be salvaged from the disturbance footprint and stockpiled for use as interim and final reclamation cover material and growth media. Predetermined quantities of soil would be stripped from targeted soil units based on analyses of the BLM GIS data, NRCS soil mapping database, and previous and proposed field testing. Salvaged soils would be stockpiled. Soil and growth media stockpiles would have a higher erosion potential than the natural environment due to the potential for decreased soil compaction, increased slope gradients, and the loss of stabilizing vegetation cover. Revegetating soil and growth media stockpiles with an intermin seed mix would further decrease erosion potential.

The soils stockpiles west of the existing Mine Shop and north of the existing Main Open Pit in Section 36 (Figure 2.2.1) have been contoured and seeded. The soils stockpiles currently exhibit mature plant species and provide local habitat for indigenous desert animals. During final reclamation the soils stockpiles would be excavated and used to provide growth media cover prior to reseeding. Growth media stockpiles would be stabilized and revegetated following the removal of material for the reclamation of other facilities during final reclamation activities.

Soil erosion potential for other areas of disturbance within the Project Area would also be higher than the natural environment. The construction of sloped facilities, such as the mine and mill waste stockpiles, ore stockpiles, open pits, interceptor drainage ditches, sedimentation basins, and the remediation of the past landslides, would increase the erodibility hazard of soils until the completion of stabilization and revegetation activities during reclamation. The construction of other features, including staging areas, the truck scale and well facilities, road improvements, access, haul, and exploration roads, bulk sampling, and mineral exploration, would also increase the erosion potential of soils within the Project Area.

The Project Area is susceptible to and impacted by erosion from precipitation events. Soils disturbance from the Proposed Action would increase the potential for erosion during initial topsoil and overburden stripping. The Proposed Action would remove all soil cover during the life of the Project; however, erosion is expected to be limited within the confines of the open pits. Freshly exposed diatomite is generally more cohesive and resistant to erosion than

weathered diatomite, and diatomaceous soils and the network of drainage ditches around proposed open pits would divert most of the runoff away from the proposed open pits and into temporary settling ponds.

Table 4.10-2: Impacts to Soils within the Project Area for the Proposed Action

ID No.	Mapping Unit ID	Soil Series	Impacts from the Proposed Action (acres)	Percentage of the Soil Series Impacted
18	Ateron	Ateron (85%);	2.87	0.21
51	Bucklake-Mahoon-Rubble	Bucklake (35%); Mahoon (35%); Rubble (20%)	50.14	3.38
80	Doyn	Doyn (85%)	0.00	0
136	Gumble-Mahoon-Cagle	Gumble (35%); Mahoon (30%); Cagle (25%)	276.70	16.38
161	Lambranch	Lambranch (60%)	34.15	30.10
173	Legler	Goosel (90%)	45.08	15.25
186	Mahoon	Mahoon (85%)	93.21	81.11
201	Merlin-Rubble	Merlin (70%); Rubble (15%)	0.00	0
209	Minam	Minam (85%)	0.00	0
239	Nuss-Rock outcrop	Nuss (20%); Rock outcrop (40%)	72.25	8.19
262	Poall-Gumble	Poall (50%); Gumble (35%)	2.41	0.17
265	Porterfield	Porterfield (85%)	4.05	1.95
284	Risley-Gumble	Risley (45%); Gumble (40%)	63.45	3.90
285	Risley-Gumble-Torriorthents	Risley (40%); Gumble (25%); Torriorthents (20%)	15.75	2.90
322	Teguro	Teguro (90%)	14.04	4.01
333	Torriorthents-Gumble	Torriorthents (45%); Gumble (40%)	113.81	8.81
364	Westbutte-Rock outcrop	Westbutte (65%); Rock outcrop (20%)	0.00	0
365	Westbutte-Lambring-Rock outcrop	Westbutte (40%); Lambring (35%); Rock outcrop (15%)	0.00	0

Erosion and the sedimentation of precipitation runoff would be reduced through the diversion and routing of storm water around Project facilities and the construction of sediment collection ponds to protect downstream water quality. A network of drainage ditches is proposed around

mine workings to capture and channel storm water runoff into different sediment basins. These sediment basins capture all storm water runoff from stockpiles, pits, waste stockpiles, or other working areas. All of these sediment basins would function as both retention basins and evaporation ponds and, as a result, they would not discharge water into the Mill Gulch drainage ditch, Altnow Pond, or other water resources. As the sediment basins fill up with sediment, they are cleaned, with the excavated material used either for reclamation purposes or deposited in a waste stockpile.

Following construction, areas such as cut and fill embankments and growth media stockpiles would be seeded as soon as practicable and safe to provide vegetation cover that would also reduce wind and water erosion potential. Concurrent reclamation would be maximized to the extent practicable to accelerate the revegetation of disturbed areas. All sediment and erosion control measures would be inspected periodically and repairs or maintenance performed as necessary.

Potential increases in the soil erodibility hazard within the Project Area would be reduced by the implementation of interim reclamation. Interim reclamation would be carried out whenever a mine area is no longer needed or stockpiles need to be stabilized or reclaimed. In specific cases, open pits or cuts are backfilled or partially backfilled, recontoured to resemble existing topography or to a 3H:1V slope, covered with topsoil or other growth media, and reseeded. Soil stockpiles would be seeded to prevent erosion. Any other stockpiles that are not being used are seeded. Reclamation would be completed as soon as is practicable in order to reduce the amount of surface disturbance. Final reclamation activities under the Proposed Action would include the stabilization and revegetation of all disturbed areas within the Project Area, with the exception of pit walls and mine benches.

The greatest effects to soils within the Project Area would occur during the initial construction of activities under the Proposed Action prior to and during the installation of erosion control structures such as sediment ponds. Effects to soils during later stages of operations would be minimized by the constructed impoundments that would contain the sediment related to runoff.

4.10.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to soils from Alternative 3 are generally the same as those described in the Proposed Action; however, Alternative 3 includes additional measures for growth media management (Section 3.3.11.1), such as seed mixes designed specifically for the different types of soils within the Project Area to improve reclamation success. The seed mixes are based on the types of soil (i.e., amount of DE) and, therefore, should provide a higher rate of revegetation success (i.e., increased species density, cover, number of species, etc.). Alternative 3 would not otherwise impact soils.

4.11 Special Status Species

4.11.1 Regulatory Framework

4.11.1.1 Bald and Golden Eagle Protection Act

When first enacted in 1940, the Bald and Golden Eagle Protection Act prohibited the take, transport or sale of bald eagles, their eggs or any part of an eagle except where expressly allowed by the Secretary of Interior. The Act was amended in 1962 to extend the prohibitions to the golden eagle. The Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance provides guidance to conduct informed impact analyses and mitigation during the NEPA process (USFWS 2010).

4.11.1.2 Oregon Department of Fish and Wildlife

The Oregon Fish and Wildlife Commission adopted the Oregon Wildlife Diversity Plan in November 1993 and updated it in January 1999. This plan sets forth the goal, objectives, strategies, sub-strategies, and program priorities for ODFW's Wildlife Diversity Program. Although the focus of this plan is on nongame species, it addresses all fish and wildlife species, both game and nongame. In addition to being a policy document to guide the Wildlife Diversity Program actions, the Oregon Wildlife Diversity Plan is also a reference document containing biological information on fish and wildlife species in the state, habitat information, organized by physiographic provinces, and summaries of state and federal laws and programs affecting fish and wildlife and their habitats.

4.11.1.3 Oregon Natural Heritage Information Center

The Oregon Natural Heritage Information Center (ORNHIC) maintains a computerized inventory of the plant, wildlife, and ecological community resources of Oregon. As part of the Natural Heritage Network and NatureServe, ORNHIC contributes to a better understanding of global biodiversity and provides tools for managers and the public to better protect species and communities.

The Oregon Natural Heritage Program (ONHP) works to establish natural areas in Oregon, manages the Rare and Endangered Invertebrate Program for the State of Oregon, and manages the Oregon Natural Heritage Databank, containing comprehensive information on ecologically and scientifically significant natural areas in the state. The ONHP Mission Statement: "to acquire, maintain and distribute information on the organisms and ecosystems that constitute Oregon's natural heritage, and to ensure, through a public planning process and through voluntary public and private efforts, that the full range of Oregon's natural heritage resources is represented within a statewide system of recognized natural areas."

The Oregon Natural Heritage Act (ORS 273.563-273.591) provides for the following:

1. A natural heritage data management system for Oregon, with an office to manage the system and the other parts of the act;

2. A Natural Heritage Advisory Council, with nine citizens appointed by the Governor, and a representative from each of the state's natural resources agencies;

3. An Oregon Natural Heritage Plan, outlining strategies for protecting examples of Oregon's Natural Heritage and the Natural Heritage Program;

4. An Oregon Register of Natural Heritage Areas, a voluntary program which recognizes important natural areas in Oregon; and

5. A system of dedicated and protected natural areas, including state Natural Heritage Conservation Areas, private reserves, and federal Research Natural Areas.

4.11.1.4 BLM (Manual 6840)

BLM Manual 6840 defines sensitive species as "... those species not already included as BLM special status species under (1) federal listed, proposed, or candidate species, or (2) State of Oregon listed species. Native species may be listed as "sensitive" if one of the following applies: (1) could become endangered or extirpated from a state or significant portion of its range; (2) is under review by the USFWS; (3) numbers or habitat capability are declining so rapidly that federal listing may become necessary; (4) has typically small and widely dispersed populations; (5) inhabits ecological refugia, specialized, or unique habitats; or (6) is state-listed; although, is better conserved through application of the BLM sensitive species status." It is BLM policy to provide sensitive species with the same level of protection that is given to federal candidate species. The major objective of this protection is to preclude the need for federal listing.

The federal land management plans and the BLM resource management plans provide management direction for the many multiple uses including outdoor recreation, range, timber, watershed, fish and wildlife, minerals, wilderness, roadless areas, and cultural resources. These plans were amended by the Northwest Forest Plan on the west side of the state and the Interior Columbia Basin Strategy on the east side of the state.

Interior Columbia Basin Ecosystem Management Project developed a framework for ecosystem management and a scientific assessment of the ecological, biophysical, social, and economic conditions of the Columbia basin, including all of eastern Oregon. Instead of a formal, basin-wide decision from the project, federal decision makers adopted a strategy of incorporating the science into ongoing BLM land management plans.

4.11.1.5 USFWS Candidate Species

The Greater sage-grouse was listed as a candidate species by the USFWS on March 5, 2010. Greater sage-grouse (*Centrocercus urophasianus*) is currently a BLM special status species, an ORNHIC list 2 species, and an ODFW sensitive-vulnerable species.

4.11.2 Affected Environment

4.11.2.1 Study Methods

The study methods used to determine the existing condition for special status species included the following: 1) utilizing the USFWS list of species by county for Harney and Malheur

Counties; 2) BLM GIS data; 3) data requests from the ORNHIC; 4) resource data detailed in other sections of Chapter 4; and 5) the 1985 EA. Data on special status plant species were provided by Douglas D. Linn, a botanist at the BLM Burns District Office. The ORNHIC identified four sensitive species as potentially occurring in the Project Area: bull trout (*Salvelinus confluentus*), greater sage-grouse, fibrous pondweed (*Potamogeton foliosus* var. *fibrillosus*), and Leiberg's clover (*Trifolium leibergii*). A data request from the ODFW identified three sensitive species as potentially occurring in the Project Area: bull trout, redband trout (*Oncorhynchus mykiss*), and bald eagle. Bull trout and redband trout are not known to be present within the Project Area and are not discussed further.

Three BLM strategic species were reported as having the potential to occur in the vicinity of the Project Area: fibrous pondweed, Malheur prince's plume (*Stanleya confertifolia*), and Leiberg's clover. Botanical surveys were conducted for Malheur prince's plume and Leiberg's clover in the past, and neither species were detected in the Project Area. Additional botanical surveys were conducted by the BLM in 2009. No plants or habitat for fibrous pondweed, Malheur prince's plume, or Leiberg's clover were located within the Project Area during surveys; therefore, sensitive plant species do not occur within the Project Area and are not further discussed in this EIS.

Table 4.11-1 contains a list of special status species found in the BLM Burns District and discusses the potential of the species to occur within the Project Area. Bald eagles are a wide ranging species, and have been observed at reservoirs and agricultural fields adjacent to the Project Area. Individual birds may occasionally pass through the Project Area when traveling between preferred habitat at reservoirs or agricultural fields in search of food. Lewis' woodpecker and white-headed woodpecker occur in suitable habitat adjacent to the Project boundary, but individuals may sporadically foray into the Project Area. Implementation of the alternatives would have negligible effect to these two woodpecker species or their habitat, and they are not carried through for further analysis. The only special status species from this list with habitat known to occur in the Project Area is greater sage-grouse.

Table 4.11-1: BLM Burns District Special Status Species List

Common Name	Scientific Name	Listing Status	Potential to Occur in the Project Area
Plants			
Fibrous pondweed	*Potamogeton foliosus* var. *fibrillosus*	BLM: SS	Low
Howell's spectacular thelypody	*Thelypodium howellii* ssp. *spectabilis*	Federal: LT	Low
Leiberg's clover	*Trifolium leibergii*	BLM: SS ORNHIC:4	Low
Malhuer prince's plume	*Stanleya confertifolia*	BLM: SS	Low
Malheur wire-lettuce	*Stephanomeria malheurensis*	Federal:LE ORNHIC:4	Low
Amphibians			
Blotched tiger salamander	*Ambystoma mavortium melanostictum*	Federal: None BLM: SS State: None ORNHIC: None	Low

Common Name	Scientific Name	Listing Status	Potential to Occur in the Project Area
Columbia spotted frog	*Rana luteiventris*	Federal: C BLM: SSS State: SV ORNHIC: 2	Low
Birds			
American peregrine falcon	*Falco peregrinus anatum*	Federal: None BLM: SSS State: LE ORNHIC: 2	Low
American white pelican	*Pelecanus erythrorhynchos*	Federal: None BLM: SSS State: SV ORNHIC: 2	Low
Bald eagle	*Haliaeetus leucocephalus*	Federal: D BLM: SSS State: LT ORNHIC: 4	Low
Black rosy finch	*Leucosticte atrata*	Federal: None BLM: SSS State: SP ORNHIC: 2	Low
Bobolink	*Dolichonyx oryzivorus*	Federal: None BLM: SSS State: SV ORNHIC: 2	Low
Broad-tailed hummingbird	*Selasphorus platycercus*	Federal: None BLM: SS State: None ORNHIC: 3	Low
Franklin's gull	*Larus pipixcan*	Federal: None BLM: SSS State: SP ORNHIC: 2	Low
Grasshopper sparrow	*Ammodramus savannarum*	Federal: None BLM: SSS State: SV/SP ORNHIC: 2	Low
Greater sage-grouse	*Centrocercus urophasianus*	Federal: C BLM: SSS State: SV ORNHIC: 2	High
Horned grebe	*Podiceps auritus*	Federal: None BLM: SSS State: SP ORNHIC: 2	Low
Lewis' woodpecker	*Melanerpes lewis*	Federal: SOC BLM: SSS State: SC ORNHIC: 2	Low
Snowy egret	*Egretta thula*	Federal: None BLM: SSS State: SV ORNHIC: 2	Low

Common Name	Scientific Name	Listing Status	Potential to Occur in the Project Area
Trumpeter swan	*Cygnus buccinator*	Federal: None BLM: SSS State: None ORNHIC: 2	Low
Western snowy plover	*Charadrius alexandrinus*	Federal: PS/LT BLM: SSS State: LT ORNHIC: 2	Low
White-headed woodpecker	*Picoides albolarvatus*	Federal: SOC BLM: SSS State: SC ORNHIC: 2	Low
Yellow-billed cuckoo	*Coccyzus americanus*	Federal: C BLM: SSS State: SC ORNHIC: 2-ex	Low
Fish			
Alvord chub	*Gila alvordensis*	Federal: SOC BLM: None State: SV ORNHIC: 1	Low
Borax Lake chub	*Gila boraxobius*	Federal: LE BLM: None State: LE ORNHIC: 1	Low
Bull trout	*Salvelinus confluentus*	Federal: LT BLM: None State: SC ORNHIC: 1	Low
Catlow Valley tui chub	*Gila bicolor* ssp.	Federal: SOC BLM: Sensitive State: Sensitive ORNHIC: 2	Low
Lahontan cutthroat trout	*Oncorhynchus clark henshawi*	Federal: LT BLM: None State: LT ORNHIC: 2	Low
Redband trout	*Oncorhynchus mykiss*	Federal: SOC BLM: SSS State: SV ORNHIC: 4	Low
Invertebrates			
Bueno's velvet water bug	*Hebrus buenoi*	Federal: None BLM: SS State: None ORNHIC: 3	Low
California floater	*Anodonta californiensis*	Federal: None BLM: SS State: None ORNHIC: 2	Low
Cooley's lace bug	*Acalypta cooleyi*	Federal: SOC BLM: SS State: None ORNHIC: 3	Low

Common Name	Scientific Name	Listing Status	Potential to Occur in the Project Area
Donner and Blitzen pebblesnail	*Fluminicola insolitus*	Federal: None BLM: SSS State: None ORNHIC: 1	Low
Harney Basin duskysnail	*Colligyrus depressus*	Federal: None BLM: SS State: None ORNHIC: 1	Low
Harney Hot Spring shore bug	*Micracanthia fennica*	Federal: None BLM: SSS State: None ORNHIC: 3	Low
Jackson Lake springsnail	*Pyrgulopsis robusta*	Federal: None BLM: SSS State: None ORNHIC: 2	Low
Western ridged mussel	*Gonidea angulata*	Federal: None BLM: SSS State: None ORNHIC: 1	Low
Mammals			
California wolverine	*Gulo gulo*	Federal: SOC BLM: SSS State: LT ORNHIC: 2	Low
Canada lynx	*Lynx canadensis*	Federal: LT BLM: SSS State: None ORNHIC: 2	Low
Fringed myotis	*Myotis thysanodes*	Federal: SOC BLM: SSS State: SV ORNHIC: 2	Low
Kit fox	*Vulpes macrotis*	Federal: None BLM: SSS State: LT ORNHIC: 2	Low
Pallid bat	*Antrozous pallidus*	Federal: SOC BLM: SSS State: SV ORNHIC: 2	Low
Pygmy rabbit	*Brachylagus idahoensis*	Federal: SOC BLM: SSS State: SV ORNHIC: 2	Low
Spotted bat	*Euderma maculatum*	Federal: SOC BLM: SSS State: None ORNHIC: 2	Low
Townsend's big-eared bat	*Corynorhinus townsendii*	Federal: SOC BLM: SSS State: SC ORNHIC: 2	Low

Federal Designations: (Source: USFWS 2010)

LE: Federally listed, endangered
LT: Federally listed, threatened
PE: Proposed to be listed as federally endangered
PT: Proposed to be listed as federally threatened
SOC: Federal Species of Concern (former Category 2-Candidate Species)
C: Federal candidate for listing
D: Delisted

BLM Designations: (Source: BLM Manual 6840.06)
SSS: BLM special status species
SS: BLM strategic species

Oregon Designations (Source: ORNHIC 2007)
LE: State listed, endangered
LT: State listed, threatened
PE: Proposed to be listed as State endangered
PT: Proposed to be listed as State threatened
SC: State Sensitive-Critical
SV: State Sensitive-Vulnerable
SP: State Peripheral or Naturally Rare

ORNHIC Designations:
1: Threatened or endangered throughout range
2: Threatened, endangered, or extirpated from Oregon-secure or abundant elseware
3: Review
4: Watch
2-ex: Extirpated in Oregon
1-X: Presumed extinct

4.11.2.2 Existing Conditions

Mill Gulch, an intermittent stream within the Project Area, provides some habitat for trout (*Oncorhynchus* sp.) and nongame fish species during those periods when it carries water (BLM 1985), but does not contain any special status fish. The main fisheries habitat in the region lies outside the Project Area in Otis Creek and the Malheur River basin.

The ORNHIC identified known occurrences of greater sage-grouse northeast of Hald Butte approximately 4.19 miles from the Project Area and south of Squaw Creek Reservoir approximately 3.57 miles from the Project Area (BLM 2009). The BLM identified that greater sage-grouse leks occur approximately 1.5 miles northwest and outside of the northwestern boundary of the Project Area. Figure 4.11.1 shows that a two-mile buffer around the BLM identified lek (BLM 2004) includes a portion of Sections 21, 22, 27, and 28, T19S, R36E within the Project Area. Approximately 94 acres of the Eagle Mine Operations Area occurs within the radius drawn around the lek and is categorized as yearlong habitat (Figure 4.11.1). The lek occurs at approximately 3,900 feet amsl, and between the lek and the mining operations is a ridge ranging in elevation between 3,940 and 4,164 feet amsl. Sage-grouse habitat within the Project Area is influenced by the same anthropogenic disturbances listed in the Migratory Birds Existing Conditions Section 1.1.2.2.1.

4.11.3 Environmental Consequences

4.11.3.1 Assessment Methodology

Impacts to greater sage-grouse habitat were analyzed by overlaying boundaries of the existing operations (No Action Alternative), the proposed operations (Proposed Action), and the BLM-administered land on the greater sage-grouse habitat map (Figure 4.11.1). Potential effects on special status species are described as direct or indirect, during the 50-year life of the Project and long term. Direct impacts are those that would result in the death or injury of a sensitive species. Indirect impacts include the degradation of special status wildlife species habitat to the extent that population numbers decline. Long-term impacts are those occurring after reclamation is complete. Yearlong habitat consists of 1,697 acres witin the Project Area and probable habitat with uncertain sage-grouse usage totals 6,366 acres. Potential habitat occurs on 4,689 acres, but greater sage-grouse use in these areas is expected to be infrequent because the habitat is impaired by juniper encroachment, past fires, or other factors.

4.11.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue to expand operations on federal land as previously approved under the 1985 DR (BLM 1985) or permitted by the BLM under a subsequent approval. The total existing disturbance associated with the No Action Alternative is 465 acres within a 1,633.7-acre Project Area. No impacts to greater sage-grouse would be expected because the majority of the mining operations on BLM-administered land occur on land currently considered potential habitat, but infrequently used by sage-grouse due to juniper encroachment and other limiting factors (Figure 4.11.1). Approximately 295 acres occur on probable habitat but withuncertain sage grouse use. Greater than half of the acres considered probable habitat are fragmented within potential but impaired areas, and are unlikely to receive extensive use by greater sage-grouse.

4.11.3.3 Alternative 2 - Proposed Action

The Proposed Action would result in 1,394.5 acres of incremental disturbance over the 50-year life of the Project. The majority (317 acres) of the 462 acres of disturbance proposed for the North Kelly Field Mine Operations Area would occur primarily on habitat land mapped as considered non-potential sage-grouse habitat, but impaired habitat due to juniper encroachment and existing mining activity. The remaining surface disturbance (145 acres) in the North Kelly Mine Area for greater sage-grouse would occur on probable habitat with uncertain usage (nine percent) as shown on Figure 4.11.1.

The proposed 286-acre Eagle Mine Operations Area consists of 94 acres (5.5 percent) of yearlong greater sage-grouse habitat, 153 acres of probable habitat with uncertain grouse usage, and 39 acres of non-habitat potential. The proposed Hidden Valley Mine Operations Area consists of 255 acres of probable habitat with uncertain usage. Overall, approximately 94 acres (5.5 percent) of yearlong habitat, and 553 acres (8.7 percent) of probable habitat with uncertain usage in the Project Area could be directly impacted from mining operations. The proposed Hidden Valley Mine Operations Area consists of 255 acres of probable but uncertain usage habitat. Overall, approximately 94 acres (5.5 percent) of yearlong habitat, and 553 acres (8.7 percent) of probable habitat with uncertain usage could be directly impacted from mining

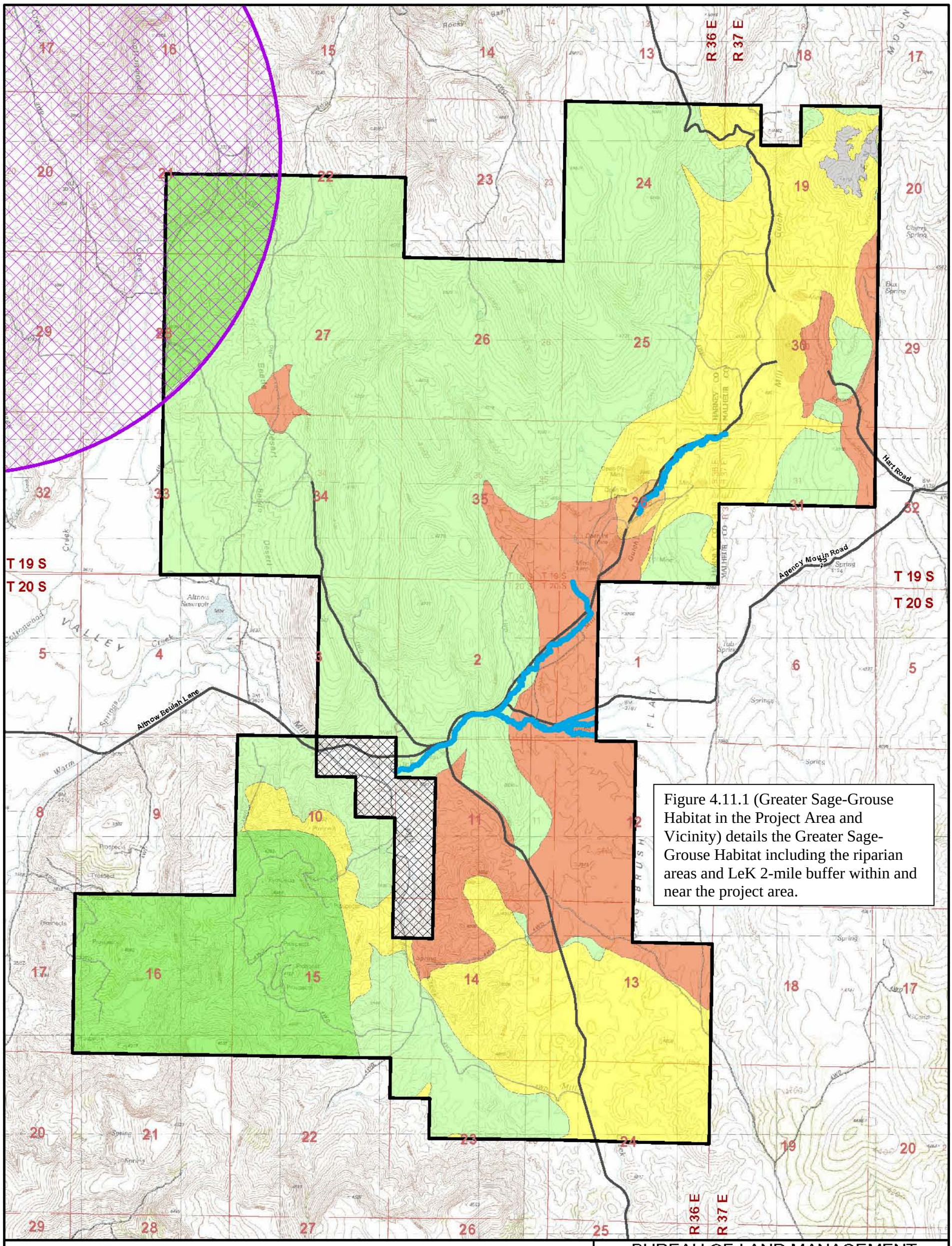

Figure 4.11.1 (Greater Sage-Grouse Habitat in the Project Area and Vicinity) details the Greater Sage-Grouse Habitat including the riparian areas and LeK 2-mile buffer within and near the project area.

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CELATOM MINE EXPANSION PROJECT

Greater Sage-Grouse Habitat in the Project Area and Vicinity

Figure 4.11.1

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operations. This would create an indirect impact to greater sage-grouse through the loss of habitat.

Exploration activites could disturb up to 250 acres of habitat anywhere within the Project Area boundary. This could range as a conservative (i.e., worst case) short-term impact on fifteen percent of yearlong habitat, to four percent of probable habitat with uncertain usage, to no impact if all exploration activities are conducted in impaired habitat. The indirect impact to sage grouse in the form of habitat disturbance would likely be in the range of one to five percent because it is unlikely that all of the activities would occur on yearlong habitat over the life of the 50-year Project. Suitable habitat for greater sage-grouse occurs adjacent to the proposed mining activities within the Project Area, as well as adjacent to the Project Area. If greater sage-grouse are present in the probable habitat, individuals could be expected to move into nearby habitat during Project-related activities. Impacts from the Proposed Action are further reduced through environmental protection measures to protect breeding and nesting activities of greater sage-grouse (Section 3.2.12).

Indirect impacts to greater sage-grouse would include fragmentation of habitat. Fragmentation of habitat is unlikely because the proposed mining operations would occur as extensions to existing operations in the same areas, leaving miles of potential habitat undisturbed and undeveloped. Fragmentation from roads is unlikely to impact greater sage-grouse because only small linear areas would be disturbed, which would not act as barriers to sage-grouse movement. Sage-grouse may be temporarily displaced during road construction and new roads may facilitate predator movement into and through previously undisturbed habitat. The birds would likely avoid these impacts by moving into nearby habitat.

In the long term, reclamation of all but 250 acres of the 1,394.5 acres of proposed disturbance would occur. The areas would be recontoured and reseeded, with the exception of the pit highwalls and benches. Over time, depending on precipitation, growth media, vegetation success, and other elements of nature, habitat would be restored to approximately 82 percent of the area covered by the Proposed Action.

4.11.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Under Alternative 3, the impacts to greater sage-grouse are the same as those described in the Proposed Action with the exception of fence construction and another half mile of new road. The proposed Eagle Cutoff Road north of the Beede Desert Mine Operations Area would cause an additional 1.4 acres of vegetation removal. This would directly impact an additional 0.08 percent of the yearlong greater sage-grouse habitat within the Project Area as compared to the Proposed Action and may facilitate predator acces within the area.

The majority of public vehicle travel would still occur on Cottonwood Reservoir Road, bypassing the mine area. Approximately 10.5 miles of new fence would be constructed, including 7.3 miles in yearlong and probable sage grouse habitat, which may be a hazard to flying sage-grouse (Connelly et al. 2004). Design features, such as placement away (greater than one mile) from leks, combined with the proposed removal of nearly two miles of existing fence would help minimize potential impacts to birds. The fence-to-area ratio in the Project Area would increase to two miles of fence per square mile, which is relatively low compared to other areas (Connelly et al. 2004).

4.12 Transportation/Roads

The transportation network within, and in the vicinity of, the Project Area includes a U.S. Highway, Harney and Malheur County roads, BLM roads, and other roads.

4.12.1 Affected Environment

4.12.1.1 Study Methods

The study method for transportation and roads used the following information to define the affected environment:

-
- BLM Master Title Plats;
- BLM LR2000 database;
- Celatom Mine Complex Plan of Operations;
- Harney County Transportation System Plan;
- BLM geographical information system (GIS) data;
- Oregon Department of Transportation (ODOT) traffic count data; and
- Non-public roads developed for mining operations and reclaimed at the end of their use were analyzed as part of the Proposed Action disturbance under soils, vegetation, and special status species.

4.12.1.2 Existing Conditions

Harney County maintains four roads within the Project Area: Juntura Cutoff Road, Altnow Beulah Road, the Cottonwood Reservoir Road, and Agency Mountain Road (Figure 2.3.1). The Juntura Cutoff Road and the Agency Mountain Road continue into Malheur County. Other roads within the Project Area include the BLM Beede Desert Road, the Mill Gulch Road, the Hart Road, and the Box Springs Road. The Beede Desert Road is also located on private lands. The Mill Gulch Road is also located on State of Oregon land and private land. South of the Project Area, the Juntura Cutoff Road and the Altnow Beulah Road connect with US Highway 20, the regional highway that traverses central Oregon from east to west.

US Highway 20 has an average daily traffic count of between 1,100 and 1,400 vehicles between the Harney-Malheur County Line and Vale, Oregon. Traffic data are not available for the other roads within the vicinity of the Project Area. Project-related truck traffic from the Project Area to the processing facility near Vale is approximately 48 trips per day (24 round trips), when the mining operations are occurring.

4.12.2 Environmental Consequences

4.12.2.1 Assessment Methodology

The analysis of effects is based on traffic trip information provided by EPM, along with the information obtained for the definition of the affected environment. Direct effects could result from the closing or blocking of existing travel routes, or increasing the use of travel routes.

4.12.2.2 Alternative 1 - No Action Alternative

No changes to the transportation network would occur under the No Action Alternative.

4.12.2.3 Alternative 2 - Proposed Action

Since US Highway 20 is the main east-west corridor through Harney and Malheur Counties (connecting Vale with Burns), the primary reason that the public may utilize US Highway 20 in the vicinity of the Project Area would be to travel to and from Vale and Burns. The Project use of US Highway 20 would be at the continued rate of 48 trips per day. This use is approximately three percent of the total traffic.

The existing public transportation network in areas near and to the north of the Project Area would not be impacted by the Proposed Action. As roads are developed, maintained, and closed for mine uses, the current levels of public access through the Project Area will be maintained. The transportation network in the vicinity of Mill Gulch would be improved under the Proposed Action by the reestablishment of Hart Road around the existing Kelly Field open pit. The existing transportation network would remain available throughout the construction, mining, and reclamation phases of the Project. The non-public mine roads are not considered part of the public transporation network because these roads would ultimately be reclaimed. The non-public roads are instead analyzed as part of the disturbance impacts in the soils, vegetation, and special status sections. The Proposed Action would have essentially the same impacts as the existing approved operation.

4.12.2.4 Alternative 3 - Proposed Action with Additional Design Elements

The existing public transportation network in areas near and to the north of the Project Area would not be impacted by Alternative 3. The transportation network in the vicinity of Mill Gulch would be improved under Alternative 3 by the reestablishment of Hart Road around the existing Kelly Field open pit. The existing transportation network would remain available to the public throughout the construction, mining, and reclamation phases of the Project. The Eagle Cutoff Road proposed under Alternative 3 is considered a temporary road that is not part of the public transportation network and would, therefore, be reclaimed at the end of the Project. Alternative 3 would have essentially the same impacts as the existing approved operation.

4.13 Vegetation, Forestry and Woodland Resources

4.13.1 Regulatory Framework

4.13.1.1 Federal and State Management Policies

The FLPMA, PRIA, 43 CFR 4180, and the Oregon/Washington Standards for Rangeland Health provide the direction, goals, and objectives for vegetation management in the Project Area.

The discussion and analysis of potential effects on forestry and woodland resources is tiered to the Proposed Three Rivers RMP/FEIS (BLM 1991).

4.13.2 Affected Environment

4.13.2.1 Study Methods

Ecological Site Inventory (ESI) data were gathered on the Project Area from 1985 to 1992. ESI provides soil condition, vegetation composition, and ecological status data. This information was obtained from the BLM's GIS layers, which were used in this EIS. This information is older than the data that were provided by the BLM for greater sage-grouse habitat, which show areas that burned, were reseeded, consist of perennial grasslands, and juniper woodlands. The information shown on Figure 4.13.1 is adequate for a general vegetation discussion.

The information pertaining to Forestry and Woodlands was compiled from the Timber Inventory for the northwest quarter of Section 30 and southwest quarter of Section 19, T19S, R37E, dated April 1995 (EPM 2008, Appendix 53).

4.13.2.2 Existing Conditions

Seven upland vegetation communities and at least one stand of ponderosa pine occur in the Project Area. The stand of ponderosa pine was analyzed and approximately 77 acres were approved for removal in the 1985 EA, FONSI, and DR. Due to the age of the decision and the fact that the stand has not yet been harvested, it is still part of the existing environment, but will not be re-analyzed in this EIS. Vegetation in the Project Area is generally sparse as a result of the soil properties, the high content of DE, and historical and existing disturbance regimes. The vegetation community types within the Project Area include the following: big sagebrush/annual grassland; big sagebrush/crested wheatgrass; big sagebrush/grassland; juniper/big sagebrush; low sagebrush/grassland; mountain big sagebrush/perennial grassland; and stiff sagebrush (Figure 4.13.1). Vegetation community data for 315 acres are missing in three locations within the Project Area boundary that may be the result of existing open pits and mine operations. Riparian areas were included on Figure 4.13.1 from the BLM database; however, no specific vegetation communities were identified. Table 4.13-1 summarizes the vegetation community types and acreage within the Project Area.

There are several stands of ponderosa pine (*Pinus ponderosa*) located in the northwest quarter of Section 30 and in the southwest quarter of Section 19, T19S, R72E, in the vicinity of the existing Kelly Field mine. The timber stands noted in Table 4.13-1 encompass approximately 141 acres (EPM 2008, Appendix 53) and occur in one of these data gap areas shown on Figure 4.13.1. The ponderosa stands within the Project Area are unusually far south for this area and may exist as

Figure 4.13.1 (Vegetation Communities within the Project Area) exhibits the general vegetation found within the project area. Perennial and intermittent streams and riparian areas are exhibited as well.

Explanation

- Project Boundary
- Excluded Area within Project Boundary
- Perennial Streams
- Intermittent Streams
- Riparian Areas

General Vegetation

- Big Sagebrush/Annual Grassland (1978.9 acres)
- Big Sagebrush/Crested Wheatgrass (1723.3 acres)
- Big Sagebrush/Perennial Grassland (6289.0 acres)
- Juniper/Big Sagebrush (724.1 acres)
- Low Sagebrush/Grassland (19.6 acres)
- Mountain Big Sagebrush/Grassland (1583.1 acres)
- Stiff Sagebrush (7.1 acres)

0 5,000 Feet

0 2,000 Meters

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Vegetation Communities within the Project Area

Figure 4.13.1

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the result of the moisture-bearing characteristics of the diatomite since the stands appear to coincide with the western edge of the deposit (BLM 1985). The ponderosa pine stands in the Project Area are not within a designated fuelwood harvest area; however, fuelwood harvest is not prohibited within the Project Area (BLM 1991). The ponderosa pine stands in the Project Area are not within a proposed old growth management area or within a proposed old growth forest stand (BLM 1991).

A timber inventory was conducted in April of 1995 (EPM 2008, Appendix 53). Commercial timber within the Project Area consists of five stands of pole size and small sawlog ponderosa pine. The stands of ponderosa pine occur on slopes ranging from zero to 45 percent with east and west aspects. Defect percentages range from six to 11 percent and considerably higher in some of the scattered timber. In 1995, the stands were as follows:

- Stand 1 included approximately 300 trees per acre with a diameter at breast height (dbh) range of seven inches to 22 inches;

- Stand 2 included approximately 454 trees per acre with a dbh of seven inches to 24 inches;

- Stand 3 included approximately 413 trees per acre with a dbh of seven inches to 24 inches;

- Stand 4 included approximately 263 trees per acre with a dbh of seven inches to 22 inches; and

- Stand 5 included approximately 350 trees per acre with a dbh of seven inches to 26 inches.

The total volume during the 1995 survey was 221,023 board feet (BDFT) gross and 190,687 BDFT net.

4.13.3 Environmental Consequences

4.13.3.1 Assessment Methodology

The Project Area was the analysis area used to assess the types of vegetation and the percentages of those types that occur. Potential effects on vegetation resources can be categorized as direct and indirect, over the 50-year life of the Project and long term (following reclamation). Direct effects on vegetation resources would include temporary and permanent vegetation removed associated with construction, operation, and maintenance of the Project. Indirect effects could include changes in the watershed function and condition, or habitat values resulting from the changes to vegetation. Long-term impacts are those occurring after reclamation is complete.

Potential effects to forestry and woodland resources can be categorized as direct and indirect, as well as short term (i.e., during the life of the Project) and long term. Direct effects to forestry/woodland resources would include temporary and permanent habitat loss associated with construction, operation, and maintenance of the Project. Indirect effects could include degradation of forestry and woodland resources due to increased access and introduction of noxious weeds. Short-term impacts are those that could occur during Project implementation and

until reclamation is complete. Long-term impacts are those occurring after reclamation is complete.

Table 4.13-1: General Vegetation Community Types within the Project Area

General Vegetation Community	Elevation Range within the Project Area (feet amsl)	Acres[1] within the Project Area	Percent within the Project Area
Big sagebrush/Perennial grassland	3,629 to 4,855	6,289	49.7
Big sagebrush/Annual grassland	3,638 to 4,725	1,979	15.7
Big sagebrush/Crested wheatgrass	3,689 to 4,429	1,723	13.7
Mountain big sagebrush/Grassland	4,409 to 4,536	1,583	12.5
Juniper/Big sagebrush	3,714 to 4,476	724	5.7
Low sagebrush/Grassland	4,409 to 4,536	20	0.2
Stiff sagebrush	3,796 to 5,089	7	0.1
Ponderosa pine stand [2]	4,100 to 4,140	141	1.1
Areas with no vegetation data	N/A	174	1.3
	Total	**12,640**	**100**

[1]These acreages have been rounded to the nearest whole number.
[2]The ponderosa pine stand is located near Mill Gulch in an area with no vegetation data. The ponderosa pine stand acreage was determined from the timber study that was completed following the 1985 EA DR. This acreage was substituted for part of the area with no vegetation data.

4.13.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue operations at the Project, as previously approved under the 1985 DR (BLM 1985) or other permits and as outlined in Chapter 2, which would result in 465 acres of disturbance. During and upon completion of mining operations, EPM would be required to meet the reclamation criteria and conditions established in the 1984 MPO. The area covered by the Proposed Action would remain available for future DE processing or for other purposes, as approved by the BLM.

The No Action Alternative would have unavoidable impacts to vegetation during the the mining operations. However, revegetation and reclamation would minimize these impacts to vegetation.

Under the No Action Alternative the BLM would not approve the MPO and EPM would continue operations at the Project Area, as previously approved under the 1985 DR (BLM 1985) or other permits and as outlined in Chapter 2. Removal of the five stands was authorized in the 1985 DR. The 1984 MPO required that EPM give BLM one year's notice prior to their use of the area with the pine trees so BLM could conduct and implement a timber sale. Since the area has not been needed for mining operations the stands remain intact. The inventory and resultant NEPA analysis of the ponderosa pine stands used in the 1985 authorization are considered out of date by BLM because of the time that has passed. While the 1985 DR authorized removal of these stands of ponderosa pine, it is too old to implement without being updated with current information and analysis. The area covered by the Proposed Action would remain available for future DE processing or for other purposes, as approved by the BLM.

4.13.3.3 Alternative 2 - Proposed Action

4.13.3.3.1 General Removal of Vegetation

Implementation of the Proposed Action would result in the incremental disturbance of up to 1,394.5 acres of vegetation over the 50-year life of the Project, of which 250 acres would be disturbed through exploration activities. A total of 250 acres (17 percent of the total) would be permanently lost due to pit walls and benches that would not be reclaimed. The communities located within the mine area boundaries are shown in Table 4.13-2 and represent the types of vegetation that could be impacted from mining operations within the mine operations boundaries. None of these four vegetation communities is considered unique with regard to the area's known resources, as they represent some of the most common vegetation types in eastern Oregon.

Table 4.13-2: General Vegetation Communities Affected by the Mining Activities Associated with the Proposed Action

Vegetation Community	Proposed Action Mine Areas (acres)	Total Acres in Project Area	Percent of Community in Project Area
Big sagebrush/Perennial grassland	939	6,289	14
Big sagebrush/Annual grassland	284	1,979	14
Big sagebrush/Crested wheatgrass	50	1,723	3
Mountain big sagebrush/Grassland	348	1,583	22
Ponderosa pine forest	77	141	55

Mining Operations

As indicated in Table 4.13-2, a maximum of approximately 14 percent of the big sagebrush/perennial grassland vegetation community, approximately 14 percent of the big sagebrush/annual grassland vegetation community, three percent of the big sagebrush/crested wheatgrass vegetation community, and 22 percent of the mountain big sagebrush/grassland vegetation community could be affected by activities associated with the construction of open pits, ore and waste stockpiles, growth media stockpiles, and access and haul roads. No direct impacts would result from proposed mining activities to juniper/big sagebrush, low sagebrush/grassland, or stiff sagebrush communities or the remaining 64 acres of ponderosa pine not approved for removal in the previous decision (BLM 1985). No riparian areas would be impacted by mining activities. A total of 1,144.5 acres would be reclaimed at the end of the Project and not all surface disturbance would occur at the same time. As areas are mined out, recontouring and seeding would result in interim reclamation. Over the long term (following reclamation), sagebrush and grasslands would become reestablished and increase in abundance as a result of reclamation and succession.

Exploration Activities

Exploration drilling and subsequent trenching and bulk sampling would be conducted to delineate boundaries of known ore reserves and to explore for new deposits and could occur on federal lands anywhere within the Project Area over the 50-year life of the Project. Up to 250 acres of disturbance from the exploration activities would be created incrementally and dispersed throughout the Project Area. Exploration activities could occur in any of the vegetation types listed in Table 4.13.1 (with the exception of the ponderosa pine stand) and would disturb up to two percent of the vegetation within the Project Area boundary. Overland travel would be managed to minimize disturbance of vegetation. The surface disturbance would be primarily linear (for access roads, drill pads, and trenches) and areas of native vegetation communities would remain between areas of disturbance; therefore, the disturbance would be highly likely to be recolonized by surrounding vegetation.

Reclamation and revegetation would minimize the direct impacts to the vegetation communities within the Project Area. Revegetation activities would be conducted as outlined in Section 2.5. Under the Proposed Action, seed mixtures and application rates, based on previous BLM requirements are shown in Table 2.5-1. This mixture would provide forage and cover species similar to the pre-disturbance conditions, facilitating the post-mining land uses of livestock grazing and wildlife habitat. The seed mixture and application rates would be subject to modification by the BLM. The actual seed mixture and application rates would be determined prior to seeding based on the results of reclamation in other areas of the mine, concurrent reclamation, revegetation test plots, or changes by the BLM in the seed mixture requirements.

4.13.3.3.2 Particulate Deposition on Vegetation

The Project mining activities and vehicular traffic would indirectly affect vegetation by increasing the amount of airborne particulate deposition onto vegetation surfaces. Deposition could result in lowered primary production in plants due to reduced photosynthesis and decreased water-use efficiency. The potential effects on vegetation from dust would be reduced by wind and periodic precipitation, which would remove accumulated dust. In addition, the implementation of the dust abatement measures outlined in the Proposed Action would reduce the impact of deposition on vegetation.

4.13.3.3.3 Modification of Vegetation Structure

Vegetation removal and subsequent reclamation efforts would result in plant community simplification and the conversion from a shrub-dominated community to a grass/forb-dominated community during activities conducted over the 50-year life of the Project. Once established, shrub species may become dominant within three to five years, depending on precipitation and growth media characteristics. Although the structure of the vegetation would be temporaily modified, the reclaimed plant community is expected to produce adequate cover to stabilize the site and provide forage for use by livestock and wildlife in the long term, thereby meeting reclamation goals.

4.13.3.3.4 Forestry and Woodland Resources

Implementation of the Proposed Action would result in logging and probable loss of up to 76.7 acres (54 percent) of the ponderosa pine stands over the 50-year life of the Project. Short-term

effects would result from the timber sale. EPM would give the BLM two year's notice prior to their use of the area with the pine trees so the BLM can conduct and implement a timber sale. It would have a very small positive impact on the local forest products economy. The removal of 76.7 acres of ponderosa pine would be a long-term impact, since it would take 75 to 100 years for mature trees to become reestablished if they were able to return at all. In Section 19, where ponderosa pine would be removed to facilitate mining, final reclamation would include seeding with one of the approved seed mixes. Ponderosa pines would not be planted as part of reclamation, because the primary goals of rehabilitation are soil stabilization and control of noxious and invasive weeds. Establishment of a more continuous ground cover of grasses and forbs is more important than replanting 77 acres of pine trees. Secondarily, because this stand of trees is an outlier in a drier, lower location than typical for the area there is some chance that the trees are present because of the water-holding qualities of diatomite. With the diatomite mined and the pit backfilled with more porous material, plus climate change, it is likely that pines could not survive on the mined sites.

4.13.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Implementation of Alternative 3 would result in essentially the same impacts to vegetation as the Proposed Action over the 50-year life of the Project. The differences between the Proposed Action and Alternative 3 include additional measures for growth media management (Section 3.3.11.1) such as seed mixes (Tables 3.3-1 and 3.3-2) designed specifically for the species' ability to grow within the constraints of the low annual precipitation experienced in the region and for the soils within the Project Area to ensure reclamation success. Alternative 3 would result in impacts to an additional 1.24 acres of mountain big sagebrush/grassland and an additional 0.32 acre of big sagebrush/perennial grassland for the proposed Eagle Cutoff Road. Alternative 3 would result in a reduction of impacts to big sagebrush/perennial grassland by 2.86 acres because the sediment basin would not be constructed in the Hidden Valley Mine Operations Area for this alternative.

Impacts to forestry and woodland resources from Alternative 3 are the same as those described in the Proposed Action. Alternative 3 would not otherwise impact forestry and woodland resources.

4.14 Visual Resources

4.14.1 Regulatory Framework

Scenic quality is a measure of the visual appeal of a parcel of land. Section 102(a)(8) of FLPMA placed an emphasis on the protection of the quality of scenic resources on public lands. Section 101(b) of the NEPA of 1969 required that measures be taken to ensure that aesthetically pleasing surroundings be retained for all Americans.

To ensure that these objectives are met, the BLM devised the Visual Resources Management (VRM) System. The VRM system provides a means to identify visual values; establish objectives for managing these values; and provide information to evaluate the visual effects of proposed projects. The inventory of visual values combines evaluations of scenic quality, sensitivity levels, and distance zones to establish visual resource inventory classes, which are "informational in nature and provide the basis for considering visual values in the land use planning process. They do not establish management direction and should not be used as a basis for constraining or limiting surface disturbing activities" (BLM 1986b).

VRM classes are typically assigned to public land units through the use of the visual resource inventory classes in the BLM's land use planning process. One of four visual resource management classes is assigned to each unit of public lands. The specific objectives of each visual resource management class are presented in Table 4.21-1.

Table 4.14-1: BLM Visual Resource Management Classes

Class	Description
I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any change must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the character should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 1986b

4.14.2 Affected Environment

4.14.2.1 Study Methods

The study area for visual resources is defined as the viewshed of the Project, or the area from which the Project can be seen, which is Drinkwater Pass on U.S. Highway 20 (Figure 1.1.1 and Figure 4.14.1). The key observation point (KOP) determined by the BLM during the ID Team kickoff meeting and Project field trip is shown on Figure 1.1.1. The cover of the EIS also shows the viewshed, which includes parts of Agency Mountain to the northeast and Beede Desert to the northwest.

4.14.2.2 Existing Conditions

The study area lies in the Blue Mountain section of the Columbia Plateau Province of the United States. The Blue Mountain section is characterized by north-south trending elongated valleys and ridges. The ridges rise from a couple of hundred feet to 2,000 feet above the valleys.

The existing pit developments are predominantly along the sides of the valleys. The Project is located in an area that has been historically explored, prospected, and mined. Both historic and recent operations are visible as white areas containing waste rock dumps, roads, and drill pads.

Vegetation within the Project Area is typical of the surrounding ridges and consists of areas of pine trees in the higher elevations and sagebrush and western juniper in the lower elevations. Previous mining and exploration activities are visible because the light-colored cleared areas contrast with the darker vegetation stands and darker weathered rock formations.

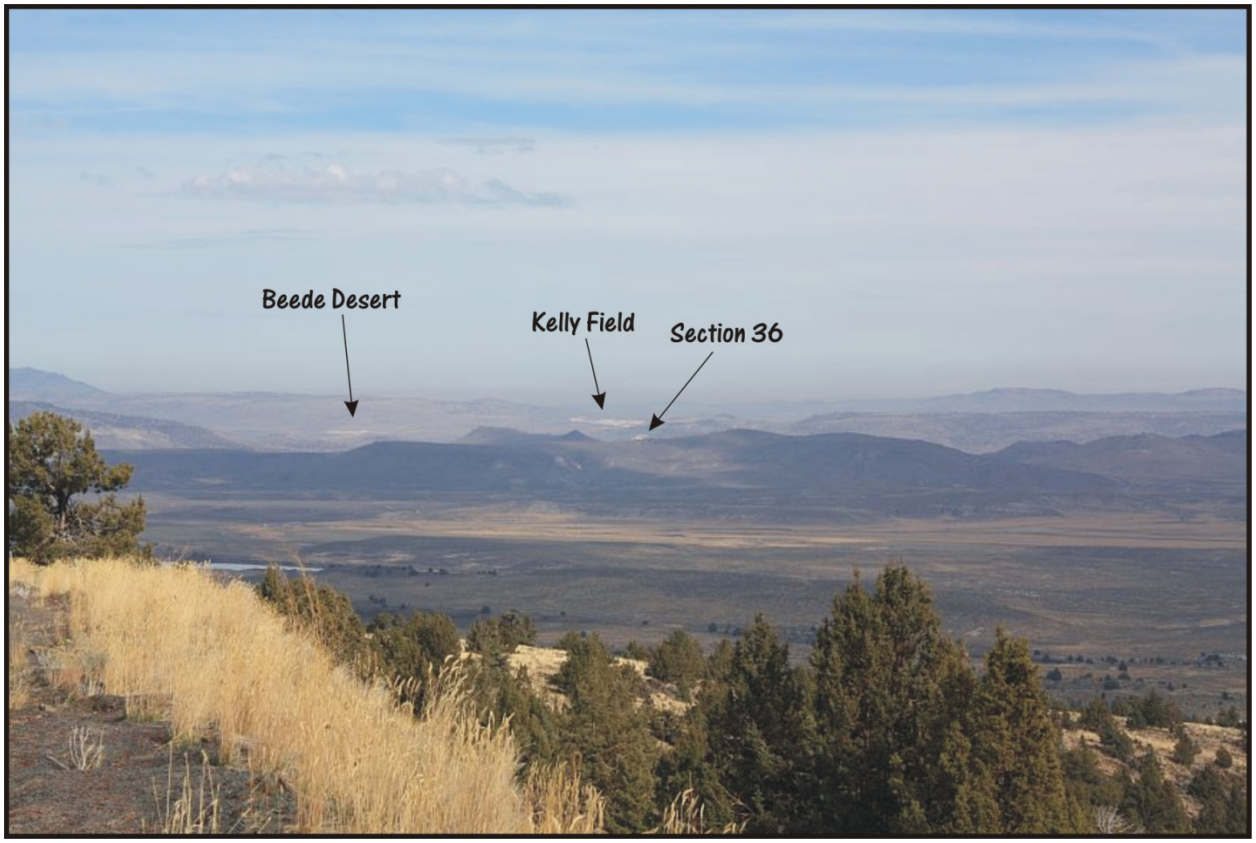
The Project Area was designated as a Visual Management Class IV area by the BLM for the Three Rivers and Southeastern Oregon RMPs (BLM 1992 and 2001). Class IV is the least restrictive of the four management classes. A management activity in this class could draw attention as a dominant feature in the landscape, but attempts should be made to minimize the contrast by repeating the form, line, color, and texture of the characteristic landscape (BLM 1984).

4.14.3 Environmental Consequences

4.14.3.1 Assessment Methodology

The BLM prescribes VRMs for all BLM-administered lands, including the area of the Proposed Action and alternatives. Analysis is completed from a viewpoint that the general public can see (e.g., state or county roads) and where the Project can be seen for a duration of time. The visual effects of the facilities and operations of the Proposed Action were evaluated with respect to conformance with the established VRM (Class IV). The Analysis was based on the view as seen from KOP #1 (Figure 1.1.1), which is Drinkwater Pass on U.S. Highway 20. When driving, this view is only seen for a few seconds. The BLM field checked other potential KOP sites but determined that KOP #1 was the best overall site to view the existing disturbance. All of the other considered sites either did not have a view of the mining operations due to topography or the operations could only be observed close up.

Figure 4.14.1: Project Area Viewshed



The process used to assess visual impacts is the BLM Contrast Rating Process, as outlined in BLM Technical Manual 8432, "Visual Contrast Rating." This is a systematic process that is used to identify, describe and analyze potential visual impacts of proposed projects and activities. VRM Form 8400-4 was prepared for KOP #1. This process consists of first separating the existing landscape into major features, which include land/water, vegetation and structures. Then the landscape character elements, which include form, line, color, and texture are described for each feature. As is common throughout the Columbia Plateau Physiographic region, views are open and expansive. Potentially sensitive viewing locations (places where people travel, recreate, or reside) were examined, and from these, one KOP was identified and evaluated. The VRM process was then conducted for the Project. The degree of contrast between the features and elements of the existing landscape and post-development landscape is then determined. The degree of contrast cannot exceed the threshold for the Visual Management Class. Since the Visual Management Class for the Project Area is Class IV, there can be strong contrasts between the existing landscape and post-development landscape.

4.14.3.2 Alernative 1 - No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed and associated impacts to visual resources would not occur. Under the No Action Alternative the BLM would not approve EPM's MPO and EPM would not expand mining operations on BLM-administered lands or conduct additional exploratory drilling operations on BLM-administered land outside of the boundary approved by the BLM in 1985. EPM would continue to expand operations on federal land as previously approved under the 1985 DR (BLM 1985) or permitted by BLM under a subsequent Notice. The total existing disturbance associated with the No Action Alternative is 465 acres. Under the No Action Alternative there would continue to be a contrast from the existing operations as permitted under VRM Class IV guidelines.

4.14.3.3 Alternative 2 - Proposed Action

The primary issues related to visual resources would include the following: 1) an increase in the number of sensitive viewpoints, as there is currently only one, impacted by the Project, 2) increases in the extent and scale of visible mining disturbances; and 3) the ultimate appearance of the Project at full reclamation.

KOP #1 is located at a pass on U.S. Highway 20 which provides the only view of the entire Project Area (Figure 4.14.1). This KOP is located at the point where the Project Area is in the observer's line-of-sight for a brief period of time when driving between Burns and Vale, Oregon. Figure 21.1.1 is a photograph taken at KOP #1. The foreground consists of coarse-grained green mature trees and medium-grained, wheat-colored grasses. The middle ground shows a broad valley floor with medium-grained shrubs green to brown in color with light colored broad patches of vegetation and bare ground. The background consists of gently rolling hills and valleys blue in color and fine-grained. Beede Desert, Kelly Field, and Section 36 Mine Area Operations show up as light-colored areas at the edges of the valleys. These areas contrast with the surrounding dark-colored vegetation.

The proposed mining activities would be visible from KOP #1. The Proposed Action would result in minor contrast in the form and line between the existing landscape and the post-mining/post-reclamation background landscape. The contrast in color would be more pronounced. The contrasts are naturally mitigated by the distance from the KOP to the

disturbance and the contrasts would be further mitigated after reclamation of the mined areas. The changes to the landscape are allowable under the Class IV VRM.

The Proposed Action would not result in unavoidable physical changes to the character of the Project Area. There would be color changes that would be visibly apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action.

4.14.3.4 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to visual resources from Alternative 3 are the same as those described in the Proposed Action.

4.15 Water Quality and Quantity

4.15.1 Regulatory Framework

In Oregon, the EPA has delegated authority to implement the "Federal Water Pollution Control Act of 1972" (Public Law 92-500) and amendments, and the 1977 "Clean Water Act" (CWA) to the DEQ. As specified in these acts, federal agencies are responsible for water quality on land they manage, and therefore, memorandums of understanding (MOUs) are developed between federal agencies and the DEQ. These MOUs require federal agencies to meet water quality standards, monitor activities to assure that they meet standards, report results to the State of Oregon, and meet periodically to recertify BMPs. Through a MOU between the BLM and the DEQ, the DEQ assists the BLM in developing or updating BMPs and evaluating practices that protect rivers and lakes. The BLM is charged with implementing and enforcing natural resource management programs for the protection of water quality on federal land under its jurisdiction (BLM 1990).

The primary cause of water quality degradation on public land is pollution from nonpoint sources. High sediment and turbidity levels and elevated temperatures are the primary water quality problems stemming from nonpoint sources. As part of meeting the requirements of the CWA, the State of Oregon produced the "1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution Report." This report identified waters affected by nonpoint source pollution, categories of nonpoint source pollution, the process for identifying BMPs, and state and local nonpoint source programs.

As required under section 303(d) of the CWA, the State of Oregon has updated its list of "water quality limited" waters. The listing of waters that do not meet the state's water quality standards is based on actual evidence of violation (OAR 340-41). The BLM coordinates with the DEQ on the development, implementation, and monitoring of future management plans, or revisions of current plans, to prevent nonpoint source pollution of water quality limited waters.

Oregon has adopted an anti-degradation standard (OAR 340-41-026, implemented through OAR 340-41-120 through 340-41-962) that incorporates federal policies. In general, the federal policies and state standard require that water quality be maintained for beneficial uses. BLM management that affects water quality is also governed by other laws and regulations. The BLM obtains permits from the EPA through the DSL and from the Army Corps of Engineers to

comply with sections 401, 402, and 404 of the CWA. Based on an agreement with the DEQ, DOGAMI has primacy to implement the federal CWA.

4.15.2 Affected Environment

4.15.2.1 Summary and Purpose of Water Quality Study

The following sections contain a very detailed baseline water resources analysis completed by SRK (2010a). This analysis was necessary to determine if there would be impacts associated with the Proposed Action or the alternatives. The basic issue is that one of the proposed open pits may be excavated to elevations below the water table, potentially creating a bathtub type effect with some ground water flowing into the open pits, allowing the ground water to interact with DE that contains sulfide mineralization (see Section 4.3 and Appendix A for material characterization details). That interaction could cause the water to have a low pH, an indicator that the water could act as acid rock drainage. If that low pH water mixes with the ground water, the ground water could become degraded. Although a pit lake is not anticipated to form in these pits because of the low ground water inflow rates and high evaporation rates, there is some potential for a variable amount of rainwater or snowmelt to accumulate seasonally in the open pit, depending on the amount of precipitation (the SLERA indicates that the metal concentrations are sufficiently low in accumulated pit water and would not pose a credible risk to wildlife or livestock when, and if, present). However, this meteoric water could also interact with sulfide bearing DE and create low pH (acidic) water that could interact with the ground water and cause degradation.

In order to eliminate the possibility of degrading ground water, and based on the extensive study whose details follow, it was determined that the surface expression of groundwater (although transient) and any impact could be mitigated through the use of an engineered partial backfill of any open pit that intersects ground water. The intent of this closure strategy would be to maintain the pit as an evaporative sink for ground water (i.e., not allowing any water to flow through the pit), while reducing the potential for a low pH to form in the ponded meteoric water. This is generally achieved by backfilling the pit to an elevation where evapotranspiration losses through the uppermost portions of the backfill would equal the rate of ground water inflow. Evaporation would occur primarily by capillary action (i.e., a phenomenon where liquid spontaneously rises in a narrow space such as a thin tube) so that surface water ponding on the backfill is less likely to occur with evaporation (and possibly transpiration, which is evaporation through vegetation), and a localized ground water sink could be maintained not allowing any water to flow into the ground water aquifer.

All of the graphs and figures from the baseline study are included in the Water Resources section to allow those readers with knowledge of hydrology to understand the parameters that were used in the impact analysis.

4.15.2.2 Study Methods

SRK conducted a baseline study and site characterization to establish baseline conditions of water resources (physical and chemical) present within the Project Area (SRK 2010a). Information was collected by reviewing existing ground water elevation and chemistry data, performing a baseline inventory of surface water features, collecting and analyzing surface water samples, drilling 23 borings, installing 14 ground water monitoring wells (shown on

Figure 4.15.1 (Surface Water Resources and Ground Water Monitoring Wells) reveals wells, ponds, reservoirs, seep/spring locations, streams and drainage areas. The hydrologic study area is also noted.

Explanation

- Ground Water Monitoring Well
- Pond
- Reservoir
- Seep/Spring
- Stream
- Hydrologic Study Area
- Project Boundary
- Excluded Area within Project Boundary

0 5,000 Feet

0 2,000 Meters

Projection: UTM Zone 11 North, NAD83

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may by updated without notification.

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BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Surface Water Resources and Ground Water Monitoring Wells

Figure 4.15.1

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Figure 4.15.1), and six piezometers for hydraulic testing and ground water sampling. The hydrologic study area included the entire Project Area and its immediate vicinity as shown on Figure 4.15.1. The findings of this study are used in the following section to establish existing conditions and serve as a baseline for impact analysis.

4.15.2.3 Existing Conditions

4.15.2.3.1 Surface Water Resources

Surface Water Hydrology and Climate

The Project Area is located in the Upper Malheur Hydrologic Unit (17050116) within the Middle Snake subbasin of the Columbia River Basin region. The majority of drainages present in the hydrologic study area is ephemeral in nature and only flows during heavy snowmelt or high precipitation events. Surface water on site generally flows to the west and southwest into Mill Gulch drainage, which eventually joins with Warm Springs Creek. Warm Springs Creek and Otis Creek flow into Cottonwood Creek, and Cottonwood Creek flows into the Middle Fork of the Malheur River toward the Warm Springs Reservoir. Surface drainage in the northeastern portion of the Project Area, including Beede Desert, flows directly into Cottonwood Creek. Catchment basins were constructed downgradient of Beede Desert Mine Operations Area to prevent any sediment from the Project disturbance from reaching the Altnow Ditch and Altnow Reservoir, west of the Project Area. Hidden Valley lies two miles west of the Mill Gulch drainage and contains an intermittent drainage that flows into a catchment area that traps the water flow within the lower reaches of the valley, where an earthen dam transects the drainage to create a water source for livestock and wildlife.

As described in Chapter 2, drainage control ditches and sediment basins have been constructed to prevent sediment from migrating off site. The basins in the Kelly Field and Section 36 Mine Operations Areas were constructed to reduce sediment loading in the surface water prior to being discharged into the Mill Gulch drainage.

The Project Area is located in a semi-arid climate zone with hot dry summers and cold winters. Based on data evaluated from three meteorological stations within close proximity to the Project, it is estimated that the average annual precipitation at the site is slightly greater than ten inches and is primarily in the form of snow (SRK 2010a). Therefore, most of the annual runoff within and through the Project Area is derived from snowmelt. Based on pan evaporation data obtained from a meteorological station located approximately 20 miles south of the Project, the estimated open-water evaporation rate in the Project Area is 42.32 inches annually. The greatest amount of evaporation occurs in the months of July and August (SRK 2010a).

Surface Water Use

Surface water within the Project Area is used primarily by livestock and wildlife. There is no historic or existing use of surface water for domestic purposes within the Project Area.

Surface Water Features

Seeps and Springs

SRK identified a total of 32 potential seeps and springs within the hydrologic study area but only five of the seep and spring locations had water present during the 2009 field studies (SRK 2010a). Tub Spring and Box Spring are the most prominent springs in the area, both of which are located outside and east of the Project Area.

Ponds

SRK identified a total of 29 ponds within the hydrologic study area. Most of the ponds were stockwater ponds and some were sediment basins associated with the existing mining operations. The Hidden Valley Pond is a small man-made BLM stock water pond located at the southern end of Hidden Valley outside of the proposed Hidden Valley Mine Operations Area. This pond is an ephemeral feature that is fed by intercepted water from the Hidden Valley watershed. Since this pond is located outside the footprint of disturbance, water quality data obtained from this feature represents background conditions.

Drainages

The major drainages within the hydrologic study area include Mill Gulch, Mill Creek, Warm Springs Creek, Cottonwood Creek, the Altnow Ditch and the Stallard Ditch. In addition, 12 tributaries (Drainages A through L) to these drainages were identified (Figure 4.15.1).

Perennial Reservoirs and Streams

The only permanent water body located inside the hydrologic study area is the Altnow Reservoir, which is located outside and to the west of the Project Area. The Altnow Reservoir is reportedly fed by an artesian water source.

Surface Water Quality

Water quality samples were collected only from the three most prominent surface water features (Tub Spring, Box Spring, and Hidden Valley Pond) during the 2005, 2006, 2007, and 2008 sampling events. See Figure 4.15.1 for the locations of these water bodies. A total of 11 water quality samples were collected during the 2009 field program. Locations with waters suitable for sampling included the following:

- Two improved springs (Tub Spring and Box Spring);
- Two seep locations within Mill Creek;
- One seep location within Mill Gulch;
- One seep location within Drainage B (a tributary to Mill Gulch);
- Three perennial stream locations, including Cottonwood Creek, the Altnow Ditch and where Cottonwood Creek is diverted into the Altnow irrigation ditch; and
- Two perennial reservoirs, including Cottonwood Reservoir and Altnow Reservoir.

Additional surface water samples were collected by EPM in April 1995 from water that ponded in the bottom of the Section 36 and Kelly Field Open Pits after the spring snowmelt. Water quality results from these samples were compared to Oregon Maximum Contaminant Levels (MCLs), which are drinking water standards. Samples from the perennial surface water features were also compared to Oregon Aquatic Life Criteria.

Spring and Seep Water Quality

The water quality data for the seep and spring water samples are summarized for select parameters in Table 4.15-1. Similar to previous sample events conducted by EPM for Tub Spring and Box Spring, manganese and iron (total and dissolved) were elevated above the Oregon MCLs in Tub Spring and none of the parameters were above Oregon MCLs in Box Spring. Manganese (total and dissolved), total iron and total aluminum were also elevated in the Mill Gulch seep and the tributary to Mill Gulch (Drainage B). Total and dissolved arsenic values are also slightly elevated above the Oregon MCL in the tributary to Mill Gulch. All constituents are below the respective MCLs in the two Mill Creek seep samples, with the exception of total and dissolved manganese values that are elevated in the most downgradient location (i.e., SE-C27).

Table 4.15-1: Spring and Seep Chemistry

Parameter	Oregon MCLs (333-061-0030)	Tub Spring	Box Spring	Mill Gulch Seep	Tributary to Mill Gulch	Mill Creek Seep	Mill Creek Seep
		SP-A02	SE-C23	SE-C17	DR-C07	SE-C26	SE-C27
Aluminum, dissolved	0.2	<0.03	<0.03	<0.03	<0.03	<0.03	0.04
Aluminum, total	0.2	<0.03	<0.03	1.19	0.76	0.06	0.04
Arsenic, dissolved	0.01	0.0023	0.0045	0.0059	0.0146	0.0012	0.001
Arsenic, total	0.01	0.0019	0.0041	0.0059	0.015	0.001	0.001
Iron, dissolved	0.3	0.37	<0.02	0.27	0.31	0.02	0.02
Iron, total	0.3	0.89	<0.02	1.54	1.49	0.06	0.04
Manganese, dissolved	0.05	0.846	<0.005	2	1.4	0.015	0.059
Manganese, total	0.05	0.884	<0.005	2.04	1.47	0.015	0.066
Nitrate/Nitrite as N	10	<0.02	0.09	0.03	0.16	<0.02	<0.02
pH (s.u.)	6.5-8.5	8.2	8.2	7.8	8.3	8.2	8.6
Total Dissolved Solids	--	300	250	420	520	280	270
Sulfate	250	40	20	80	70	33	46
Total Alkalinity	--	176	193	219	268	165	155

All values reported in mg/L unless otherwise noted.
Shaded values exceed the respective Oregon Maximum Contaminant Levels (MCLs) as regulated by 333-061-0030.
< Denotes less than the specified laboratory method detection limit (MDL).

Based on results from sites located upgradient of existing mine areas or in areas not previously disturbed by mining (i.e., background conditions), constituents that may be naturally elevated include aluminum, arsenic, iron and manganese. In the Mill Creek drainage, only manganese is elevated for background conditions.

Pond Water Quality

During the 2009 field program, none of the surface water ponds within the hydrologic study area, including the Hidden Valley Pond, contained water suitable for sampling. However, water samples were collected from the Hidden Valley pond during previous sampling events.

- The chemistry for the Hidden Valley Pond from the three earlier sampling events is summarized in Table 4.15-2 for select parameters. As shown in Table 4.15-2, aluminum, iron and manganese are consistently elevated above the respective MCLs, and the total metals concentrations are several orders of magnitude greater than the dissolved metals for all three samples. These constituents are naturally elevated in the Hidden Valley Pond and are likely to be elevated during future monitoring events.

Despite the similarities, the total dissolved solids (TDS) and sulfate results for the 2005 sampling event are higher than the other two sampling events, even though samples were collected from the same location using the same sample collection methods. For the October 2007 and June 2008 sampling events, TDS and sulfate concentrations were below the respective MCLs. In addition, total metals concentrations are greater for the October 2007 and June 2008 samples. This might be due to the occurrence of a surface water runoff event prior to sample collection. The introduction of surface water runoff to the pond could potentially reduce sulfate and TDS loads (by dilution) and increase suspended solids in the water column, resulting in an increase in total metals concentrations.

The watershed upgradient of Hidden Valley Pond is undisturbed, and mining activities have not yet been expanded to this area. The elevated metals and sulfate concentrations in Hidden Valley Pond can be attributed to colloidal suspensions and the natural process of concentration by evaporation (i.e., evapoconcentration) of constituents in surface water runoff that is collected and stored in the pond.

Table 4.15-2: Hidden Valley Pond Chemistry

Parameter	Fraction	Hidden Valley Pond				Oregon MCLs (333-061-0030)
		Nov-09	Oct-09	Jun-09	May-09	
pH (s.u.)	--	7.7	8.1	7.9	7.3	6.5-8.5
TDS	--	**1520**	360	210	380	500
Sulfate	--	**510**	20	10	25	250
Alkalinity	--	44	202	81	33	--
Aluminum	dissolved	**5.19**	**1.92**	**6.6**	**0.23**	0.05-0.2
	total	**111**	**371**	**183**	**155**	
Arsenic	dissolved	0.0026	0.0049	<0.003	0.0011	0.01
	total	0.01	**0.039**	0.006	0.009	
Iron	dissolved	**1.94**	**4.22**	**2.68**	0.16	0.3
	total	**108**	**374**	**159**	**123**	
Manganese	dissolved	0.04	**0.909**	**0.672**	**0.063**	0.05
	total	**0.891**	**9.46**	**3.25**	**1.27**	

All values reported in mg/L except pH, which is reported as s.u.
< denotes less than the specified laboratory method detection limit.
Shaded values exceed the respective Oregon MCLs (333-061-0030)

Perennial Stream and Reservoir Water Quality

Four aquatic life samples were collected from perennial surface water features at Cottonwood Reservoir, Cottonwood Creek, Altnow Reservoir, and the Altnow Ditch. The water quality data for the surface water samples are summarized for select parameters along with Oregon Aquatic Life Criteria and Oregon MCLs in Table 4.15-3.

This comparison indicates dissolved aluminum concentrations in both the Cottonwood Reservoir and Cottonwood Creek were above the Oregon Aquatic Life Criteria of 0.087 mg/L. Total aluminum and total iron concentrations were elevated in all samples, except the Altnow Reservoir sample. Both total and dissolved manganese values were greater than the Oregon MCLs, but less than the Oregon Aquatic Life Criteria in the Altnow Ditch and Cottonwood Reservoir. In addition, the pH values observed in both reservoirs were greater than the Oregon MCL of 8.5. All other parameters were below the respective Oregon Aquatic Life Criteria and Oregon MCLs. For the sample collected at the Altnow irrigation ditch diversion within the Cottonwood Creek drainage, the only parameter that was elevated above Oregon MCLs is aluminum. Dissolved aluminum concentrations at this location are comparable to aluminum concentrations observed in the aquatic life samples collected from Cottonwood Creek and the Cottonwood Reservoir. Based on results from sites located upgradient of existing mine areas (Cottonwood Reservoir and Cottonwood Creek), constituents that have the potential to be elevated in background conditions include aluminum, iron and manganese.

Pit Surface Water Quality

The water quality data for the April 1995 and February 2010 samples are summarized for select parameters in Table 4.15-4. Results from the April 1995 and February 2010 pit surface water are considered comparable to any water that may collect in the existing and proposed open pits that intercept unoxidized diatomite. In Table 4.15-4, this chemistry has been compared to Oregon MCLs and background surface water chemistry for Mill Gulch as defined by DR-C07 (Tributary to Mill Gulch). In addition, two samples were collected from water in the sediment ponds within Mill Gulch. Background surface water chemistry for the Eagle Mine is not available and has therefore not been included in this comparison. The Hidden Valley open pit would only expose oxidized diatomite, and therefore, the results below do not apply to surface water that may collect in the Hidden Valley open pit.

As shown in Table 4.15-4, the pit surface water samples from 1995 and 2010 are comparable with acidic pH values ranging from 3 to 4 and concentrations of aluminum, iron, manganese, sulfate and TDS elevated above Oregon MCLs. However, these concentrations are comparable to background conditions observed for sample DR-C07, with the exception of sulfate, which is lower in the background sample. The sediment pond chemistry is comparable to the pit water and also has elevated aluminum, iron, manganese and sulfate concentrations, although concentrations are lower than those observed in the pit water and the pH value is 7.

Table 4.15-3: Perennial Stream and Reservoir Water Quality

Parameter	Oregon MCLs (333-061-0030)	Aquatic Life Criteria		DR-C103 (Altnow Ditch)	Cottonwood Reservoir	DR-C102 (Cottonwood Creek)	Altnow Reservoir
		Acute (CMC)	Chronic (CCC)				
Aluminum, dissolved	0.2	0.75	0.087	<0.03	0.19	0.12	<0.03
Aluminum, total	0.2	0.75	0.087	0.51	4.66	0.5	0.04
Arsenic, dissolved	0.01	0.85	0.048	0.0014	<0.0005	<0.0005	0.0008
Arsenic, total	0.01	0.85	0.048	0.0015	0.0005	<0.0005	0.0009
Iron, dissolved	0.3	--	--	0.09	0.27	0.15	<0.02
Iron, total	0.3	--	--	0.68	3.25	0.3	0.04
Manganese, dissolved	0.05	--	--	0.055	0.054	0.02	<0.005
Manganese, total	0.05	--	--	0.196	0.087	0.013	<0.005
Mercury, dissolved	0.002	0.0024	0.000012	0.0000006	0.000004	0.0000008	0.0000003
Mercury, total	0.002	0.0024	0.000012	0.0000006	0.0000028	0.0000009	0.0000003
Nitrate/Nitrite as N	10	--	--	0.1	<0.02	<0.02	<0.02
pH (s.u.)	6.5-8.5	--	--	8.2	8.5	7.8	9.4
Total Dissolved Solids	500	--	--	140	120	100	120
Sulfate	250	--	--	<1	<1	<1	<1
Sulfide as S	--	--	0.002	<0.02	0.02	<0.02	<0.02
Total Alkalinity	--	--	20[a]	80	45	50	70

All values reported in mg/L unless otherwise noted.
Shaded values exceed the respective Maximum Contaminant Levels (MCLs) or aquatic life criteria.
< Denotes less than the specified laboratory method detection limit (MDL).
[a] Oregon Aquatic Life Criteria of 20 mg/L for alkalinity is derived from the EPA Aquatic Life Criteria, which is a minimum value (EPA 1986).

Table 4.15-4: Pit Surface and Sediment Pond Water Quality

Parameter	Oregon MCLs (333-061-0030)	DR-C07 Tributary to Mill Gulch	1995 Pit Water		2010 Surface Water Samples			
			S-36 Pit Water Sample	Kelly Field	Kelly Field Open Pit	S36 PIT	Sed Basin 1	Sed Basin 2
Total Alkalinity	--	268	0	0	<2	<2	47	5
Acidity as $CaCO_3$	--	<10	--	--	100	20	<10	<10
Chloride	250	33	2	2	1	<1	13	2
Fluoride	2	0.3	0.59	0.36	0.5	<0.1	0.3	0.1
Nitrate/Nitrite as N	10	0.16	<0.1	<0.1	0.17	0.09	0.72	0.18
pH (s.u.)	6.5-8.5	8.3	**3.2**	**3.1**	**3.3**	**4.2**	7.6	7

Parameter	Oregon MCLs (333-061-0030)	DR-C07 Tributary to Mill Gulch	1995 Pit Water		2010 Surface Water Samples			
			S-36 Pit Water Sample	Kelly Field	Kelly Field Open Pit	S36 PIT	Sed Basin 1	Sed Basin 2
Sulfate	250	70	**441**	**316**	**440**	19	**260**	65
Total Dissolved Solids	500	**520**	**670**	**506**	**650**	30	460	120
Aluminum, dissolved	0.2	<0.03	--	--	**8.41**	**1.19**	<0.2	0.06
Aluminum, total	0.2	**0.76**	**3.8**	**5.3**	**8.69**	**2.02**	**2.25**	**8.29**
Arsenic, dissolved	0.01	**0.0146**	--	--	0.0017	<0.0005	0.0057	0.0021
Arsenic, total	0.01	**0.015**	0.006	<0.005	0.0022	0.0009	0.0059	0.0061
Iron, dissolved	0.3	**0.31**	--	--	**3.87**	**0.32**	0.1	0.03
Iron, total	0.3	**1.49**	**2.05**	**3.56**	**4.49**	**1.54**	**2.4**	**7.85**
Manganese, dissolved	0.05	**1.4**	--	--	**1.12**	**0.299**	**0.19**	0.029
Manganese, total	0.05	**1.47**	**1.18**	**0.56**	**1.09**	**0.538**	**0.267**	**0.099**

All values reported in mg/L except pH, which is reported as s.u.
< denotes less than the specified laboratory method detection limit.
Shaded values exceed the respective Oregon MCLs (333-061-0030).
Parameters not reported in this table were below the respective Oregon MCLs.

Categorization of Surface Water Types Based on Chemistry

In Figure 4.15.2, the major ion concentrations of water samples collected in 2009 are plotted on a trilinear diagram. A trilinear diagram provides a method to compare water types based on the ionic composition of different water samples. Cation and anion concentrations for each sample are converted from milligrams per liter (mg/L) to milliequivalents per liter (meq/L) and plotted as percentages of their respective totals in two triangles. The cation and anion relative percentages in each triangle are then projected into a quadrilateral polygon that describes the water type.

From Figure 4.15.2, the major ion chemistry for the Altnow and Cottonwood Creek perennial streams and associated reservoirs are all similar and show a strong enrichment in bicarbonate in comparison to the other samples. However, the Altnow reservoir and Altnow ditch are slightly enriched in sodium+potassium in comparison to the Cottonwood Creek and Cottonwood Creek reservoir.

Samples collected from seeps within the Mill Gulch and Mill Creek drainages also plot in a similar area and are classified as mixed cation-bicarbonate-type waters but show a slight increase in sulfate concentrations in comparison to the perennial streams and associated reservoirs.

The ionic composition of the two developed springs in the area (Tub Spring and Box Spring) is similar and can be classified as mixed cation-bicarbonate-type waters. These springs show a slight enrichment in magnesium ions in comparison to the other surface water samples, suggesting a more evolved ground water source for the spring water.

The sample from the Hidden Valley pond collected during 2008 is enriched in sodium plus potassium and chloride in comparison to the other surface water samples, suggesting the pond chemistry is influenced by evapoconcentration.

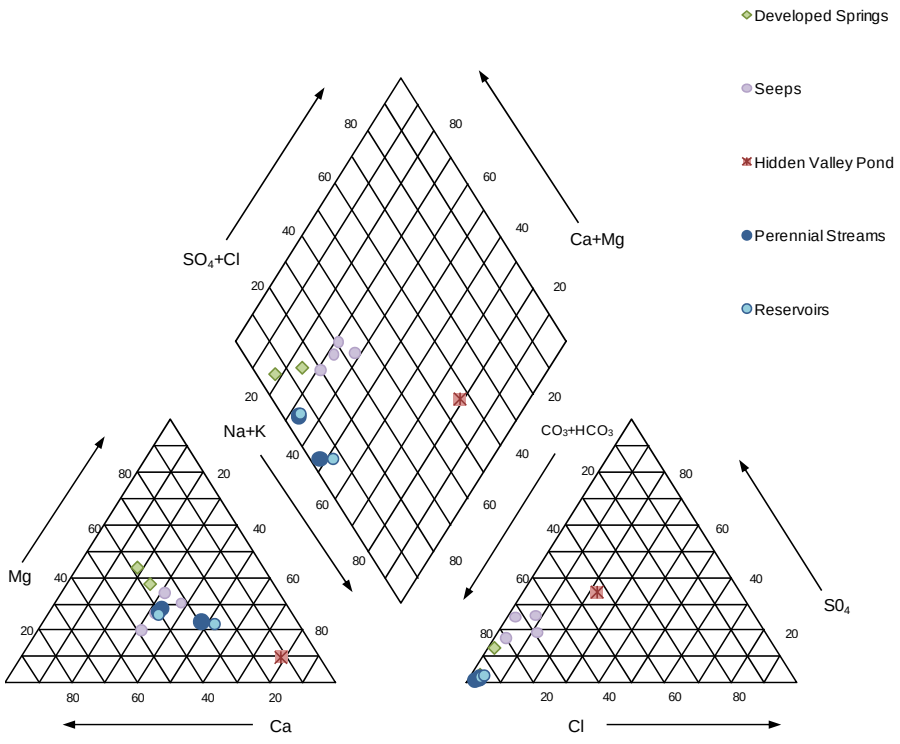
4.15.2.3.2 Ground Water Resources

Hydrogeologic Conditions

The primary ground water aquifers in the Project Area occur in the underlying volcanic bedrock and the overlying diatomite deposit. The occurrence and direction of ground water flow in the bedrock is controlled by fractures and faults and the hydraulic conductivity of the various volcanic rocks. Ground water in the diatomite aquifer is unconfined, and the flow and elevation of the water table appears to mimic the surface topography. This upper aquifer in the diatomite material appears to have hydraulic connectivity to the lower bedrock aquifer. A number of artesian wells are present in the Otis Valley, which is located immediately hydraulically downgradient and to the southeast of the proposed Beede Desert Mine Operations Area.

Based on the data presented in SRK's Baseline Characterization Report (2010a), the existing and proposed mine operations areas that are located within close proximity to the Mill Gulch drainage are the only locations within the Project Area where a shallow ground water aquifer in the diatomite deposit was encountered. Ground water beneath Mill Gulch occurs in a shallow, water-table aquifer within the diatomite and in a deeper aquifer in fractured volcanic basement rocks. The basement aquifer is locally confined by the overlying diatomite (SRK 2010a).

Figure 4.15.2:Trilinear Plot – Surface Water



The majority of the diatomite aquifer is of very low permeability, whereas the uppermost 50 feet or so of the diatomite is of higher permeability (not withstanding a 20- to 30-foot thick bed of tuff in the lower diatomite, which is of higher permeability than the diatomite). The transition between high and low permeability within the diatomite is defined by the long-term position of the water table (i.e., high permeability above, low permeability below). In the same way, the long-term position of the water table generally coincides with the transition between oxidized and unoxidized diatomite. As a consequence, lateral ground water flow in the diatomite occurs primarily in the low permeability, generally unoxidized lower aquifer, with only occasional flow in the upper, higher permeability, generally oxidized zone. Ground water levels in the diatomite define a fairly regular potentiometric surface, sloping down from the hill sides to the valley axis and down the valley, roughly corresponding with the stream gradient. The horizontal hydraulic gradient in upper Mill Gulch is 0.023 ft/ft. In view of the enhanced permeability of the upper diatomite and the seasonal fluctuations in ground water level, the majority of recharge to the diatomite aquifer is believed to be via direct precipitation. The diatomite may also be recharged, at least locally, from abutting and underlying basement rocks (SRK 2010a).

Ground water in the proposed Hidden Valley and Eagle Mine Operations Areas lies within the volcanic basement, significantly below the base of proposed mining. Ground water in this area likely mimics topography, flowing generally from the highlands in the northeast toward Cottonwood Creek in the southwest. In the lowland areas of Beede Desert, the basement ground water may be confined by the overlying diatomite, as suggested by local artesian conditions (SRK 2010a).

Ground Water Use

Ground water use in the Project Area includes two wells that are used to supply water to the existing mining operations. No other beneficial use ground water wells have been identified within the boundaries or influence of the Project Area, except for those developed by EPM.

Ground Water Quality

Ground water samples have been collected from monitoring wells and piezometers by SRK during November 2005, October 2007, June 2008, and May and August 2009 sampling events in order to characterize ground water conditions for the Celatom Mine. Thirteen of these wells are located within the Mill Gulch mine area, four of which (MW-8, MW-9, PZ-5S and PZ-5D) are located upgradient of the current mining operations in Kelly Field. The remaining wells are either located within the active mine area or downgradient of the mine area. The most downgradient point within Mill Gulch is represented by MW-3.

One of the monitoring wells included in the ground water sampling events is located downgradient of the Beede Desert Mine area (MW-10B). Two new monitoring wells in the Eagle Mine area were sampled for the first time during August 2009. In addition, a water quality sample was collected from the artesian well in Otis Valley during November 2005 and provides baseline chemistry for artesian water sources within this area. Ground water chemistry conditions beneath the Hidden Valley area are not included in this evaluation because the monitoring well in that area (i.e., MW-2) has been dry since installation in 2005.

The average ground water results are summarized in Table 4.15-5 for select parameters. Water quality standards (Oregon MCLs per 333-061-0030) are based on total concentrations; however,

due to the potential for contamination from suspended fine particles (i.e., clay) in ground water, samples were submitted for both total (i.e., unfiltered) and dissolved metals (i.e., filtered) analysis. As shown in Table 4.15-5, total metals are generally greater than dissolved metals in the ground water samples. This can be attributed to suspended diatomite and clay particles in the samples due to the fine-grained nature of the sedimentary deposits in the area. Furthermore, total silica concentrations are elevated in all samples, and dissolved silica concentrations are similar to total concentrations. Total metals results are considered biased and the dissolved metals results are used in the following evaluation of water chemistry because of the potential for contamination from suspended fine particles. As can be seen from the ground water monitoring data provided in Table 4.15-5, pH values for all ground water samples are within the Oregon MCLs (i.e., between 6.5 and 8.5). Sulfate and TDS concentrations are generally low, and are below the respective MCLs for all ground water samples.

All dissolved ground water constituent concentrations are below the Oregon MCLs, with the exception of arsenic, iron and manganese. Arsenic is slightly elevated above the MCL in the three shallowest wells: MW-7s, MW-8 and MW-10B. Iron and manganese are elevated above the MCLs in all of the Mill Gulch monitoring wells except MW-7s. The highest manganese values were obtained from MW-7D and MW-12, located adjacent to the Kelly Field Pit. Monitoring well MW-7D also has the highest iron concentrations. Iron and manganese are also elevated above the MCLs in the upgradient monitoring wells MW-9 and MW-8, which are representative of background conditions for the site. As a result, the observed concentrations of iron and manganese in ground water beneath the site are considered naturally occurring. The only dissolved constituent elevated above the MCLs in the Section 25 (PZ-5s and PZ-5d) area is manganese. All other constituents are below the respective MCLs. The quality of ground water downgradient of Mill Gulch (MW-3) is considered good, with pH values around 8 and constituent concentrations below the respective MCLs, with the exception of manganese. The elevated manganese and iron concentrations measured in the upgradient and on-site monitoring wells can be attributed to mobilization of these constituents from the unoxidized (sulfide bearing) horizons within the localized ground water system. This is demonstrated by Figure 4.15.3 where pH is plotted versus manganese. As shown in Figure 4.15.3, the highest manganese concentrations are obtained from wells screened in unoxidized diatomite. Manganese concentrations are also elevated in the underlying volcanic bedrock as represented by MW-5 and MW-3, but at slightly lower concentrations than observed for the well screened in unoxidized diatomite. Manganese for the one well screened in oxidized diatomite (MW-7s) is significantly lower and is below the laboratory detection limit. A similar trend is observed for iron concentrations in Figure 4.15.4.

As shown in Table 4.15-4, the pit surface water samples from 1995 and 2010 are comparable with acidic pH values ranging from 3 to 4 and concentrations of aluminum, iron, manganese, sulfate and TDS elevated above Oregon MCLs. However, these concentrations are comparable to background conditions observed for sample DR-C07, with the exception of sulfate, which is lower in the background sample. The sediment pond chemistry is comparable to the pit waste and also has elevated aluminum, iron, manganese and sulfate concentrations, although concentrations are lower than those observed in the pit water and the pH value is 7.

Table 4.15-5: Average Ground Water Results for Select Parameters

Sample Location	Location Relative to Mine Areas	Well	n	pH	SO_4	TDS	Total Alk.	Aluminum		Arsenic		Iron		Manganese	
								diss.	total	diss.	total	diss.	total	diss.	total
Mill Gulch	Upgradient	MW-8	4	7.6	18	135	52	0.03	0.22	0.010	0.011	2.12	3.54	0.121	0.129
		MW-9	4	7.5	63	260	70	0.03	0.43	0.002	0.014	3.67	34.35	0.361	0.408
		PZ-5S	1	8.0	13	150	53	<0.03	3.91	0.002	0.004	<0.02	5.69	0.101	0.164
		PZ-5D	1	8.5	45	270	123	<0.03	0.28	0.003	0.004	<0.02	0.51	0.484	0.52
	On site	PZ-3	1	8.1	54	280	134	<0.03	0.03	0.002	0.002	0.17	0.78	0.678	0.632
		PZ-4	1	8.5	40	190	115	<0.03	0.11	0.003	0.004	<0.02	0.32	0.403	0.383
		MW-4	4	8.3	31	245	141	<0.03	0.10	0.002	0.002	0.02	0.39	0.282	0.355
		MW-5	4	8.2	23	205	140	<0.03	1.97	0.001	0.003	0.84	7.04	0.164	0.336
		MW-6	4	7.9	50	245	126	0.03	0.04	0.003	0.005	0.76	1.83	0.409	0.446
		MW-7s	4	7.9	133	355	73	0.04	0.14	0.010	0.010	0.03	0.14	0.008	0.008
		MW-7d	4	7.6	51	255	85	0.04	0.04	0.001	0.001	10.54	11.14	0.755	0.775
		MW-12	2	7.1	170	370	31	<0.03	0.04	0.002	0.002	5.11	6.33	1.04	1.084
	Downgradient	MW-3	4	8.3	25	230	149	0.03	0.07	0.004	0.004	0.10	0.30	0.108	0.127
Beede Desert	Downgradient	MW-10B	4	8.0	24	178	67	0.06	0.19	0.013	0.013	0.03	0.18	0.006	0.008
		Artesian Well	1	8.2	20	80	49	<0.03	<0.06	0.001	0.001	<0.02	<0.02	<0.005	<0.005
Eagle Mine	On site	MW-13	1	8.3	7	140	74	0.07	3.93	0.002	0.002	0.04	3.03	<0.005	0.057
		MW-14	1	8.3	11	150	78	<0.03	7.31	0.002	0.003	0.02	12.6	<0.005	0.243
Oregon MCLs (333-061-0030)				**6.5-8.5**	**250**	**500**	**--**	**0.2**	**0.2**	**0.01**	**0.01**	**0.3**	**0.3**	**0.05**	**0.05**

All values reported in mg/L except pH, which is reported as s.u.
< denotes less than the specified laboratory method detection limit.
Shaded values exceed the respective Oregon MCLs as regulated by 333-061-0030.

Figure 4.15.3: Ground Water pH versus Dissolved Manganese

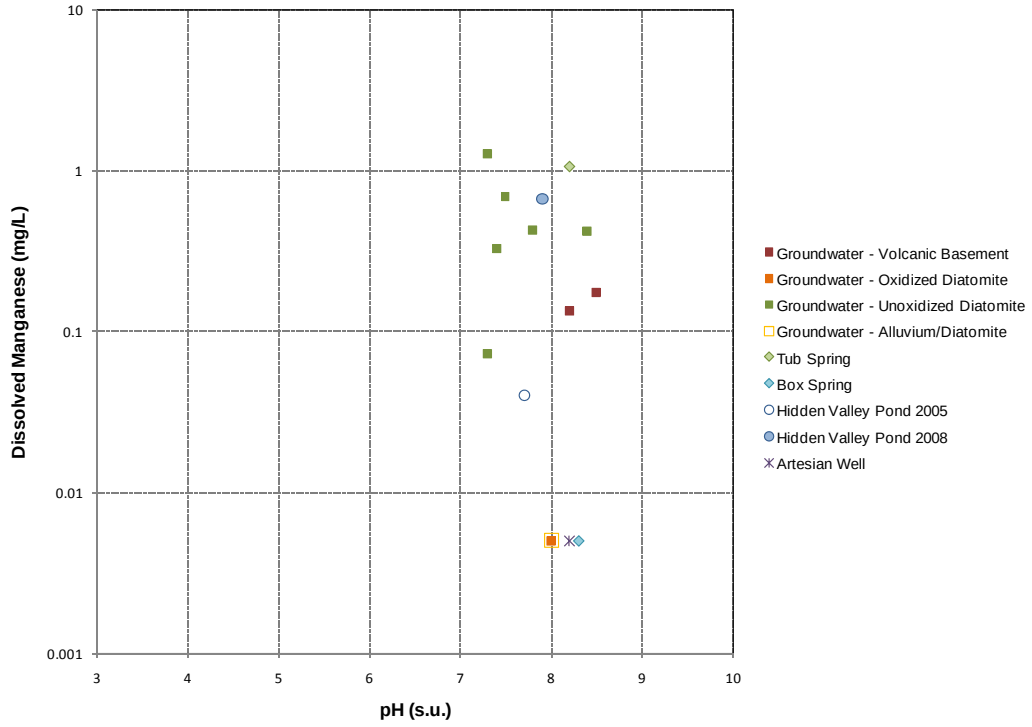


Figure 4.15.4: Ground Water pH versus Dissolved Iron

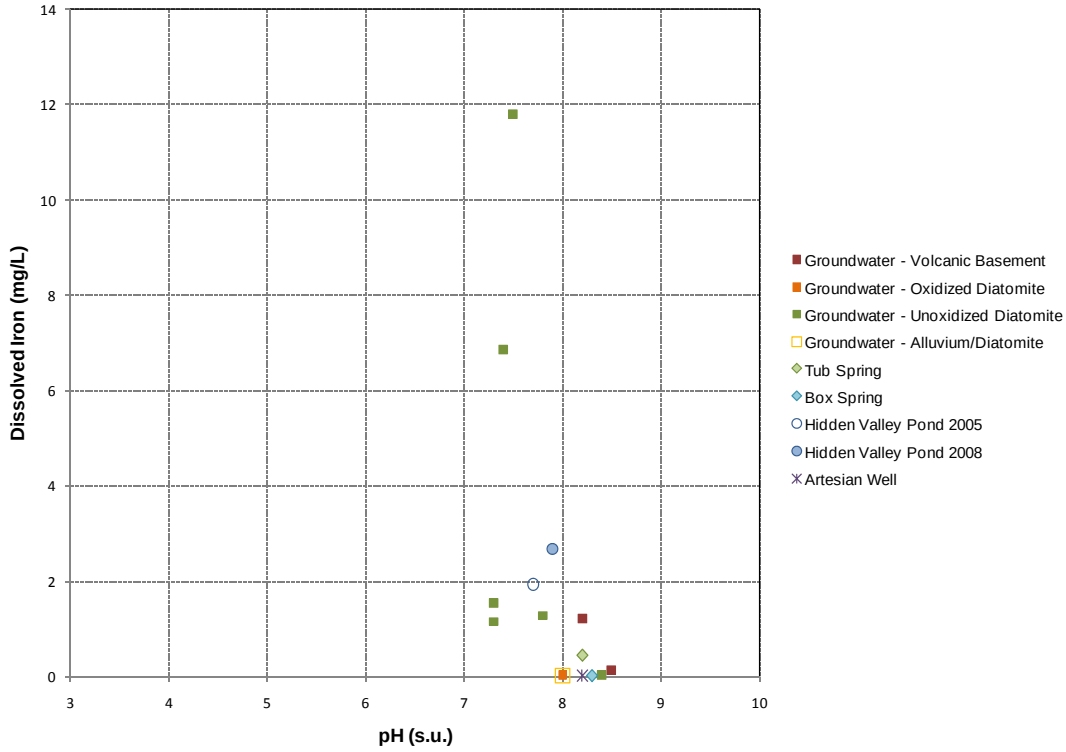
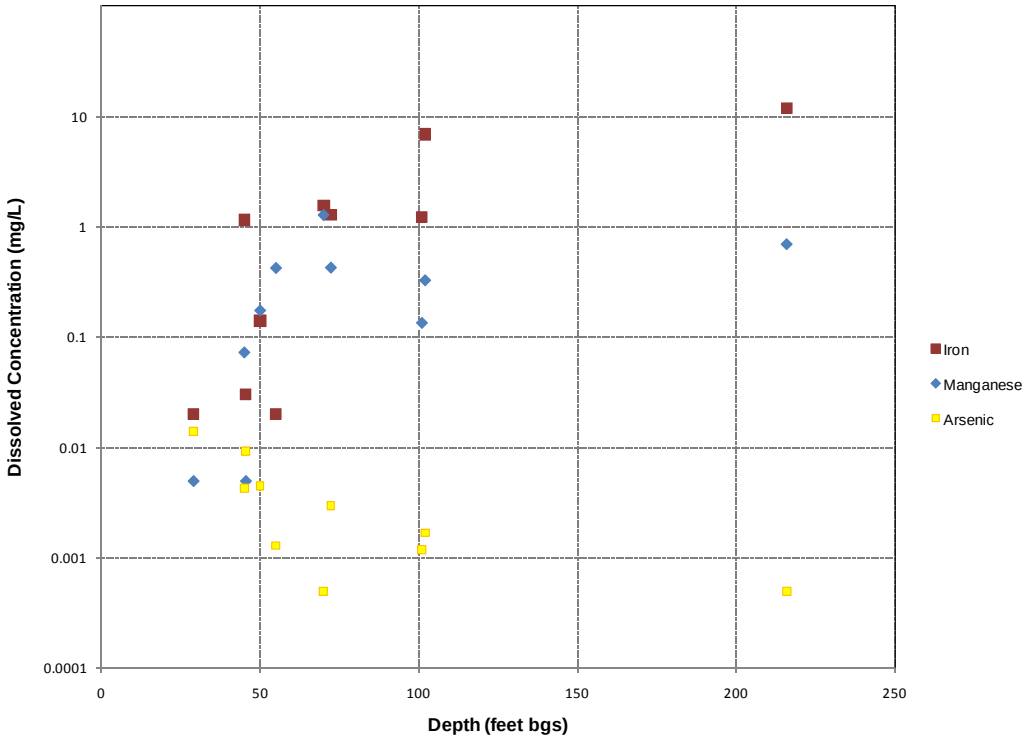


Figure 4.15.5: Dissolved Iron, Manganese and Arsenic versus Depth



Concentrations show a decrease with depth and are greatest in the shallow wells screened across the oxidized and unoxidized diatomite zone (MW-8, MW-7s and MW-10B). The trend in arsenic concentrations with depth can be related to the control of pH on arsenic conditions and the presence of insoluble Fe-Mn hydroxides that act as adsorption surfaces.

For the Beede Desert monitoring well (MW-10B), water quality is good with pH values around 8, low TDS and sulfate, and iron and manganese below the MCLs. Average arsenic concentration for MW-10B is slightly elevated above the MCL at 0.013 mg/L. As expected, the water quality of the artesian well in Otis Basin is good with all parameters below the respective MCLs, pH greater than 8, and very low total dissolved solids (i.e., 80 mg/L). Arsenic is detected in this sample, but the concentrations in both the total and dissolved fraction are below the respective MCL. Water quality for the two basalt bedrock wells in the Eagle Mine Area (MW-13 and MW-14) is similar where none of the dissolved constituents are elevated above Oregon MCLs. However, total aluminum, iron and manganese are elevated above Oregon MCLs in both wells.

Categorization of Water Types Based on Chemistry

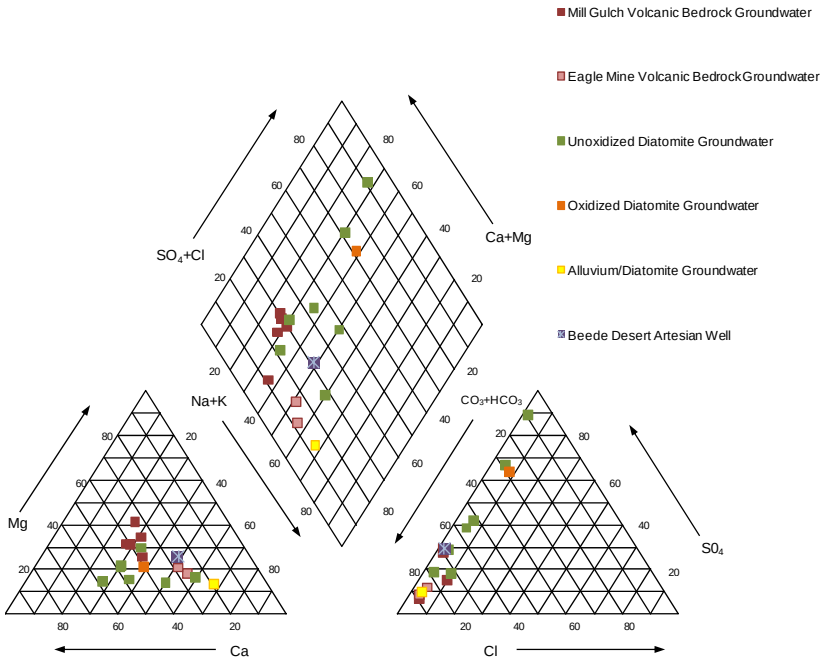
In Figure 4.15.6, the major ion concentration of water samples collected in 2009 are plotted on a trilinear diagram, indicating a wide range in major ion chemistry for the ground water samples. Most of the ground water samples have the same cation composition (i.e., mixed with no dominate cation) but the dominant anion varies between bicarbonate and sulfate. The majority of the ground water samples can be classified as mixed cation-sulfate-type and mixed cation-bicarbonate-type waters.

Samples representing the ground water in the Mill Gulch volcanic bedrock (MW-3, MW-5, PZ-4, and PZ-5D) are all similar and have a mixed cation composition with bicarbonate as the

dominant anion. The one sample representative of the oxidized diatomite aquifer (MW-7s) is classified as mixed cation-sulfate water. Samples from wells screened in unoxidized diatomite show a wide range in anion composition, ranging from bicarbonate- to sulfate-dominated. Monitoring well MW-12 is more enriched in calcium and sulfate in comparison to the other ground water samples and is classified as calcium-sulfate-type water.

The sample from MW-10B that was screened across the alluvium/diatomite contact in Beede Desert is slightly enriched in sodium and potassium in comparison to the other ground water samples and is classified as sodium+potassium-bicarbonate type water. The samples from the two Eagle Mine Area wells screened in the basalt bedrock are similar in ionic composition to MW-10B and are also classified as sodium+potassium-bicarbonate-type waters. The artesian well in Beede Desert plots in a similar area with a slight enrichment in calcium and bicarbonate as the dominant anion.

Figure 4.15.6: Trilinear Plot - Ground Water



EP Test Wells

Ground water samples were collected from the EP test wells during 2004 by site personnel and are provided in Table 4.15-6 for completeness and comparison. Originally, the intent was to augment the data from this early sampling event with the results of the current investigations. However, upon comparison of the two data sets, it became clear that some significant differences existed, despite being developed within the same aquifers. For instance, metals concentrations in the EP test wells are several orders of magnitude greater than those observed in the recently installed monitoring wells (Table 4.15-6). In addition, lower pH values were reported for the EP test wells.

Table 4.15-6: 2004 Ground Water Chemistry for the EP Test Wells (Superseded)

Location Relative to Mining Areas	Well ID	pH	TDS	Sulfate	Total Alk.	Dissolved Metals			
						Al	As	Fe	Mn
Downgradient	WELL#1	7.98	327	53	236	<0.02	**0.013**	<0.02	**0.177**
	WELL#2	7.82	270	39.5	154	<0.02	**0.016**	<0.02	<0.02
	WELL#2	8.1	250	40	145	<0.03	0.0051	<0.02	<0.005
	WELL#3	8	308	68.8	187	<0.02	<0.01	<0.02	0.0486
On site	WELL#4	6.68	157	32.3	32	<0.02	**0.015**	**1.42**	**0.138**
	WELL#5	**4.37**	**547**	**326**	--	**0.357**	**0.01**	**13.9**	**0.914**
	WELL#6	**6.43**	276	91.7	37.4	<0.02	**0.012**	**2.32**	**0.154**
Upgradient	WELL#7	**6.05**	**670**	**378**	32	<0.02	<0.01	**20.2**	**1.06**
Downgradient (Beede Desert)	WELL#9	7.86	147	3.14	74.3	<0.020	<0.01	<0.02	<0.02
Oregon MCLs (333-061-0030)		**6.5-8.5**	**500**	**250**	--	**0.05-0.2**	**0.01**	**0.3**	**0.05**

All values reported in mg/L except pH, which is reported as s.u.
< denotes less than the specified laboratory method detection limit.
Shaded values exceed the respective Oregon MCLs as regulated by 333-061-0030.

The 2004 ground water data (along with recent data collected from Test Well #2) are, therefore, not considered valid for the following reasons:

- Test wells were installed with the intent to monitor ground water elevation only;
- Detailed drill records including field notes, drill logs, and well completion logs are not available;
- Test wells were not constructed according to State of Oregon monitoring well construction regulations (OAR 690 Division 240);
- Test wells do not have locking caps, and there is no record of the steps taken to maintain the integrity of these wells;
- No records are available for the development and sampling of the test wells during the 2004 sampling event;
- Results from the recently installed monitoring wells that were constructed in accordance with applicable construction regulations and properly developed and sampled are not comparable to the 2004 results; and
- Poor recovery of ground water during bailing of Test Well #2 during the 2005 field program resulted in the purging of only one well volume prior to sample collection.

As a result, ground water data from the EP test wells have not been included in the current evaluation, with the exception of ground water elevations, for which they provide additional piezometric data.

4.15.2.3.3 Water Rights

The Project Area is located in the Malheur Basin. Surface and ground water rights on private land are managed by the State of Oregon and typically correspond to the owner of the private land. EPM owns the southwestern quarter of Section 30 and a portion of Section 25 and holds the water rights for this private land. The BLM manages the water rights on all public land. In some cases, local ranchers hold the water rights to springs on public land. These springs were initially located by the government and distributed to local ranchers during the time of homesteading as an incentive to settle the area. The segregation and distribution of spring water rights predates the establishment of the BLM. In addition, ranchers have specific surface water rights to streams draining from reservoirs.

4.15.3 Environmental Consequences

4.15.3.1 Assessment Methodology

For this analysis, the 50-year life of the Project impacts include those actions that potentially degrade surface water quality, change surface water flows, or change ground water quality and quantity as a result of unstable soils or poor watershed conditions until revegetation or other reclamation can be established (up to five years).

Impacts to surface water quantity include those that reduce or supplement stream flows and may either be beneficial or adverse, depending on the quantity and the location of the withdrawals or discharges. Direct impacts to surface water quantity result from activities, watershed conditions, or treatments (including vegetative and physical treatments, impoundments, retention and detention structures, etc.) that increase or decrease runoff, as well as from changes in the quantity of produced water discharged into the system. Direct impacts also can be the result of adding or modifying withdrawals from the drainage system. Indirect impacts to surface water quantity result from activities that modify the capacity of stream channels or result in changes to the amount of water reaching the stream system. For example, changes in the locations of roads that direct surface water runoff into drainages may increase or decrease the timing and amount of surface water flowing in the stream system. The distribution and condition of wetlands and riparian areas would indirectly result in changes to surface water quantity because they increase infiltration and delay peak flows. Long-term impacts to surface water quantity are those that result from long-term facilities that increase impervious surface, changes to established discharges that alter supplemental stream flows, or those impacts that occur following reclamation.

Direct impacts to surface water quality result from activities that degrade the ambient water quality of surface waters. Indirect impacts include actions that disturb soil, especially highly erodible soil. Indirect impacts to surface water quality also may result from activities that modify drainages. For example, actions that change the number of road-stream crossings or the distribution and condition of wetlands and riparian areas would indirectly result in changes to surface water quality. Wetlands and riparian areas filter pollutants contained in runoff before they enter the stream system. Beneficial impacts to surface water quality consist of those actions that minimize, reduce, or prevent off-site erosion or the discharge of supplemental water that is of lower quality than the ambient water quality of the receiving water. An adverse impact to water quality is any action resulting in a violation of state water quality standards or negatively impacts a designated beneficial use. Surface-disturbing activities that contribute to off-site

erosion and sediment delivery also are considered direct adverse impacts. Long-term impacts to surface water quality are those that result from long-term bare ground or established point discharges that increase sediment loads or degrade water quality.

Direct impacts to ground water quality and quantity could result from changes in the number of wells drilled, the number of springs developed, water conservation efforts, and the amount of surface water that infiltrates the ground before flowing to the surface water system. Indirect impacts to ground water quality and quantity result from activities that modify the areas or sources that recharge the ground water system. For example, activities that decrease vegetative cover or increase runoff would reduce the infiltration of precipitation and reduce ground water recharge. Long-term impacts to ground water quality and quantity are those that result from permanent facilities or landscape alterations that modify ground water recharge, including wells that deplete the aquifer through extraction, facilities that are paved to eliminate surface water infiltration, or wells that are used to inject water into the ground water system.

4.15.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, direct and indirect disturbance of water quantity and water quality would continue under already approved actions, until those projects are completed. The remainder of the Project Area water resources would remain unaffected.

4.15.3.3 Alternative 2 - Proposed Action

4.15.3.3.1 Surface Water Quantity

The Proposed Action includes the excavation of open pit mines, stockpiling of ore and waste, and the construction and maintenance of roads. In addition, the Proposed Action would create drainage, interceptor ditches, and sediment basins to collect drainage water and prevent storm water runoff or pit water from exiting the operating areas or reaching any streams. Drainage ditches would run along all haul roads and improved roads and would circle all stockpiles and other working areas. Interceptor ditches would form a perimeter around working areas to prevent runoff from running into the pit. Sediment basins would be constructed at the mine operations area to collect all the water diverted. No dewatering activities would be carried out as part of the Proposed Action unless there was a seasonal meteoric water event resulting in excess water in the open pit. In most cases, evaporation would suffice as a means of controlling pit water, but if it is not sufficient then the water would be pumped into one of the sediment basins. No water would be discharged into streams or drainages, including the Mill Gulch drainage.

The Proposed Action would not result in the diversion of water that would impact other users or reduce the flow of streams, springs, or seeps.

4.15.3.3.2 Surface Water Quality

The Proposed Action incorporates design elements including a Spill Prevention Plan and the implementation of BMPs to ensure that water quality is protected as a result of the Project activities. No discharge would occur to Mill Gulch or other tributaries, and all meteoric water would be collected in sediment basins and diversion ditches to allow for sediment to filter out. The Proposed Action would not have impacts on surface water quality.

4.15.3.3.3 Ground Water Quantity

Under the Proposed Action EPM would continue to use the existing two wells discussed in Section 2.3.4. One new well is expected to be needed but would be drilled on private land owned by EPM at some time in the future. EPM has the only wells in the Project Area and therefore would not impact ground water drawdown for other users or impact water rights holders. One of the proposed open pits (Kelly Field West) may be excavated to elevations below the water table, potentially resulting in nominal ground water flow into those pits. This open pit would have an engineered partial backfill preventing any subsidence or impact to ground water flow or quantity.

The consumptive use of ground water for mining operations for the Proposed Action would occur from the pumping of ground water production wells and evaporation of water from open pits prior to backfilling. The Proposed Action would not result in ground water quantity impacts that would lower the water table enough to impact other users. The open pits would be backfilled or partially backfilled during reclamation ensuring no long-term impacts would result from the Proposed Action.

4.15.3.3.4 Ground Water Quality

Nominal ground water could potentially flow into the proposed pit excavations as soon as they are deepened to below the water table. However, the rates of inflow would depend on numerous factors and would change through time. A very general estimate of initial (maximum) inflow rates can be made using the principle of superposition, where inflows through upper and lower diatomite in the pit walls and inflows through the pit bottom are analyzed separately. It should be noted that the method used below is conservative and would most likely over-estimate the total combined inflow to the open pits. There have been no identified impacts associated with past or current mining and no impacts are expected in the future.

Figure 4.15.7 shows parameters and assumptions for a very general analytical calculation of ground water inflow to a conceptual pit dug into laterally-continuous diatomite. Inflow rates through upper and lower diatomite in the pit walls were analyzed as lateral flow to separate, fully-penetrating large diameter wells in an unconfined aquifer, using an analytical equation derived from the Theim-Dupuit equation and presented in Krusseman and De Ridder (1979):

$$Q = \frac{\pi \cdot K \cdot \left(H^2 - h^2\right)}{Ln\left(\frac{R}{r_p}\right)} \qquad (1)$$

Where:
Q = ground water inflow (L^3/t),
K = hydraulic conductivity of wallrock (L/t),
H = saturated thickness of aquifer (L),
h = head in floor of pit (L),
r_p = equivalent radius of pit (L),
R = radius of influence (L), $= 1.5 \cdot \sqrt{\frac{K \cdot H \cdot t}{S}}$
S = storativity ( ), and
t = life of mine (t).

Inflow rates through the floor of a pit are commonly modeled using an analytical equation presented in Marinelli and Niccoli (2000). However, their equation assumes that the properties of the materials at the bottom of and underlying the pit are uniform over a significant thickness. Although this may be the case for pits dug in the very thick diatomite on the western and northwestern sides of Mill Gulch, on the eastern and southeastern side it is assumed that high-*K* basement rocks would be isolated from the bottom of the pit by a relatively thin barrier of low-*K* diatomite. For this more conservative scenario, flow through the floor can be estimated using an analytical equation derived directly from the Darcy equation:

$$Q = K_v \cdot A \cdot \left(\frac{H - h}{b} \right) \qquad (2)$$

Where:
A = area of pit floor (L^2)
b = thickness of barrier between pit bottom and high-*K* unit (L),
K_v = vertical hydraulic conductivity of barrier (L/t),
and other parameters are as above.

Equation 2 would generally be valid where the low-*K* diatomite floor of the pit remains intact. However, if the floor barrier is left too thin, failure of the floor barrier could result in significantly increased ground water inflows.

Table 4.15-7 shows results of calculations using Equations 1 and 2 for an idealized steep-sided pit, with a pit bottom area of 30 acres, excavated into a laterally-continuous diatomite layer. For these calculations, it is assumed that the volcanic rocks underlie the diatomite at a depth of 105 feet below a seepage face developed in the upper diatomite (i.e., the volcanic contact is about 150 feet bgs), and heads in the basement are equivalent to heads in the lower diatomite. In the idealized pit, it is also assumed that no significant ash/tuff layers or other discontinuities are associated with the diatomite. Table 4.15-7 shows that for all scenarios, ground water inflow through the diatomite walls of the pit would be very small. The initial rates of inflow through the pit bottom would be of greater significance. Based on a K_h to K_v anisotropy of 10:1, the inflow rates would range from eight gallons per minute (gpm) with a floor barrier of 40 feet, to as much as 97 gpm with a floor barrier of just five feet.

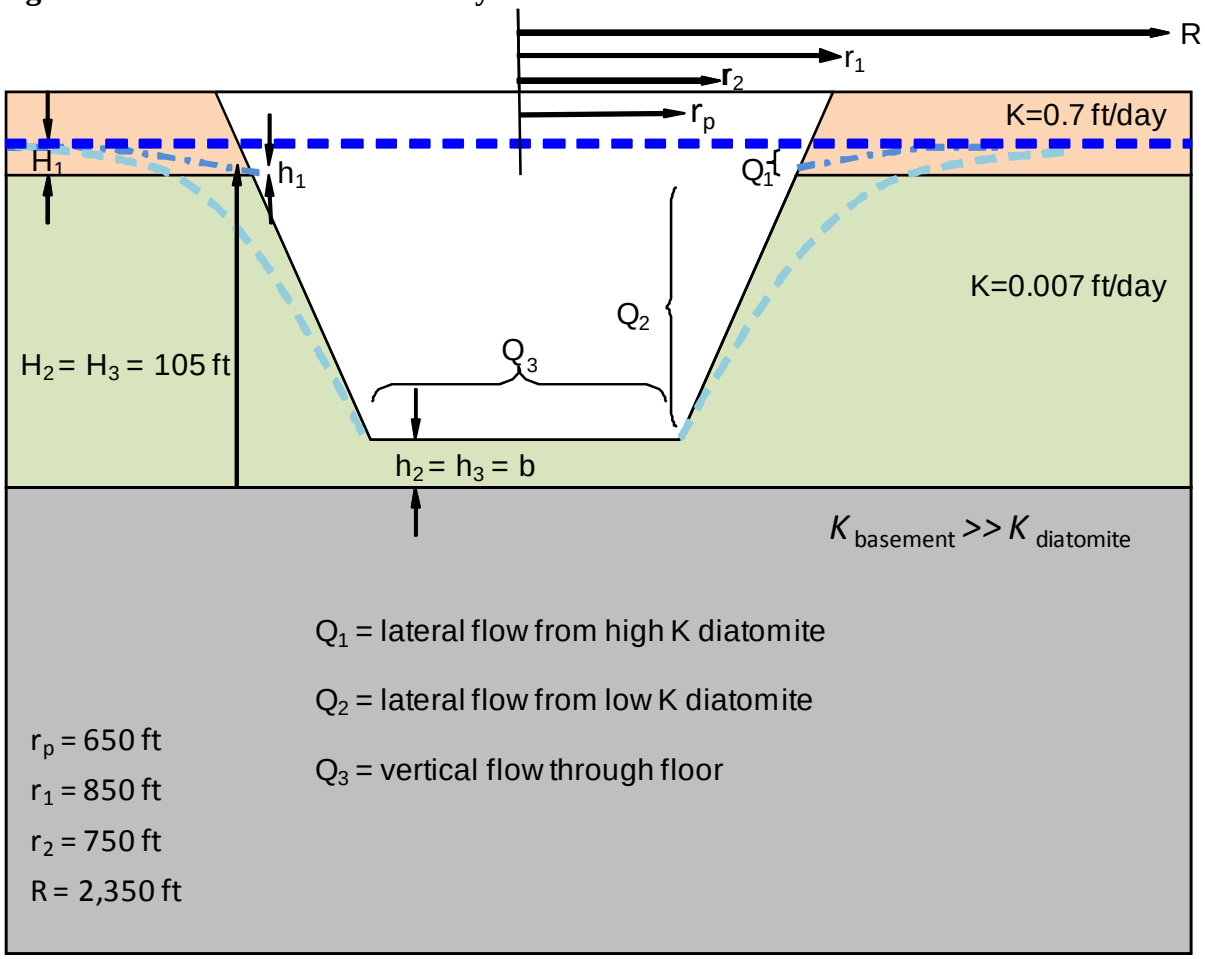
The inflows shown in Table 4.15-7 are initial rates and would decrease in time as heads in the formations are lowered. More importantly, they are valid only for an idealized diatomite aquifer with a saturated thickness of 115 feet. Where the saturated diatomite is thinner (e.g., on the eastern side of Mill Gulch), pits would be shallower relative to the water levels in the basement, and inflow rates therefore would be much lower.

Table 4.15-7: Analytical Estimates of Initial Rates of Ground Water Inflow to an Ideal, 30-Acre Pit with 115 feet of Saturated Diatomite

Basement Assumption	Floor-Barrier Assumption (K_h : K_v = 10:1)	Initial Inflow (gpm)		
		Upper Diatomite Wall[a]	Lower Diatomite Wall[a]	Pit Floor [b]
K of Volcanics Significantly Greater than ***K*** of Lower Diatomite	Diatomite Floor 40 ft thick	2.3	2.3	8
	Diatomite Floor 20 ft thick	2.3	2.8	21
	Diatomite Floor 10 ft thick	2.3	2.9	46
	Diatomite Floor 5 ft thick	2.3	3.0	97

[a] Equation 1
[b] Equation 2 assume K_v = 0.5 x K_h when unfractured

Figure 4.15.7: Parameters for Analytical Estimates of Ground Water Inflow to Pit



4.15.3.4 Ground Water Conditions during Mining

The principle criterion by which to assess the potential for dissolved constituents generated in the open pits to migrate into and impact the ground water system is whether the deepened pits would constitute ground water sinks or develop into flow-through pit lakes.

The results of the preliminary calculations above and summarized in Table 4.15-7 show that if ten feet of diatomite is left in the bottom of a pit excavated to 105 feet below the water table (and assuming that ten feet is a sufficient thickness to prevent floor failure), then steady-state inflow rates through the walls and floor of an idealized 30-acre pit could be just a little more than 50 gpm. Yearly net evaporation from the 30-acre pit floor, though, would average about 82 gpm. Consequently, the open pit would remain dry from year to year (although some seasonal accumulation of water could occur). Where floor barriers are thicker or where excavations extend to shallower depths below the water table, inflow rates would be lower and the exceedance of the inflow rate by evaporation would be even greater.

Conversely, if the excavation extends deeply below the water table, and the floor barrier is left too thin, then long-term ground water inflow rates could possibly exceed evaporation rates, and shallow perennial pit lakes might develop. The depth of the hypothetical pit lake would depend first on inflow rates, which would decrease as the lake deepens (due to decreasing head differential), and to a lesser extent on the shape of the pit, which would define an increasing evaporative surface as the lake deepens. Ultimately, evaporation would balance inflow; and the final lake level, which could take many years to establish, would be at some depth below the current static water level in the basement aquifer (i.e., pit lake levels would never reach the current ground water level due to the effects of evaporation).

Although in the above case, a pit lake theoretically could form, ground water flow out of and away from the pit still would not occur if the static lake level remained below the ground water level in the diatomite. In a very simplified (i.e., isotropic) system all ground water flow would be toward the lake, and the lake would constitute a long-term sink resulting in a net extraction of ground water from both the volcanic and diatomite aquifers, with no potential for contaminants to migrate away from the pit.

Only if the current static ground water level in the volcanic basement is significantly higher than the current ground water level in the upper diatomite, and the floor barrier were left sufficiently thin that inflow rates would exceed evaporation even as the lake level approaches the water table, could pit lake water enter the ground water system and possibly constitute migration. The current conceptual model shows that this would only be possible in the proposed pits east of the Upper Mill Gulch fault.

The proposed Mill Gulch open pits that lie in the western block of the Upper Mill Gulch fault and north of the inferred northeast-southwest fault in lower Mill Gulch would develop in a thick diatomite unit that lies over deep volcanic rocks. The pit highwalls would be comprised entirely of diatomite, as would the floors of the pits. Current mine plans show that the diatomite floor of the pits on the western side of the valley would remain at least 100 feet above the volcanic contact. Consequently, the low-permeability diatomite would limit ground water inflow to the pits during and after mining, resulting in year-to-year dry conditions since inflow would be less than evaporation.

Proposed mining in the Eagle Mine and Hidden Valley areas would not extend below the water table, and therefore, pits would remain dry except for seasonal meteoric accumulations. Low-*K* diatomite pit walls and floors would minimize seepage of the waters until they evaporate in the dry season.

4.15.3.5 Ground Water Conditions during Closure

As described above, one of the proposed open pits (Kelly Field West) may be excavated to elevations below the water table, potentially resulting in nominal ground water flow into those particular pits. Although no pit lake is anticipated to form in these pits due to the low ground water inflow rates and high evaporation rates, there is the potential for accumulation of transient water (influent ground water plus meteoric runoff). The amount of water that may accumulate seasonally would vary depending upon the meteoric and ground water inputs. The surface expression of ground water (albeit transient) would be mitigated under the Proposed Action through the partial backfilling of the open pits that intersect ground water. The intent of this closure strategy would be to maintain the pit as an evaporative sink for ground water (i.e., no flow-through), while reducing the potential for free-standing water with low pH. This is generally achieved by backfilling the pit to an elevation where evapotranspiration losses through the uppermost portions of the backfill would equal the rate of ground water inflow.

Under this partial backfill scenario, evaporation would occur mostly by capillary action (i.e., a phenomenon where liquid spontaneously rises in a narrow space such as a thin tube) so that a free water surface is less likely to occur, but evaporation (and possibly transpiration through vegetation) would continue, and a localized ground water sink could be maintained. This approach would require balancing the following:

- Rate of ground water inflow, which depends on the head difference between the water table and the evaporative surface;
- Evaporation rate, which depends on the surface area (in turn dependent on the height above the pit floor), and soil-specific parameters; and
- Seasonal variations in precipitation, heat, wind, and vegetative transpiration.

The amount of backfill in the Proposed Action has not been determined; therefore, there is a potential impact to ground water if the amount of backfill is not appropriately calculated.

4.15.3.6 Alternative 3 - Proposed Action with Additional Design Elements

Impacts to water resources from Alternative 3 are generally the same as those described in the Proposed Action, except that under Alternative 3 there would be no effect to ground water because the backfill thickness would be correctly calculated.

4.16 Wilderness Characteristics

4.16.1 Regulatory Framework

The FLPMA directed the BLM to manage the public lands and their resources under principles of multiple use and sustained yield. Wilderness is one of these multiple use values.

Section 2(c) of the Wilderness Act of 1964 requires that in order to be considered to have wilderness characteristics, an area must meet all of the following criteria:

(1) "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;" This is commonly referred to as naturalness.

(2) "has outstanding opportunities for solitude or a primitive and unconfined type of recreation;"

(3) "has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition;"

The Wilderness Act further states areas with wilderness characteristics "may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value." These are commonly referred to as supplemental values and are not required to be present.

4.16.2 Affected Environment

4.16.2.1 Study Methods

The BLM's 1980 wilderness inventory found wilderness character was not present on BLM-administered lands within the Project Area. In September 2007 BLM received a citizens' Proposed Wilderness Study Area (PWSA) called the Cottonwood PWSA, which included much of the Project Area.

The BLM ID team used current field data along with the citizens' PWSA data and determined that the Project Area included parts of five wilderness inventory maintenance (WIM) units that were 5,000 acres or larger.

4.16.2.2 Existing Conditions

4.16.2.2.1 Agency Mountain WIM Unit (4,960 acres)

The unit has an irregular shape, due in part to the location, number and distribution of four private land inholdings, which are boundary features of the unit. Thus the unit has highly varied dimensions, none of which exceeds 1.5 miles in width and no greater than about 4.3 miles long (but narrow – no wider than 0.75 miles before abutting a private inholding or outer boundary feature). This narrow and contorted configuration of the unit does not possess outstanding opportunities for solitude.

The unit possesses no special or unique features that would draw or encourage recreating visitors. The unit does not have outstanding opportunities for primitive and unconfined recreation.

4.16.2.2.2 Drinkwater WIM Unit (6,044 acres)

The BLM ID team made similar findings in the 1979 wilderness inventory. The sagebrush and scattered juniper covered rolling hills and central plateau resulted in unrestricted views. Due to the general absence of topographic or vegetation screening, this WIM unit did not possess an outstanding opportunity for solitude.

The diversity and quality of recreation opportunities are like those that can be found on public lands across eastern Oregon and the northern Great Basin. They are not unique. They do not have characteristics, either individually or collectively, that result in outstanding recreation activities.

4.16.2.2.3 West River Breaks WIM Unit (6,265 acres)

This unit consists of high hills and ridges that drop off toward the east into Water Gulch, which flows northeast to the North Fork Malheur River. Numerous small drainages dissect the countryside flowing northeast toward the river. This setting creates a sense of solitude in some locations. Outstanding opportunities for solitude are precluded because the unit is narrow with private land on three sides and private lands running through the middle. Vegetation provides little screening.

The unit does not possess special or unique values or properties that attract recreational use. The diversity and quality of recreation opportunities are the same as those found on public lands across eastern Oregon and the northern Great Basin. They are not unique. They do not have characteristics, either individually or collectively, that result in outstanding recreation activities.

4.16.2.2.4 Cottonwood WIM Unit (7,750 acres)

This unit is generally two to 2.5 miles wide, east to west. About three-quarters of the area do not offer opportunities for solitude, because the views are unobstructed. The sights and sounds of people and their activities can be seen and heard from many locations in the unit.

Cottonwood Reservoir is a public fishing area during the spring and early summer. The purpose of the reservoir is irrigation, and most of the water is withdrawn through the summer. The water quality is poor due to extreme water level fluctuations, lack of vegetation, and a rocky bottom. The diversity and quality of recreation opportunities are similar to those found on public lands across eastern Oregon and the northern Great Basin and are not unique. There are no characteristics, either individually or collectively, that result in outstanding recreation activities.

4.16.2.2.5 Rocky Basin Unit 2-17E (5,980 acres)

The 1980 Oregon Wilderness inventory had included the Rocky Basin Unit, which contained approximately 5,980 acres. The 2010 WIM assessment determined a 1980 boundary road was no longer a road; thereby, combining two 1980 WIM units. Another change resulting from the 2010 assessment was the Beede Desert Road is now a cherry-stemmed road and not a boundary road due to a washout in Rocky Basin. The current Rocky Basin WIM unit contains 11,360 acres. The 2010 assessment found that the unit had the following developments: fences: 20.6 miles, reservoirs: 14, seedings: 285 acres, boundary roads: 23.5 miles, and non-boundary roads: 8.3 miles.

Naturalness: A north-south trending ridge divides the unit and creates a long, narrow western portion less than one mile wide. The Cottonwood Reservoir Road, part county road and part mine road, which is most of the unit's west boundary, influences the naturalness of this area. The eastern portion of the unit containing Rocky Basin and surrounding high plateau country makes an area of naturalness southward to where mining operations are obvious.

The Rocky Basin Unit includes parts of five grazing allotments, the northern half in Castle Rock (Vale District) and Cottonwood Creek, the southern half in Rocky Basin, Tub Springs-Hart, and Mill Gulch. Fences have been constructed along the eastern and a small portion of the western boundaries. An allotment boundary fence divides the unit from east to west, and a number of interior fences divide the allotments into pastures. There are pasture fences throughout the unit. The fences are not obvious to the casual observer from a distance because of the rough terrain. There are fourteen stock ponds in the WIM unit with about half of them in the central portion. Again, the terrain hides them from the casual observer until they are close to a pond. The ID team found that these developments were dispersed enough that the imprint of humans appears to be substantially unnoticeable and that the unit appears natural to the average visitor.

The primary human uses in the northern three-quarters of the WIM unit and the surrounding area are associated with livestock grazing. The southern quarter includes the EPM's authorized mining operations and their proposed mine expansion area. Mining operations are obvious to the casual observer. Diatomite is a locatable mineral, and EPM holds claims in the Rocky Basin WIM unit.

Outstanding Opportunities for Solitude: The southern portion of the unit (about one-fifth) would not offer opportunities for solitude due to EPM's existing mining operations. Most mining activities are immediately adjacent to the inventory unit; therefore, the sights and sounds of mining can be seen and heard from many locations within the unit.

The majority of the WIM unit's size, ruggedness, lack of vehicular access and lack of visitors using this basin area is conducive to creating a place and atmosphere of solitude.

Outstanding Opportunities For Primitive And Unconfined Recreation: After reviewing the information submitted, the ID team found that the recreation opportunities present are not unique and do not present characteristics, either individually or collectively, that would result in them being outstanding.

Supplemental Values: There are no known greater sage-grouse leks in the Rocky Basin WIM unit. The closest lek is approximately 2.25 miles west of the unit. The unit provides critical deer winter range, and elk and turkeys use the area. There is an isolated grove of pine trees along the ridge that currently forms the west edge of the Kelly Mine. This grove of trees was approved for removal as part of the 1984 MPO DR.

4.16.3 Environmental Consequences

4.16.3.1 Assessment Methodology

The BLM ID team used current field data along with the citizens' PWSA data to analyze five WIM units that were 5,000 acres or larger and to determine if those units contained wilderness characteristics.

4.16.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative EPM could continue operations as previously approved under the 1985 MPO (BLM 1985) as described in Chapter 2. The 1985 MPO area would remain available for exploration and development, as described in the 1985 MPO and subsequent approved amendments to that MPO. Approximately 150 acres of the Rocky Basin WIM unit lie within the 1985 MPO area (in section 25) and would continue to be affected by the approved uses described in Chapter 2.

Diatomite is a white mineral. While there are areas where diatomite lies on the surface, most of the Project Area consists of sagebrush steppe with areas of juniper and a patch of ponderosa pine approved for removal in the 1985 EA FONSI and DR. In contrast to this generally greenish gray to tan setting, the intensely white diatomite mines and stock piles are highly visible. The Beede Desert pit is visible from Stinkingwater Pass on Highway 20, approximately 13 miles away. The Section 36 pit is visible from Drinkwater Pass, the VRM KOP on Highway 20, approximately seven miles away. Some parts of the existing mining operations are visible from the high points and ridges in the southern part of the Rocky Basin WIM unit as well as from Agency Mountain in the Agency Mountain WIM unit. The diatomite mineral areas can effectively be seen from many vantage points in the southern portion of the Rocky Basin WIM unit. Gradually, over decades, the affected areas would start looking more natural as the productive capacity of the mines is reached and reclamation is completed.

Under the No Action Alternative EPM's mining claims in the Project Area remain valid. At this time the proposed mining expansion area has not been withdrawn from mineral entry, nor designated as a special management area. The mining of DE will continue under the No Action Alternative because EPM has approvals to mine DE on BLM-administered lands in the 1984 MPO area DR.

4.16.3.3 Alternative 2 - Proposed Action

Implementation of the Proposed Action would affect the Rocky Basin WIM unit. Of the 11,360 acres in the Rocky Basin WIM unit, approximately 4,338 acres are in the proposed Project Area. For the purpose of this analysis, the Proposed Action would diminish or eliminate wilderness characteristics on the 4,338 acres in the Project Area. The least affected areas would be the north central areas of the Project Area that have a generally northern aspect and are sheltered from mining activities to the east or west by ridgelines. In much of the Project Area, mining or associated activities would, through time, be visible. As discussed above, another factor that makes diatomite mining so visible is it is a white mineral in a grayish green to tan setting. The white of the open pit mines, stock piles, and bare ground where diatomite is exposed at the surface are very visible. Taken together these factors would diminish or eliminate feelings of naturalness and outstanding opportunities for solitude from the majority of the proposed Project Area.

Figure 4.16.1 (Lands with Wilderness Characteristics) shows areas with wilderness characteristics and wilderness inventory maintenance units within and surrounding the project boundary. Existing and proposed roads are also shown.

Explanation

- Project Boundary
- Excluded Area within Project Boundary
- Proposed Mine Operations Areas
- Approved Mine Operations Areas
- Proposed Roads

Existing Roads

- County
- Other

Lands with Wilderness Characteristics

- Rocky Basin

Wilderness Inventory Maintenance Units

- Drinkwater
- West River Breaks
- Cottonwood
- Agency Mountain

0 500 1,000 1,500 2,000 Meters

0 2,000 4,000 6,000 8,000 Feet

Projection: UTM Zone 11 North, NAD83

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CELATOM MINE EXPANSION PROJECT

Lands with Wilderness Characteristics

Figure 4.16.1

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4.16.3.4 Alternative 3 - Proposed Action with Design Elements for Environmental Protection

Impacts to Lands with Wilderness Characteristics from Alternative 3 are the same as those described in Alternative 2 - Proposed Action.

All the known potential affects, past, present, and reasonably foreseeable future actions were analyzed above. No additional cumulative impacts to lands with wilderness characteristics are known.

4.17 Wildlife and Fisheries

4.17.1 Regulatory Framework

4.17.1.1 Federal Regulations

Section 102.8 of the FLPMA states that the policy of the United States is to manage public land in a manner that would protect the quality of multiple resources and provide food and habitat for fish, wildlife, and domestic animals. The PRIA directs the BLM to improve rangeland conditions with due consideration given the needs of wildlife and their habitats.

The character of vegetation, including arrangements, densities, and age classes, greatly influences fish and wildlife habitat quality and productivity. Since vegetation character can vary in response to federal land use authorizations, the BLM considers the consequences to the health of fish and wildlife habitat of various land uses such as grazing and mining, and treatments such as burning and seeding.

The BLM's role in the management of fish and other aquatic resources is to provide the habitat that supports these resources. Aquatic habitat values are products of the attributes and processes of properly functioning riparian and aquatic systems at a desired ecological status. Therefore, the maintenance, restoration, or improvement of aquatic habitat to support these resources is relative to the alternatives identified under the Water Resources, Vegetation, and Special Status Species sections.

Wildlife must have a reasonable amount of protection from adverse impacts associated with human disturbances and most human activities. This is especially true during breeding seasons and when wildlife use winter ranges.

4.17.1.2 Oregon Laws

The ODFW manages wildlife species populations through management objectives specified in their respective management plans; the BLM manages adequate habitat to support these numbers. The BLM and the ODFW would work cooperatively to benefit the management of wildlife and wildlife habitat as described in the MOU of 2001 between the two agencies. Elk have expanded their range in the Project Area, while pronghorn antelope numbers have remained fairly stable and deer numbers have decreased. Changes in numbers of wildlife depend on availability, quality and quantity of seasonal and year long habitat, and other factors.

4.17.2 Affected Environment

4.17.2.1 Study Methods

The existing condition for wildlife resources was determined utilizing GIS data collected by the BLM and resource data detailed in other sections of Chapter 4 of this document. Migratory birds are located in the Project Area and are discussed in Section 4.5. Habitat for only one special status species, the greater sage-grouse, is found in the Project Area and is discussed in Section 4.11. Therefore, this Section only discusses general wildlife and game species.

4.17.2.2 Existing Conditions

4.17.2.2.1 General Wildlife and Game Species

Wildlife habitat in the Project Area consists primarily of sagebrush and grassland vegetation associations with some intermixed juniper and ponderosa pine. The specific vegetation communities that comprise the wildlife habitat in the Project Area are described in the vegetation section (Section 4.18). Junipers and pines provide structural diversity for wildlife species as both cover and food sources, particularly during the winter season. Big sagebrush provides important habitat for many sagebrush obligate and facultative wildlife species. The low sagebrush areas provide seasonal habitat for some wildlife species and year-round habitat for smaller wildlife species. Stock water ponds, ephemeral drainages, and springs are present in the Project Area that provide water sources for wildlife that utilize the area, but there are no permanent water bodies within the Project Area.. The nearest permanent water body is the Altnow Reservoir, which is located outside and to the west of the Project Area. Riparian areas are shown on Figure 4.15.1, which are limited to intermittent or ephemeral drainages (see Section 4.15); however, no specific riparian communities have been identified.

General wildlife expected to be present in the Project Area include reptiles such as western rattlesnake (*Crotalus oreganos*) and bullsnake (*Pituophis catenifer sayi*). Small mammals include least chipmunk (*Neotamias minimus*) and deer mouse (*Peromyscus maniculatus*). Large mammals such as badger (*Taxidea taxus*), coyote (*Canis latrans*), and mountain lion (*Puma concolor*), are also supported in the Project Area (BLM 1985).

Game species observed in or near the Project Area include mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), Rocky Mountain elk (*Cervus canadensis nelsoni*), and wild turkey (*Meleagris gallopavo*). Mule deer utilize the entire Project Area, especially in winter, and are typically associated with complex mid- to upper- elevation plant communities supporting a wide variety of sagebrush, mountain shrubs, juniper, and herbaceous vegetation. Mule deer browse on shrubs and forbs, which provide most of their annual diet. Thermal cover is critical on winter range to provide protection from wind and other adverse elements. Grassy slopes, meadows, brush fields, and other early successional stages (artificially created and otherwise) provide the majority of deer forage. The juniper/big sagebrush, sagebrush/antelope bitterbrush (Purshia tridentata) shrublands and the small ponderosa pine stands in the Project Area function as thermal cover. Figure 4.17.1 shows the deer winter habitat within the Project Area. The Project Area makes up less than one percent of ODFW's Beulah Hunt Unit.

Transition range can be divided into spring and fall. The vegetation of the spring transition range is similar to winter range and consists of sagebrush and juniper woodland. Grasses and forbs are

Figure 4.17.1 (General Wildlife and Game Species) presents the areas utilized by deer and elk in the hunt unit as well as noting the riparian areas of the project.

Explanation

- Project Boundary
- Excluded Area within Project Boundary
- Riparian Areas
- Deer
- Elk

Hunt Units

- Beulah (Encompasses entire project area)

0 5,000 Feet

0 2,000 Meters

Projection: UTM Zone 11 North, NAD83

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may by updated without notification.

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CELATOM MINE EXPANSION PROJECT

General Wildlife and Game Species

Figure 4.17.1

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important components of the spring transitional ranges. The fall transitional ranges are botanically similar to summer ranges and consist primarily of shrub steppe, and juniper woodland communities. Maintaining migratory routes is critical to the seasonal deer movements.

Pronghorn antelope have light use within the Project Area during spring, summer, and fall (BLM 1985) and mainly utilize areas adjacent to the Project Area. During the summer, pronghorn antelope are widely distributed throughout areas having low structure and a mixture of grasses, forbs, and shrubs. Sagebrush is used for both cover and forage.

Rocky Mountain elk use portions of the Project Area in winter when there is deep snow at the higher elevations (BLM 1985), as shown in Figure 4.17.1. Three types of cover are important to elk: hiding cover; thermal cover; and optimal thermal cover. Hiding cover includes any vegetation capable of hiding 90 percent of a standing elk at 200 feet or less. Thermal cover and optimal thermal cover exist in juniper woodlands and juniper/big sagebrush areas. Winter range is an important consideration in managing elk populations. During winter, elk use south-facing slopes and lower elevations because of warmer temperatures, reduced snow depths, and available forage.

Small game species that utilize the Project Area include light use by mourning dove (*Zenaida macroura*), California quail (*Callipepla californica*), and greater sage-grouse. Greater sage-grouse are a BLM special status species and a USFWS candidate species as discussed in Section 4.11. Chukar (*Alectoris chukar*) potentially occur near Mill Gulch (BLM 1985). Mourning dove, California quail, and chukar would inhabit most of the vegetation communities within the Project Area. Wild turkeys have been observed in the ponderosa pine stand, half of which is approved for removal (BLM 1985), along the western side of the present Kelly Field Mine. In general, wild turkey inhabit a wide variety of vegetation communities, and may utilize the juniper/sagebrush and ponderosa pine stands in the Project Area. This species nests on the ground, in open areas, usually at the edge of forest or woodland and roosts in trees at night.

4.17.2.2.2 Fisheries

There are no fisheries located in the Project Area; therefore, fisheries will not be further discussed.

4.17.3 Environmental Consequences

4.17.3.1 Assessment Methodology

Potential effects on wildlife resources are described as direct or indirect, during the 50-year life of the Project) and long term (post Project). Direct impacts are those that would result in the death or injury of an animal. Indirect impacts include the degradation of wildlife habitat to the extent that population numbers decline. Life of the Project impacts are those that could occur during implementation of the Project and until reclamation is complete. Long-term impacts are those that occur after reclamation is complete.

4.17.3.2 Alternative 1 - No Action Alternative

Under the No Action Alternative, EPM would continue to expand operations on BLM-administered land as previously approved under the 1985 DR (BLM 1985) or permitted by the

BLM under a subsequent approval. The total existing disturbance associated with the No Action Alternative is 465 acres within a 1,633.7-acre Project Area.

4.17.3.3 Alternative 2 - Proposed Action

4.17.3.3.1 General Wildlife and Game Species

Construction and operation of the Project would directly affect wildlife habitat through removal of vegetation in areas proposed for surface disturbance, as detailed in Section 3.2. A maximum of 1,394.5 acres of habitat would be incrementally removed or disturbed over the 50-year life of the Project as a result of implementation of the Proposed Action. Exploration would account for 250 acres of this total. Due to incremental mining and exploration activities with interim reclamation, this acreage would not be disturbed all at one time. All surface disturbance would be reclaimed with the exception of 250 acres of pit walls and benches. Wildlife displaced by Project activities would likely shift spatially into adjacent available habitat. Areas that pose a hazard to wildlife such as open trenches, drill holes, or open pits with steep walls would be constructed with a sloped end for easy egress or would be fenced to preclude access (Section 3.2.12). Water impoundments constructed and maintained as a result of the Proposed Action could benefit wildlife and game species within the Project Area. Surface disturbance would be reseeded with the BLM-approved seed mix (Table 2.5-1) that includes native seeds or plants that are compatible with native soils located in the Project Area and include forb and shrub species to provide forage for wildlife. Project-related activities would generally occur seasonally from April through November but may run year-round depending on market demand. Wildlife may be able utilize the Project Area during the winter from December through March without disruption, other than haul trucks transporting ore. Speed limits on Project roads would decrease the potential of vehicular mortality of wildlife species.

There is similar habitat adjacent to the Project Area where wildlife, especially individual invertebrates, reptiles, and small mammals, displaced by Project-related disturbance could relocate. Mining activities, construction of roads and drill pads, and the operation of drilling equipment could disturb wildlife typically between April and November, but possibly year-round, through the presence of humans, removal of vegetation and upper soil layers, and by creating noise and dust seasonally over the 50-year life of the Project.

Direct impacts to individual general wildlife and game species as a result of the Proposed Action are not quantifiable. Some individuals may be directly impacted either positively or negatively, but due to the dispersed nature of the proposed disturbance and available habitat in adjacent areas, no impacts to regional populations would result from the Proposed Action. The Proposed Action includes installation of water impoundments that may benefit wildlife and game species utilizing the Project Area. In the long term, the combination of the common nature of the habitats in the Project Area, the adaptalility of many of the typical species, reclamation of most of the mined areas, and all other factors being equal, post-mining populations of babitat use by common wildlife and game species would be approximately equal to pre-mining populations and habitat use. Potential indirect impacts to wildlife include loss of nesting, brooding, roosting, foraging, and cover habitats until successful reclamation is complete. Long-term reclamation efforts would gradually re-establish grasses, shrubs, and forbs recovering wildlife habitat in the mined areas. The Proposed Action would result in a net loss of potential habitat, but would not contribute to a loss of viability for wildlife, including game species.

Noise would occur during the 50–year Project from April through November of each year but may run year-round depending on market demand. Sudden loud noises from mining and exploration activities could cause wildlife to disperse away from the sound. Some wildlife may avoid the area while others may tolerate the noise and continue foraging and breeding activities in the vicinity of the Project Area. Similar habitat is located adjacent to the Project Area, and general wildlife and game species could be expected to move into nearby areas during Project activities.

Change in discharge or water quality of existing water sources could impact game species use of and movement through the Project Area. Impacts to water quality is unlikely in the Project Area because the Proposed Action includes concurrent reclamation and sediment control structures to minimize suspended sediment loads from entering ephemeral drainages and intermittent streams within and adjacent to the Project Area (Section 3.2.12).

Wildlife may utilize the seasonal meteoric water that accumulates in the open pits in the Project Area for short periods during their journeys to and from more suitable feeding and breeding grounds. The SLERA prepared for the Project evaluated the risk to wildlife (SRK 2010b) and found that the seasonal meteoric water that accumulates in the open pits in the Project Area represents a low risk to wildlife.

In the short term there would be some impacts to wildlife species in the mined areas; however, because the habitats in the Project Area are common and because the wildlife species involved are generally mobile, the impacts of the Proposed Action would likely be unmeasureable to the affected populations with the exception of the removal of the small ponderosa pine stands. In the long term, successful post-mining reclamation would approach the pre-mining habitat values.

4.17.3.4 Alternative 3 - Proposed Action with Additional Design Elements

The impacts to wildlife would be the same as those described in the Proposed Action, with the exception of new fence construction and another new road. Constructing the half mile Eagle Cutoff Road north of the Beede Desert Mine Operations Area would result in an additional 1.4 acres of vegetation removal primarily through open sagebrush communities with sparse understory. The location of the road and minimal vehicle travel in the area are unlikely to measurably affect elk or other big game species, other than indirectly through the loss of forage on approximately 1.4 linear acres. The additional ten and a half miles of fence would potentially alter big game movement or increase potential for injury from entanglement or collision relative to the other Alternatives. Fences would be constructed to BLM standards, which are designed to reduce potential entanglement and allow passage of big game animals. The fence-to-area ratio in the Project Area would increase from the current ratio of one and a half miles of fence per square mile to two miles of fence per square mile. The Eagle Cutoff Road and all proposed fences, with the exception of fences around the Kelly Field Mining Operations Area, are outside deer and elk winter range.

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5 CUMULATIVE IMPACT ANALYSIS

5.1 Introduction

For the purposes of this EIS, the cumulative impacts are the sum of all past, present, and reasonably foreseeable future actions (RFFAs) resulting primarily from mining, commercial activities, and public uses. The purpose of the cumulative analysis in the EIS is to evaluate the significance of the Proposed Action's contributions to cumulative impacts. A cumulative impact is defined under federal regulations as follows:

> "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individual minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

As required under the NEPA and the regulations implementing the NEPA, this chapter addresses those cumulative effects on the environmental resources in the Cumulative Effects Study Areas (CESAs) that could result from the implementation of the Proposed Action and reasonable alternatives, past actions, present actions, and RFFAs. The extent of each CESA would vary by resource, based on the geographical or biological limits of that resource. As a result, the list of projects considered under the cumulative analysis varies according to the resource being considered. In addition, the length of time for cumulative effects analysis would vary according to the duration of impacts from the Proposed Action on the particular resource.

For the purposes of this analysis and under federal regulations, 'impacts' and 'effects' are assumed to have the same meaning and are interchangeable. The cumulative impacts analysis was accomplished through the following three steps:

- Step 1: Identify, describe, and map CESAs for each resource to be evaluated in this chapter;

- Step 2: Define timeframes, scenarios, and acreage estimates for cumulative impact analysis. Past and present disturbances and activities include commercial/public and mining operations with disturbed areas not reclaimed or unsatisfactorily reclaimed (impacts from those activities are reflected in the current condition). Future scenarios address reasonably foreseeable effects from the following: grazing and agriculture; utilities and infrastructure activities; wildfires, fuels management; recreation activities; land development activities; mining and exploration operations identified in notices and plans of operations, or on private or state land; and

- Step 3: Identify and quantify (if possible) the location of possible specific impacts from the Proposed Action, and judge the significance of these contributions to the overall impacts.

Information utilized in the cumulative impacts assessment was gathered from the following sources: the BLM; State of Oregon; local jurisdictions; and private landowners. The past actions, present actions, and RFFAs are current as of April 1, 2010. Changes in actions after this date are not considered in this analysis.

Environmental consequences of the Proposed Action and the reasonable alternatives were evaluated in Chapter 4 for the various environmental resources. Based upon the analysis of the environmental resources as completed in Chapter 4, the following resources could be impacted by the Proposed Action and reasonable alternatives: air quality; geology and minerals; grazing management; noxious weeds; soils; special status species; vegetation; water quality; and wildlife. The above resources are considered to have the potential to be cumulatively impacted by actions within the identified CESA for that resource.

5.2 Cumulative Effects Study Areas

The geographical areas considered for the analysis of cumulative effects are illustrated in Figure 5.2.1.

The CESA for air quality (908,129 acres) was determined to be the area defined by the 5,250-foot contour elevation surrounding the Project Area, which is the representative elevation where the influence of topography and atmospheric patterns would change little over space and time.

The CESA for geology and minerals, and soils (12,640 acres) was determined to be the Project Area, based on an assessment that any effect of the Project to these resources would not extend beyond the Project Area.

The CESA for noxious weeds, special status species (greater sage-grouse), vegetation, water quality, and wildlife (158,833 acres) was determined to be the local watershed, based on an assessment that each of these resources would have similar impact characteristics within the local watershed for the Project Area.

The CESA for grazing management (31,642 acres) was determined to be the grazing allotments that the Project is located within, based on the fact that the allotments define the rangeland resources.

The CESA for recreation and transportation and roads (103,681 acres) was determined to be the local use area located north of US Highway 20, based on an assessment that each of these resources would have similar impact characteristics within this use area.

The cumulative impacts analysis for this EIS utilizes a timeframe based on the estimated potential future duration of the impacts from the Proposed Action. Based on a Proposed Action approval in 2011 and a 50-year Project life, the timeframe over which the cumulative analysis was completed is through 2061.

The types of Project-specific impacts to the resources evaluated in Chapter 4 may also occur as a result of the past actions, other present actions, and RFFAs. The potential cumulative effects from the past actions, present actions, and RFFAs are discussed in Sections 5.3 through 5.5. The individual projects described below comprise the past and present actions, and RFFAs identified by the BLM and by EPM for RFFAs on private or State of Oregon land (i.e., mining or mineral development). The projects and activities include the following: grazing; utilities and distribution; wildland fires; fuels management projects; recreation; land development; mineral development

T14S
R32E

Cottonwood Reservoir

Beulah Reservoir

Drewsey

Juntura

Warm Springs Reservoir

Riverside

T24S
R39E

Figure 5.2.1 (Cumulative Effects Study Areas) details the cumulative effects study areas including air quality, recreation/transportation, water/vegetation/wildlife, and grazing in and around the project area. Also included are mineral material sites, campgrounds, boat launches and water/river use areas. Primitive campsites and locales are noted as is recreation area perimeters.

Explanation

- Minerals Material Site
- Campground
- Boat Launch
- Water/River Use Area
- Primitive Campsite
- Recreation Area Perimeters
- Locale
- Air Quality CESA (908,129 acres)
- Recreation/Transportation CESA (103,681 acres)
- Water/Vegetation/Wildlife CESA (158,883 acres)
- Grazing CESA (31,642 acres)
- Project Area
- Fuels Treatment

0 1 2 3 4 5 Miles

Projection: NAD83, UTM zone 11

N

BUREAU OF LAND MANAGEMENT

BURNS DISTRICT OFFICE
28910 Highway 20 West
Hines, Oregon 97738

CELATOM MINE EXPANSION PROJECT

Cumulative Effects Study Areas

Figure 5.2.1

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and exploration. All of the projects and activities have the potential to impact the environmental resources of concern within all or portions of the various CESAs. Table 5.2-1 outlines all the actions considered in the cumulative impacts analysis, their status, potential environmental impacts, and the area of the potential impact. An explanation of the abbreviations and numbering is located at the end of the table. Figure 5.2.1 illustrates the cumulative projects data collection area. Table 5.2-2 outlines the acres of surface disturbance associated with each of the actions considered in the cumulative impact area of analysis illustrated in Figure 5.2.1. The acreage values shown in Table 5.2-2 are totals for each category. Project-specific acres within each resource CESA are discussed under that resource.

5.3 Past, Present, and Reasonably Foreseeable Future Actions

5.3.1 Grazing Management

Livestock grazing has been and continues to be a dominant land use in Harney and Malheur Counties. Multiple grazing allotments have been permitted and administered by the BLM over approximately the past half century. Five grazing allotments comprise the area of the Grazing CESA (Figure 5.2.1). The carrying capacity, which is assumed to be the long-term use and the wildlife use, of these five grazing allotments is approximately 5,079 AUMs. The capacity of these allotments has been adjusted over the years in response to mineral development, drought, wildland fires, and availability of stock water.

Surface water sources that support livestock grazing and agriculture within the Grazing CESA include reservoirs, perennial creeks, springs, and seeps. Improved water sources include developed springs, stock wells, stock ponds, water pipelines, and troughs. Livestock would generally congregate near these features. Cow-calf pairs, heifers, steers, cows, and sheep graze on residual forage in alfalfa fields, irrigated pastures, and rangeland within Harney and Malheur Counties. A substantial amount of four-strand (three barbed and one smooth wire on the bottom) wire fencing has been constructed within the Grazing CESA. In addition, there have been a number of range improvement authorizations by the BLM within the allotments in the CESAs for the management of the cattle and sheep. These range improvements include fences, cattleguards, water troughs, spring improvements, wells, reservoirs, windmills and tanks, and pipelines.

Existing agricultural development in the Otis Valley and Drewsey areas, identified as of April 1, 2010, using aerial photographs, appears to be approximately 3,150 acres.

Livestock grazing is expected to continue in the various grazing allotments, including in the vicinity of the Project Area. Short-term (typically two to four years) adjustments to livestock numbers are expected in response to wildland fires, which affect forge levels. The following projects are proposed as part of ongoing livestock management programs at the BLM, separate from mining-related activities:

- livestock management fence construction;
- water development (i.e., springs and wells);
- permanent water haul locations;
- sagebrush enhancement;
- seeding;
- pipeline construction;

- vegetation manipulation;
- control invasive and noxious plant populations;
- fence relocation; and
- reservoir construction.

Continued agricultural activities in the Otis Valley and Drewsey areas are reasonably expected to occur in the form of flood irrigation and ranching.

Table 5.2-1: Summary of Activities that May Cumulatively Affect Resources

Project Descriptions	Status	Anticipated Resources That Could Be Cumulatively Impacted	Project Location By CESA
Grazing			
Range Operations	PP, RF	1, 5, 7, 11	AQ, RRT, WVW, GR, PA
Range Improvements (fences, cattleguards, wells, windmills, pipeline/trough, springs, water pumps)	PP, RF	1, 5, 7, 11	AQ, RRT, WVW, GR, PA
Irrigated Crops	PP, RF	5, 6, 7, 8, 10, 11	WVW, GR
Utilities and Infrastructure			
Powerlines	PP, RF	1, 2, 5, 6, 7, 8, 9, 10	AQ, RRT, WVW, GR, PA
Telecommunications	PP, RF	1, 2, 5, 6, 7, 8, 9, 10	AQ, RRT, WVW, GR
Paved Roads	PP, RF	1, 2, 3, 5, 6, 7, 8, 9, 10	AQ, RRT, WVW, GR
Unpaved Roads	PP, RF	1, 2, 3, 5, 6, 7, 8, 9, 10	AQ, RRT, WVW, GR, PA
Reservoirs	PP	1, 6, 7, 9, 11, 12	AQ, RRT, WVW
Wildland Fires and Fuels Management			
Otis Mountain-Moffit Table Project Fuels Treatment	PP	1, 2, 3, 5, 7, 8, 9, 10, 11, 12	AQ, RRT, WVW
Pinecraft Project Fuels Treatment	PP	1, 2, 3, 5, 7, 8, 9, 10, 11, 12	AQ
Chalk Hills Project Fuels Treatment	PP	1, 2, 3, 5, 7, 8, 9, 10, 11, 12	AQ, RRT, WVW, GR
Wildland Fires	PP, RF	1, 2, 3, 5, 7, 8, 9, 10, 11, 12	AQ, RRT, WVW, GR, PA
Restoration Activities			
Miller Canyon	RF	1, 2, 3, 5, 7, 8, 9, 10, 11, 12	AQ
Recreation			
Primitive Campsites	PP	1, 2, 6, 11	AQ, RRT, WVW, GR
Dispersed Recreation	PP, RF	2, 6	AQ, RRT, WVW, GR, PA
Campsites, Boat Ramps, Water Use Areas	PP	1, 2, 11	AQ, RRT, WVW
Land Development			
Juntura	PP, RF	1	AQ
Drewsey	PP, RF	1	AQ
Riverside	PP, RF	1	AQ

Project Descriptions	Status	Anticipated Resources That Could Be Cumulatively Impacted	Project Location By CESA
Land Sales	PP, RF	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	AQ, RRT, WVW, GR, PA
Mineral Development and Exploration			
Mining Operations (public, private, state)	PP, RF	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	AQ, RRT, WVW, GR, PA
Gravel Extraction Operations	PP	1, 3, 5, 6, 7, 9, 10, 11, 12	AQ, RRT, WVW, GR
Source of Information: BLM: Bureau of Land Management EPM: EP Minerals ODWF: Oregon Department of Wildlife and Fish ODEQ: Oregon Department of Environmental Quality ODOT: Oregon Department of Transportation	Status: PP-Past and Present Actions RF-Reasonably Foreseeable	Issues: 1-Air Quality 2-Biological Soil Crusts 3-Forestry/Woodlands 4-Geology and Minerals 5-Grazing Management 6-Land Use and Realty 7-Noxious Weeds 8-Soils 9-Special Status Species 10-Vegetation 11-Water Quality 12-Wildlife and Fisheries	Location: AQ-Air Quality CESA GR-Grazing CESA RRT-Recreation/Realty /Transportation CESA PA-Project Area WVW-Water/Vegetation/ Wildlife CESA

Table 5.2-2: Surface Disturbance or Area Associated with Projects within the Cumulative Effects Study Areas

Project Descriptions	Past and Present (acres)	RFFA (acres)	Total (acres)
Grazing and Agriculture			
Open Range Operations	nq	nq	nq
Range Improvements (fences, cattle guards, wells, windmills, pipeline/trough, springs, water pumps)	nq	nq	nq
Irrigated Crops	3,150	0	3,150
Subtotal	3,150	0	3,150
Utilities and Infrastructure			
Powerlines	nq	nq	0
Telecommunications	nq	nq	0
Paved Roads	nq	nq	0
Unpaved Roads	nq	nq	0
Reservoirs	4,040	0	4,040
Subtotal	4,040	0	4,040
Wildland Fires, Fuels Management, and Reseeding			
Otis Mountain-Moffit Table Project Fuels Treatment	1,000	0	1,000
Pinecraft Project Fuels Treatment	1,200	0	1,200
Wildland fires (1985, 1996, 1998,2001-2002, 2006, and 2007)	19,371	nq	19,371
Subtotal	21,571	0	21, 571
Restoration Activities			
Miller Canyon	0	1,100	1,100
Subtotal	0	1,100	1,100
Recreation			
Primitive Camp Sites	80	nq	80

Project Descriptions	Past and Present (acres)	RFFA (acres)	Total (acres)
Dispersed Recreation	nq	nq	0
Campsites, Boat Ramps, Water Use Areas	80	0	80
Subtotal	160	0	160
Land Development			
Juntura	56	0	56
Drewsey	65	0	65
Riverside	6	0	6
Land Sales	0	nq	0
Subtotal	127	0	127
Mineral Development and Exploration			
Mining Operations (public, private, state)	1,920	357	2,277
Gravel Extraction Operations (estimated)	155	0	155
Subtotal	2,075	357	2,075
Total	**34,164**	**1,512**	**55,047**

nq - not quantified

5.3.2 Fuels Management

Wildland fires occur at an irregular frequency within the CESAs. In addition to the wildland fires that occurred in 1985, 1996, 1998, 2001, 2002, 2006, and 2007, there have been a number of vegetation treatments or fuels reduction projects in the CESAs. These projects include the Otis Mountain-Moffit Table Project Fuels Treatment, the Pinecraft Project Fuels Treatment, and the Chalk Hills Project Fuels Treatment. A total of 19,371 acres have been affected by wildland fires. A total of 3,200 acres have received fuels management treatment.

Fire suppression and treatments would continue to be an important component of land management within the CESAs as wildland fires are expected to continue. Wildland fires are expected to continue to occur at irregular intervals within the CESAs and are likely to include areas previously burned and seeded.

5.3.3 Recreation

Dispersed recreation opportunities include sightseeing, pleasure driving, rock collecting, photography, off-highway vehicle use, mountain biking, picnicking, camping, fishing, hunting, and hiking. This wide range of opportunities is possible because virtually all of the public lands in the CESAs are accessible and offer a variety of settings suitable for different recreational activities. Four developed campsites are located within the CESAs (Figure 5.2.1). In addition, there are two boat ramps at Warm Springs Reservoir. There are 40 primitive campsites within the CESAs (Figure 5.2.1).

Dispersed recreational activities have not required major improvements for recreational purposes, as existing roads and trails are the primary facilities associated with these activities. Surface disturbance has occurred as a result of recreation activities and is either accounted for under other categories or the disturbance has not been quantified. There are three reservoirs, Warm Springs, Beulah, and Cottonwood, which total 4,040 acres and are located on public land.

Recreational use within the CESAs is expected to continue consistent with the past and present use, with dispersed outdoor recreational activities being the predominant type of recreation.

5.3.4 Utilities

Past utility and distribution actions include the development of roads, powerlines, and telecommunications. Roads have been developed by the State of Oregon (US Highway 20), Harney and Malheur Counties, the BLM, and the USFS. The community of Drewsey is located in eastern Harney County and the communities of Juntura and Riverside are located in western Malheur County. Individual ranches comprise the remainder of the inhabited areas in the CESAs.

Three general types of roads have been developed within Harney and Malheur Counties: paved roads; gravel surface roads; and dirt roads.

There is a major transmission line in the southern portion of the Air Quality CESA that is an east-west line. In addition, there are power distribution lines throughout the CESAs, servicing the communities and individual ranches.

Within the CESAs, the BLM has issued approximately 33 authorizations for the development of telephone and fiber optic lines, powerlines, communication sites, pipelines, weather stations, GPS sites, and wells.

There is one major travel route within the CESAs, US Highway 20. As discussed above, there are a number of county roads within the CESAs. Based on data provided by the ODOT, traffic on US Highway 20 consists of approximately 1,100 daily trips. There are also undocumented daily traffic trips on the county roads that are not represented in the traffic data from the ODOT.

Development of additional roads is reasonable to anticipate; however, these roads are likely to be dirt roads created by recreational use on the public lands in the CESAs. Need for new transmission lines within this portion of the State of Oregon is not anticipated; however, it is reasonable to expect that additional distribution lines would be constructed.

It is reasonable to expect the traffic would increase in volume on the major travel route in the CESAs, as well as on the other county roads in proportion to economic activity and population growth.

5.4 Evaluation of Potential Cumulative Impacts

5.4.1 Air Quality

5.4.1.1 Environmental Consequences

Within the 908,129-acre Air Quality CESA there are a number of present actions and RFFAs that have the potential to affect air quality. These include transportation activities, fuels treatments, wildland fires, mining operations, and recreational activities. Transportation and recreational activities would primarily result in products of combustion (PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO). Fuels treatment activities and wildland fires would primarily result in particulate emissions (PM_{10} and $PM_{2.5}$). The mining operations would result in both particulate emissions and products of combustion. Even with these effects on air quality within the CESA, as outlined in Chapter 4,

the air quality in the region is relatively good due to the limited number of air pollution sources. The Proposed Project would have emissions that are similar to those present actions and RFFAs. The expected levels of applicable pollutants are expected to be well below the NAAQS and OSAAQS (see Section 4.2). As a result, the Proposed Action would not likely have an incremental effect on air quality within the Air Quality CESA.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because of the smaller project size. The incremental cumulative effect of Alternative 3 would be the same as the Proposed Action.

5.4.2 Geology and Minerals

5.4.2.1 Cumulative Impacts

The CESA for geology and mineral resources is the Project Area CESA, which encompasses 12,640 acres and is shown on Figure 5.2.1. Current and historic mining operations within the CESAs have resulted in disturbance to approximately 2,075 acres of geologic and mineral resources. RFFAs are expected to include 357 acres of mine expansion on private or State of Oregon lands.

Past and present actions that are likely to have impacted geology and mineral resources include land sales, mineral development, and mineral exploration. However, the BLM manages these activities within the Project Area and would ensure that these activities are conducted according to management plans. Other lands are managed by DOGAMI regulations. There are no specific data that quantify impacts to geology and minerals in the Project Area.

Cumulative impacts from the alternatives analyzed in this EIS on geology and mineral resources would include the permanent continued removal of diatomite ore in accordance with current approvals. This would represent an irretrievable loss of this resource from the Project Area.

Under the Proposed Action, the current slope failures are being mitigated and monitored through the Kelly Field Highwall Management Plan Phase I through Phase III and would be completely mitigated and would, therefore, not have any cumulative impact on geologic resources. There would be no impacts associated with geologic hazards for the Proposed Action because of the mitigated slope failure.

The incremental cumulative effect of the No Action Alternative is expected to be similar to, but slightly greater than, the Proposed Action because without the Proposed Action, the Kelly Field Highwall slope failure would not be mitigated and with additional slope failures, mineral resources could be buried to the point they are no longer economic. The incremental cumulative effect of Alternative 3 would be the same as that of the Proposed Action.

5.4.3 Grazing Management

5.4.3.1 Cumulative Impacts

Impacts to grazing management are analyzed in the Grazing CESA which is approximately 31,642 acres and is shown on Figure 5.2.1. Five grazing allotments comprise the area of the Grazing CESA (Figure 5.2.1). The carrying capacity, which is assumed to be the long-term use and the wildlife use of these five grazing allotments, is approximately 5,079 AUMs. The capacity of these allotments has been adjusted over the years in response to mineral development, drought, wildland fires, and availability of stock water.

Past and present actions and RFFAs with impacts to grazing management in the Grazing CESA include irrigated crops, utilities and infrastructure, fuels treatment projects, recreation, land development, mining and mineral development and exploration. Past and present actions and RFFAs in the Grazing CESA have impacted and would continue to impact range resources and grazing management in the Grazing CESA. There are no specific data that quantify the loss of AUMs in the Grazing CESA.

Mining activities would result in 1,144.5 acres of disturbance over five allotments. This would represent a loss of 185 AUMs over the 50-year life (using the average of 6.2 acres per AUM) of the Project or 3.6 percent of the total AUMs that are currently managed in the five allotments. This loss would not happen at the same time but would occur over a 50-year time period. Interim and final reclamation to areas no longer needed for mining would reduce the number of AUMs affected because it is expected that revegetation of disturbed areas would provide forage within three to five years of seeding; therefore, the effects to grazing would be temporary. A total of 40 AUMs would be permanently lost due to pit walls and benches that would not be reclaimed. This represents a permanent loss of 0.8 percent of the AUMs currently managed.

There would be no AUMs permanently lost from exploration activities. The total number of AUMs that would be temporarily impacted over the 50-year life of the Project would be 185 or 3.6 percent of the AUMs currently managed in the five allotments. It is unlikely that an incremental cumulative impact would occur from the Proposed Action.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because of the smaller project size. Alternative 3 would impact 250 more AUMs than the Proposed Action over the 50-year life of the Project for a total of 8.6 percent of the AUMs and could create a 2.2 percent incremental cumulative impact to grazing management.

5.4.4 Noxious Weeds

5.4.4.1 Cumulative Impacts

The CESA for noxious weeds is the local watershed CESA (Water/Vegetation/Wildlife CESA) which encompasses 158,883 acres and is shown on Figure 5.2.1.

Potential impacts from noxious weeds as a result of past and present actions and RFFAs within the Water/Vegetation/Wildlife CESA include livestock grazing, agriculture, fuels management, recreation, and mineral development and exploration. Noxious weeds infestations occur within

and adjacent to the Project Area on approximately 431 acres (0.27 percent) of the local watershed CESA.

Surface disturbance creates an environment conducive to the introduction and spread of weed species. Construction and operation of the Proposed Action would result in the disturbance of up to 1,394.5 acres of vegetation over the 50-year life of the Project. The Proposed Action would disturb less than one percent of the CESA. The mitigation measures identified to reduce the potential impacts of the Proposed Action would control the spread or establishment of noxious weeds within and adjacent to the Project Area. There would likely be no incremental effect of surface disturbance on noxious weed management because only 0.27 percent of the CESA has known noxious weed infestations, and these infestations are currently being monitored and treated.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because of the smaller project size. The incremental cumulative effect of Alternative 3 would be the same as that of the Proposed Action.

5.4.5 Soils

5.4.5.1 Cumulative Impacts

The CESA for soil resources is the Project Area CESA, which encompasses 12,640 acres and is shown on Figure 5.2.1. Current and historic mining operations within the CESAs have resulted in disturbance of approximately 2,075 acres (16 percent) of soils. RFFAs are estimated at 357 acres of disturbance.

Past and present actions that are likely to have impacted soils include livestock grazing, range improvements, utilities and infrastructure, wildland fires, recreation, mineral development and mineral exploration that would have disturbed or impacted soils, or increased erosion or sedimentation. It is likely that some of these acres have become naturally revegetated over time and are no longer impacted. The amount of reclaimed soil disturbance is not quantifiable.

The incremental cumulative impact from 1,394.5 acres of disturbance that would result from the Proposed Action is unquantifiable because the disturbance would occur over the 50-year life of the Project, not all at once. As areas were no longer needed, they would be recontoured, growth media would be replaced, and reseeded. The Proposed Action includes measures to control erosion, stockpile growth media, perform interim reclamation, and reseeding. As a result of these protection measures, an incremental impact to soils in the CESA is not expected.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because there would be less disturbance to soils from a smaller project. The incremental cumulative effect of the Proposed Action with Alternative 3 would be the same as that of the Proposed Action.

5.4.6 Special Status Species

5.4.6.1 Cumulative Impacts

The CESA for special status species is the local watershed CESA (Water/Vegetation/Wildlife CESA) which encompasses 158,883 acres and is shown on Figure 5.2.1. Neither special status plant nor animal species occur within the Project Area; however, there is habitat for greater sage-grouse as discussed in Section 4.11.

Past and present actions and RFFAs within the Water/Vegetation/Wildlife CESA include livestock grazing, agriculture, fuels management, recreation, mineral development and exploration, and wildland fires. These activities could have resulted in surface disturbance, noise, and traffic that impacted the quality of special status species habitat in the CESA. There are no specific data that quantify impacts to special status species in the CESA.

Cumulative impacts to the special status wildlife species habitat located within the local watershed are not anticipated because the vegetation communities within the Project Area are common over the surrounding landscape.

There is a potential impact to greater sage-grouse populations within the CESA along the power transmission line in Section 31, T19S, R36E. Several studies (Ellis 1987, Hall 1997, Braun 1998) have documented a correlation between power lines and negative impacts on greater sage-grouse habitat use and numbers (e.g., providing hunting perches to raptors and ravens). The recent study by Hall (1997) suggests that the range of the effect of power lines on greater sage-grouse habitat is at least 3.75 miles wide. The lek located northwest of the Project Area is within 3.75 miles of the power transmission line in Section 31, T19S, R36E. The Project proposes design features in the alternatives that would reduce impacts to greater-sage grouse breeding and nesting activities and would not result in any incremental increase to this potential impact. As a result, it is unlikely that an incremental impact to special status species would occur in the Water/Vegetation/Wildlife CESA.

Based on the disturbance outlined in Table 5.5-2, it can be determined that the approximate total amount of disturbance (past, present, RFFAs from wildland fires, mineral development and exploration, reservoirs, any surface disturbing activities) in the Wildlife CESA is approximately 17,000 acres. The Water/Vegetation/Wildlife/Special Status Species CESA is 158,883 acres; therefore, the amount of past, present, and RFFA disturbance is approximately 10.7 percent of the CESA. The Proposed Action would result in an 1.3 percent incremental cumulative effect.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because of the smaller project size. The incremental cumulative effect of the Proposed Action with Alternative 3 would be the same as that of the Proposed Action.

5.4.7 Vegetation

5.4.7.1 Cumulative Impacts

The CESA for vegetation is the local watershed CESA (Water/Vegetation/Wildlife CESA) which encompasses 158,883 acres and is shown on Figure 5.2.1.

Past and present actions and RFFAs that could have impacted vegetation within the Water/Vegetation/Wildlife CESA include livestock grazing, agriculture, fuels management, recreation, and mineral development and exploration that utilized, impacted, or reduced vegetation. There are no specific data that quantify impacts to vegetation in the Water/Vegetation/Wildlife CESA.

Based on the disturbance outlined in Table 5.5-2, it can be determined that the approximate total amount of disturbance (past, present, RFFAs from wildland fires, mineral development and exploration, reservoirs, any surface disturbing activities) in the Water/Vegetation/Wildlife/ Special Status Species CESA is approximately 17,000 acres. The Water/Vegetation/Wildlife/ Special Status Species CESA is 158,883 acres; therefore, the amount of past, present, and RFFA disturbance is approximately 10.7 percent of the CESA. The Proposed Action would result in an 1.3 percent incremental cumulative effect.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because of the smaller project size. The incremental cumulative effect of Alternative 3 would be the same as that of the Proposed Action.

5.4.8 Water Quality

5.4.8.1 Cumulative Impacts

Within the Water/Vegetation/Wildlife CESA there are a number of past and present actions and RFFAs that have the potential to affect surface water quality. These include land development, grazing management, fuels treatments, recreation, and mineral development and exploration that utilized, impacted, or reduced vegetation increasing the potential for erosion All these activities have the potential to affect surface water quality through the discharge of sediment or other pollutants. Point source discharges are regulated by the ODEQ. The Proposed Action would have a potential effect on surface water quality that would be similar to those present actions. Based on the disturbance outlined in Table 5.5-2, it can be determined that the approximate total amount of disturbance (past, present, RFFAs from wildland fires, mineral development and exploration, reservoirs, any surface disturbing activities) in the Water/Vegetation/Wildlife/ Special Status Species CESA is approximately 17,000 acres. The Water/Vegetation/Wildlife/ Special Status Species CESA is 158,883 acres; therefore, the amount of past, present, and RFFA disturbance is approximately 10.7 percent of the CESA. The Proposed Action would result in a 1.3 percent incremental cumulative effect.

The incremental cumulative effect of the No Action Alternative on surface water quality would be less than that of the Proposed Action because of the smaller project size. The incremental cumulative effect of Alternative 3 would be the same as that of the Proposed Action.

Within the Water/Vegetation/Wildlife CESA there are only a few past and present actions that have the potential to impact ground water quality. The only RFFA that would have the potential to affect ground water quality would be mining on public, private, or state land. These past and present and RFFAs are limited to land development and mining operations. These three activities have the potential to affect ground water quality through the release of pollutants in the subsurface soils or bedrock that could migrate to the ground water system (i.e. septic systems, subsurface pit lake discharge). The Proposed Action would have a potential effect on ground water quality that would be similar to the present mining operations that intersect the water table.

As discussed in the Baseline Characterization Report for the Celatom Mine (SRK 2010a), the water quality levels in the area are already elevated beyond specific Oregon MCL (drinking water standards) prior to the mine expansion. Therefore, Proposed Action could have an incremental affect to ground water quality within the Water/Vegetation/Wildlife CESA.

The incremental cumulative effect of the No Action Alternative on ground water quality would be the same as that of the Proposed Action because of the smaller size of the project. The incremental cumulative effect of Alternative 3 would be the same as the Proposed Action.

5.4.9 Wildlife and Fisheries

5.4.9.1 Cumulative Impacts

The CESA for wildlife and fisheries is the local watershed CESA (Water/Vegetation/Wildlife CESA) which encompasses 158,883 acres and is shown on Figure 5.2.1. Cumulative impacts to wildlife and fisheries resources within the Project Area and CESA are considered from a habitat and population perspective.

Past and present actions and RFFAs that could have an impact on wildlife and fisheries within the Water/Vegetation/Wildlife CESA include livestock grazing, agriculture, fuels management, recreation, and mineral development and exploration. These activities likely resulted in direct impacts to individuals in travel routes, loss of habitat associated with vegetation removal, and disturbance associated with noise. There are no specific data that quantify impacts to wildlife and fisheries in the Water/Vegetation/Wildlife CESA.

Cumulative impacts to the wildlife and fisheries habitat of the local watershed would not be anticipated because the vegetation communities within the Project Area are common over the surrounding landscape and none of the perennial drainages would be affected by any of the alternatives. The potential for cumulative impacts to fisheries would be reduced because the Proposed Action includes measures to minimize sedimentation.

Potential impacts may occur to wildlife as a result of the development of a seasonal pit lake and associated changes in water chemistry. The potential impacts of metals in the pit lake within the CESA may contribute to an increased risk of potential wildlife impacts. The type of wildlife that may be impacted would be insectivorous birds and small and large mammals. The ecological risk posed by the seasonal accumulation of meteoric water in the open pits is considered low for local wildlife drinking water from the Project open pits as documented by an ecological risk assessment that was performed to evaluate this potential impact (SRK 2010b).

Cumulative impacts to large game species, particularly mule deer would be unlikely within the CESA because the Proposed Action would generally occur from April through November but may run year-round depending on market demand. The Project-related activities that would occur within the mule deer winter range (Figure 4.17.1) during the winter season would be winter mining activities (based on product need), trucks hauling stockpiled ore on the Juntura Cuttoff Road and periodic clearing and stockpiling of overburden at approved mine areas. The Juntura Cuttoff Road is a county road, so the haul trucks would travel at posted speed limits designated by the county. The Proposed Action would abide by design elements that would protect large game species from becoming trapped in the mine workings and trenches (Section 3.2.12). Wildlife within the CESA may benefit from the additional water impoundments

included in the Proposed Action. Based on the disturbance outlined in Table 5.5-2, it can be determined that the approximate total amount of disturbance (past, present, RFFAs from wildland fires, mineral development and exploration, reservoirs, any surface disturbing activities) in the Water/Vegetation/Wildlife/ Special Status Species CESA is approximately 17,000 acres. The Water/Vegetation/Wildlife/ Special Status Species CESA is 158,883 acres; therefore, the amount of past, present, and RFFA disturbance is approximately 10.7 percent of the CESA. The Proposed Action would result in an 1.3 percent incremental cumulative effect.

The incremental cumulative effect of the No Action Alternative would be less than that of the Proposed Action because of the smaller project size. The incremental cumulative effect of Alternative 3 would be the same as that of the Proposed Action.

6 CONSULTATION, COORDINATION, AND CONTACTS

The scoping period was initiated by publication in the Federal Register of a NOI to prepare an EIS for the EP Minerals Celatom Mine Expansion Plan of Operations (Volume 73, No. 179, Monday, September 15, 2008, Page 53268). In addition, the BLM prepared and distributed news releases to the local news media, including publishing an article in the Burns Times-Herald. The BLM also posted the news release on the Burns District BLM website. A scoping letter was also distributed to governmental agencies, organizations, and individuals.

The formal public scoping period officially began on September 15, 2008 when the NOI was published and closed on October 30, 2008. The BLM then extended the public comment period to November 14, 2008, to ensure the broadest possible public participation in the scoping process. A scoping letter was mailed to approximately 35 individuals on a distribution list maintained by the BLM of those who previously expressed interest in the Project.

Two public meetings were held to solicit information from the public on the scope of the EIS, both of which were announced in the news releases. The first meeting was held in Vale at the Vale District BLM Office on October 29, 2008. The second meeting was held in Burns at the Harney County Senior Center on October 30, 2008. The purpose of the public scoping meetings was to identify issues to be addressed in the EIS, identify viable alternatives, and to encourage public participation in the NEPA process.

The majority of the issues and concerns raised during the public meetings involved the analysis of impacts to range resources, impacts to ground water, impacts to surface water, impacts to air quality, impacts to wildlife resources, impacts to cultural resources and American Indian traditional practices, and successful reclamation.

Six written public comments were received by the BLM during the initial 45 day public scoping period and subsequent extended scoping period. The majority of the written comments received were concerned with the following: impacts to range resources: impacts to ground water and surface water quality; impacts to air quality; and impacts to wildlife resources.

6.1 American Indian Informal Consultation and Informal Gathering Process

The following federal legislation, regulations, and executive orders require government-to-government consultation between federally-recognized American Indian Tribes and federal agencies prior to taking any action that would affect Native American Indian Tribes: the National Historic Preservation Act; the Native American Graves Protection and Repatriation Act; the American Indian Religious Freedom Act; Regulations 36 CFR 800, section 106 and 119; and Executive Order 13007 (Sacred Sites). BLM Manual Section 8160, entitled “Native American Coordination and Consultation”, establishes agency policy regarding American Indians and integrates into all programs the management of resources valued by American Indians.

The purpose of the government-to-government consultation process is to discuss the issues and concerns of a proposed project with local Native American Indian Tribes in the preliminary planning stages. Information gathered from the American Indians would be used to develop Project alternatives and mitigation measures that would reduce the effects of the Project. In addition, the tribes have access to the cultural resources and ethnography reports, as well as sections of the EIS before they are reviewed by the general public.

The BLM has conducted consultation with the Burns Paiute Tribal Council and other agencies. The following items outline these consultation efforts:

- In August 2005 Joan Suther, the Three Rivers Resource Area Field Manager, phoned seven agencies and on August 16, 2005, BLM Burns District sent letters to those agencies (Barbara Sam, Tribal Chair, Burns Paiute Tribal Council; Nancy Gilbert, USFWS; Dan Joyce, Malheur County Court; Randy Moore, DOGAMI; Dan Gonzales, ODFW; Steve Grasty, Harney County Court; and Cyril Young, Oregon Department of State Lands) inviting them to participate in team and public meetings and provide information and comments as part of the Celatom Mine Expansion EIS process.

  Email or letter responses were received from the Harney County Judge (signed cooperating agency MOU on 9/13/2005), U.S. Fish and Wildlife Service (signed cooperating agency MOU on 11/2/2005), DOGAMI Mineral Land Regulation and Reclamation (signed cooperating agency MOU on 10/17/2005), and Oregon DEQ.

- November 7, 2005, the Burns District BLM sent emails and made phone calls to agencies, inviting them to participate in a tour at the Celatom Mine Complex and setting a date for the tour based on peoples' availability and weather. Scott Thomas talked to the Burns Paiute Tribal Council who expressed interest in a separate tour at some point but were not available for a while due to other tribal concerns.

- On May 13, 2006, at a Burns Paiute Tribal Council meeting, the BLM (Joan Suther) initiated discussion with the Burns Paiute Tribe on any American Indian sacred sites in the Project Area.

- On May 31, 2006, a tour was arranged for potential cooperating agencies for the Project. The following individuals were in attendance: Bob Hogan and Skylar Burdette, EP Minerals, Vale and Reno; Gary Miller and Marisa Meyer, USFWS, La Grande; Dan Gonzalez, ODFW, Burns; Thane Jennings, Oregon DEQ Air Quality, Bend; Vaughn Balzer and Bob Houston, DOGAMI Office of Mineral Land Reclamation and Regulation, Albany; Nancy Pustis and Chris Bedsaul, Oregon Department of State Lands, Salem; Joan Suther, Jim Buchanan, Mike McGee, and Terri Geisler, BLM, Burns.

- In May 2006, the Burns Paiute Tribal Council expressed interest to Beth Coahran to have the BLM Geologist (Terri Geisler) make a presentation on mining law and mineral materials regulations and initiate discussion to familiarize the tribe with mining activities in the Burns District. The meeting date was set for June 7, 2006, but the tribe subsequently cancelled the meeting.

- On June 26, 2007, Joan Suther planned to discuss mining and cultural resource issues at the Burns Paiute Tribal Council meeting but the meeting was cancelled.

- During the drafting of the Statement of Work for the third-party EIS contractor in August and September 2008, the BLM noted that the BLM would be the lead for all formal consultation with American Indian tribal groups, and the Burns District BLM Archeologist identified the Burns Paiute Tribal Council as the only tribal group that may have an interest in the Project Area.

- On September 10, 2008 Joan Suther talked to Wanda Johnson briefly, asking if the Burns Paiute Tribal Council would be available for a mine tour before the end of October.

- On September 15, 2008, the BLM published a NOI to Prepare an EIS for the Celatom Mine Expansion in the Federal Register. The Burns District BLM mailed a copy of the Federal Register Notice and a map, dated August 21, 2008, showing the Project Area proposed by EPM, to a mailing list containing 35 nearby landowners and potentially interested agencies and associations, including the Burns Paiute Tribal Council; Steve Grasty, Harney County Court; Brandon McMullen, Harney County Planning Dept; Malheur County Planning Department; John Dadoly, Oregon DEQ Water Quality; Dan Gonzalez, ODFW; Nancy Pustis,Oregon Department of State Lands; Bob Houston, DOGAMI; Steve Purchase, Oregon Department of State Lands; Gary Miller, USFWS; Larry Calkins, Oregon DEQ Air Quality; and Dan Joyce, Malheur County Courthouse.

- On October 10, 2008, BLM emailed a public meeting news release that provided public scoping meeting dates and locations to newspapers in the region including the Burns Times-Herald (Burns, Oregon), the Argus Observer (Ontario, Oregon), the Malheur Enterprise (Vale, Oregon) and the Baker City Herald (Baker City, Oregon).

- On October 21, 2008, the BLM mailed a copy of the public meeting news release to the same mailing list in the bulleted item above and Enviroscientists, Inc., the third party EIS contractor.

- On October 22, 2008, the Burns Times-Herald newspaper published the public meeting news release.

- On October 24, 2008, Tara Martinak, BLM Public Affairs, phoned the Burns Paiute Tribal Council to invite them to a tour of the Project Area on October 30, 2008, with the BLM staff. The Tribe said that if anyone was interested they would meet at the BLM office for the tour.

- On October 29, 2008, EPM presented their proposed mine expansion plan to the Malheur County Commissioners with the BLM and Enviroscientists attending.

- On October 30, 2008, EPM presented their proposed mine expansion plan to the Harney County Commissioners with the BLM and Enviroscientists attending.

- On October 30, 2008, the BLM led a tour of the mine for Enviroscientists; no one from the Burns Paiute Tribal Council attended the tour.

- On April 14, 2009, the BLM sent a letter to Dean Adams, Burns Paiute Tribal Council Chair, and phone calls and emails to Nancy Pustis, Oregon Department of State Lands; Dan Gonzalez, ODFW; and Frank Messina, Oregon DEQ, inviting them to be cooperating agencies for the Celatom Mine Expansion EIS. The agencies contacted by phone expressed interest but signed no additional MOUs. Nancy Pustis said she was

satisfied with the opportunity to comment by being on the public mailing list due to other workload requirements.

- On April 14, 2009, BLM (Terri Geisler) sent to Vaughn Balzer, DOGAMI, and Marisa Meyer, USFWS, a copy of the draft Proposed Action text and Existing Facilities and Operations text written by Enviroscientists. Neither agency was interested in providing input to alternatives to the Proposed Action due to other workloads.

- On May 8, 2009, Kenny McDaniels, Burns BLM District Manager, presented a progress report on the Celatom Mine Expansion EIS to the Southeast Oregon Resource Advisory Council.

The Burns Paiute Tribal Council has not identified any specific interests or concerns with the proposed Project.

7 LIST OF PARTICIPANTS

This Chapter identifies those individuals who provided, prepared, or participated in the exchange of information used in the preparation of this FEIS for the EPM Celatom Mine Expansion Project. Individuals are identified by name, contribution to the document, and affiliation.

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Douglas Linn	Plant Conservationist/Biological Soil Crusts/Soils/Special Status Species, Plants
Jason Brewer	Wildlife Biologist/Wildlife and Special Status Species
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Cooperating Agencies

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Gary Lynch	Oregon Department of Geology and Mineral Industries
Steve Grasty	Harney County

8 GLOSSARY AND LIST OF ACRONYMS

8.1 List of Acronyms

3H:1V	3Horizontal : 1Vertical
AADT	Annual Average Daily Traffic
ABA	acid-base accounting
AMPs	allotment management plans
APE	Area of Potential Effect
amsl	above mean sea level
ANSI	American National Standards Institute
AP	acidification potential
AQCR	Air Quality Control Region
AQD	Air Quality Division
ARD	acid rock drainage
AUMs	Animal Unit Months
AVS	Acid Volitile Sulfides
BBA	Brown-Buntin Associates, Inc.
BLM	Bureau of Land Management
BMPs	Best Management Practices
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
CNEL	Cumulative Noise Exposure Level
CO	carbon monoxide
CWA	Clean Water Act
cy	cubic yard
dB or dBA	decibels
DE	diatomaceous earth
DEQ	Department of Environmental Quality
DOGAMI	Oregon Department of Geology and Mineral Industries
DOI	Department of Interior
DR	Decision Record
DSL	Oregon Department of State Lands
˚F	Degrees Fahrenheit
EA	Environmental Assessment
EC	Electrical Conductivity
Eh	oxidation-reduction potential
EIS	Environmental Impact Statement
ENM	Environmental Noise Model
EO	Executive Order
EPM	EP Minerals, LLC
EPA	Environmental Protection Agency
eq	units of equivalence
ESA	Endangered Species Act
ESI	Ecological Site Inventory
Fe	Iron
FEIS	Final Environmental Impact Statement

FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FLPMA	Federal Lands Policy Management Act
FONSI	Finding of No Significant Impacts
ft/ft	foot per foot
FTA	Federal Transit Administration
4WD	Four-Wheel Drive
GHG	Greenhouse gas
GIS	Geographic Information Systems
gpm	gallons per minute
HAP	hazardous air pollutant
HCCP	Harney County Comprehensive Plan
HSWA	Hazardous and Solid Waste Amendments
ICBEMP	Interior Columbia Basin Ecosystem Management Project
ICP	inductively coupled plasma
ID Team	Interdisciplinary Team
IM	Instruction Memorandum
IMP	Interim Management Plan
K	Hydraulic conductivity of wallrock
JRA	Jordan Resource Area
kg	kilograms
KOP	key observation point
L_{50}	Median Noise Level
LCDC	Land Conservation and Development Commission
L_{dn}	day-night level
L_{eq}	Average Noise Level
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MDL	method detection limit
meq/L	milliequivalents per liter
MFP	Management Framework Plan
mg/L	milligrams per liter
$\mu g/m^3$	micrograms per cubic meter
MLRA	Major Land Resource Area
MLRR	Mineral Land Regulation and Reclamation
MMPA	Mining and Mineral Policy Act
Mn	Manganese
MOU	Memorandum of Understanding
mph	miles per hour
MPO	Mine Plan of Operations
MRA	Malheur Resource Area
MS	mass spectrometry
MSDS	Material Safety Data Sheets
MSHA	Mine Safety and Health Administration
MWMP	meteoric water mobility procedure
NAAQS	National Ambient Air Quality Standards
NAG	net acid generating
NAGPRA	Native American Graves Protection and Repatriation Act of 1990

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNP	net neutralizing potential
NO_2	nitrogen dioxide
NO_x	nitrous oxide
NOI	Notice of Intent
NP	neutralizing potential
NPR	Neutralization Potential Ratio
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NWI	National Inventory of Wetlands
O_3	ozone
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOA	Oregon Department of Agriculture
ODOT	Oregon Department of Transportation
ODWR	Oregon Department of Water Resources
OHV	off highway vehicle
OHWM	ordinary high water mark
ONHP	Oregon Nature Heritage Program
ORNHIC	Oregon Natural Heritage Information Center
ORS	Oregon Revised Statutes
OSAAQS	Oregon State Ambient Air Quality Standards
OSSC	Oregon Structural Specialty Code
PDEs	project design elements
PFC	Proper Functioning Condition
PFYC	Potential Fossil Yield Classification
pH	Potential of Hydrogen
$PM_{2.5}$	particulate matter of aerodynamic diameter less than 2.5 micrometers
PM_{10}	particulate matter of aerodynamic diameter less than 10 micrometers
ppm	parts per million
PRIA	Property Records Industry Association
PSD	Prevention of Significant Deterioration
PWSA	Proposed Wilderness Study Area
RCRA	Resource Conservation Recovery Act
RFFAs	reasonably foreseeable future actions
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
SEL	Sound Exposure Levels
SEORMP	Southeastern Oregon RMP
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLERA	Screening-Level Ecological Risk Assessment
SO_2	sulfur dioxide
SRHA	Stock Raising Homestead Act
s.u.	standard unit
TCPs	Traditional Cultural Properties

TDS	total dissolved solids
tpy	tons per year
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VHSA	Vines Hill Stockpile Area
VOC	volatile organic compounds
VRM	Visual Resource Managment
WOUS	Waters of the United States
WIM	Wilderness Inventory Maintenance
WM	Willamette Meridian
WPCR	Water Pollution Control Facility
WSA	Wilderness Study Area

8.2 Glossary

Acid Base Accounting (ABA) - An analytical procedure that provides values to help assess the acid-producing and acid-neutralizing potential of overburden rocks prior to coal mining and other large-scale excavations.

Acid Generating Potential (AGP) – The amount of acid-producing constituents in a given material. For rock material, the total sulfur concentration is determined, assumed to be reactive sulfide, and reported in terms of calcium carbonate equivalent per mass of material.

Acid Rock Drainage – Low pH drainage (pH of 2.0 to 4.5) resulting from oxidation of sulfides.

Air Quality – A measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Alluvial – Pertaining to material or processes associated with transportation or deposition of soil and rock by flowing water (e.g., streams and rivers).

Alluvium – Soil and rock deposited by flowing water (e.g., streams and rivers); consists of unconsolidated deposits of sediment, such as silt, sand, and gravel.

Ambient – Surrounding, existing, and background conditions.

Animal Unit Month (AUM) – The amount of forage required to support one animal unit for one month.

Archaeological Site – A discrete location that provides physical evidence of past human use.

Aquifer – A water-bearing, subsurface geologic deposit that may be composed either of rock or of unconsolidated sediments such as alluvium.

Baseline – The existing conditions against which impacts of the proposed action and its alternatives can be compared.

Bedrock – Any solid rock exposed at the surface or overlain by unconsolidated material.

Butte – A steep hill standing alone in a plain.

Celatom Mine Project (Project) – The Proposed Action; the entirety of the activities and operations proposed by EPM and analyzed in this DEIS.

dBA – The sound pressure levels in decibels measured with a frequency weighing network corresponding to the A-scale on a standard sound level meter. The A-scale tends to suppress lower frequencies, (e.g., below 1,000 Hz).

Ephemeral Stream – A stream channel which carries water only during and immediately after periods of rainfall or snowmelt.

Erosion – The wearing away of the land surface by running water, wind, ice, or other geological agents and by such processes as "gravitation creep".

Evapotranspiration – Discharge of water from the earth's surface into the atmosphere by transpiration by plants during growth and by evaporation from the soil, lakes, and streams.

Fault – A fracture in rock units along which there has been displacement.

Fossils – Any remains, trace, or imprint of a plant or animal that has been preserved by natural processes in the earth's crust since some past geologic time.

Geochemistry – The study of the distribution and amounts of the chemical elements in minerals, ores, rocks, soils, water, and the atmosphere, and their circulation in nature on the basis of the properties of their atoms and ions.

Geographic Information Systems (GIS) – A system of computer hardware, software, data, people, and applications that capture, store, edit, analyze, and graphically display a potentially wide array of geospatial information.

Geology – The science that relates to the earth, the rocks of which it is composed, and the changes that the earth has undergone or is undergoing.

Ground Water – Subsurface water that fills available openings in rock or soil materials to the extent that they are considered water saturated.

Habitat – A specific set of physical conditions in a geographic area(s) that surrounds a single species, a group of species, or large community. In wildlife management, the major components of habitat are food, water, cover, and living space.

Hanging Wall – The side of a fault that hangs above the fault plane.

Head – Rate of ground water inflow, which depends on the head difference between the water table and the evaporative surface;
Headwaters – The source of a stream or river.

Hydraulic Conductivity – A coefficient of proportionality describing the rate at which water can move through a permeable medium.

Hydraulic Gradient – The change in the elevation of the water level in an aquifer over a given distance, expressed either as feet per feet or as a dimensionless number.

Hydric Soils – Soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation.

Hydrology – The study of the movement, distribution, and quality of water throughout the earth, addresses both the hydrologic cycle and water resources.

Hydrophytic Vegetation – The total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

Impact – A modification in the status of the environment brought about by the proposed action or an alternative.

Infrastructure – The facilities, services, and equipment needed for a community or facility to function, such as roads, sewers, water lines, and electric lines, among others.

Intermittent Stream – A stream which flows part of the year, as when fed by runoff or spring flow.

In-Situ – In the original location.

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

Land Use Plan – The organized direction or management of the use of lands and their resources to best meet human needs over time, according to the land's capabilities.

Mesic – Moist habitats associated with springs, seeps, and riparian areas.

Mine Waste – Volcanic ash, volcanic tuff, opalite, and clay, poor quality DE, and overburden.

Mineral Process Waste – A combination of DE, fine particles of rock (basalt), volcanic ash, minor amounts of pyrite, clay, and soda ash.

Mitigation – Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

Net Neutralizing Potential (NNP) – The net amount of alkaline or basic constituents in a given material minus acid generating material, or ANP-AGP=NNP. Reported in terms of the equivalent mass of calcium carbonate per mass of material.

Oxidized Ore – Mineralized rock which is comprised predominantly of oxidized or weathered rock types and is of sufficient economic value to justify mining and recovery costs.

Paleontology – The science that deals with the life of past geological ages through the study of fossil remains of organisms.

Particulate(s) – Minute, separate particles, such as dust or other air pollutants.

Perennial Stream – A stream or reach of a stream that flows continuously throughout the year and whose upper surface is generally lower than the water table in the region adjoining the stream.

Permeability – The capacity of porous rock, sediment, or soil to transmit a fluid.

Physiographic Province – Region in which all parts have similar geologic structure and climate and whose landforms differ significantly from those of other regions.

Project Area – A defined, 12,640-acre area including 1,280 acres of State of Oregon land, 1,680 acres of private land, 8,080 acres of federal land administered by the BLM, and 1,600 acres of land patented under the Stock Raising Homestead Act (SRHA) in which all activities associated with the proposed action would result in surface disturbance, or the modification of existing facilities would occur. The Project Area includes three open pit mine areas, ore stockpiles, waste rock repositories, access roads, groundwater monitoring wells, a staging area, a mine camp, exploratory drill holes, and reclaimed areas. The open pit mining areas are referred to as the Section 36 Mine Operations Area, the Kelly Field Mine Operations Area, and the Beede Desert Mine Operations Area. The Puma Claims Area represents a small mine support area with stockpiles, a water well, and a water tank.

Recharge – Replenishment of a groundwater reserve (aquifer) by the addition of water, through either natural or artificial means.

Reclamation – Restoration of land disturbed by natural or human activity (e.g., mining) to original form, use, or condition. Also describes the return of land to alternative uses that may, under certain circumstances, be different from those prior to disturbance.

Recontouring – Return a land surface to or nearly to its original form through some type of action such as grading.

Revegetation – The reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as reseeding.

Riparian – Situated on or pertaining to the area adjacent to a river, stream, or other body of water. Riparian is normally used to refer to plants of all types that grow along streams, rivers, or at spring and seep sites.

Sediment – Solid fragmental material, either mineral or organic, that is transported or deposited by air, water, gravity, or ice.

Sediment Load – The amount of sediment (sand, silt, and fine particles) carried by a stream or river.

Sedimentary Rock – Rock resulting from consolidation of loose sediment that has accumulated in layers.

Sedimentation – The result when soil or mineral is transported by moving water, wind, gravity, or glaciers and deposited in streams or other bodies of water, or on land.

Stockpiles – An accumulation of ore, stone, or other mined or quarried material.

Subsidence – Sinking or downward settling of the earth's surface.

Subsurface – A zone below the surface of the earth, the geologic features of which are principally layers of rock that have been tilted or faulted and are interpreted on the basis of drill hole records and geophysical (seismic or rock vibration) evidence. In general, it is all rock and solid materials lying beneath the earth's surface.

Tertiary – Span of time between 65 and 2 million years ago.

Tuff – Igneous rock formed from compacted volcanic fragments from pyroclastic (explosively ejected) flows.

Waste Rock – Unmineralized, or sometimes mineralized, rock that is not minable at a profit.

Watershed – Drainage basin in which surface water flows to a single point.

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Appendix A

Waste Management
Materials Characterization

Summary of ARD Assessment by Material Type

The conclusions from the material characterization program are summarized below for each of the different sources of material.

Drill Core Samples

1. Unoxidized diatomite demonstrates a moderate to high potential to generate acid based on the NAG results. This potential to generate acid is confirmed by low pH values (<3 s.u.) observed for the unoxidized diatomite in the Meteoric Water Mobility Procedure (MWMP) tests;

2. The acid generating potential demonstrated by the unoxidized diatomite results from the presence of highly reactive AVS phases, including mackinawite and amorphous iron monosulfides, that would generate acid if exposed to air and water. Given the mineralogy of sulfide in the samples, sulfide oxidation will be fairly rapid;

3. The weathered samples of unoxidized diatomite collected from the existing pit walls in 2004 show a greater potential for acid generation and metals release than the unweathered samples of unoxidized diatomite collected from drillcore. This increase in predicted acid generation potential provides an indication of how the unoxidized diatomite will behave in response to weathering of the material (i.e., in lieu of kinetic tests);

4. Constituents that have the potential to be leached from the unoxidized diatomite under low pH conditions at concentrations above Oregon MCL values include aluminum, antimony, arsenic, beryllium, cadmium, fluoride, iron, lead, manganese, selenium, sulfate and TDS;

5. Sulfide sulfur was not detected in the oxidized diatomite samples, and this material type is considered inert in terms of geochemical reactivity. The MWMP and NAG results for oxidized diatomite support this prediction;

6. The average MWMP values for oxidized diatomite are lower than the Oregon MCL for all parameters except aluminum and arsenic. Aluminum concentrations are an artifact of the high clay content of the deposit and the average arsenic concentrations are just slightly above the Oregon MCL of 0.01 mg/L. Therefore, based on the MWMP results, the oxidized diatomite samples show a low potential to release metals and sulfate. Furthermore, weathered samples of oxidized diatomite collected from the existing pit walls in 2004 do not show an increase in the potential for acid generation and metals release due to weathering (as is observed with the unoxidized diatomite);

7. The partially oxidized diatomite (i.e., transitional) demonstrates a moderate potential for acid generation based on the NAG results and shows a low to moderate potential to release metals and sulfate. Constituents that have the potential to be leached from the transitional diatomite at concentrations above the Oregon MCL include aluminum, arsenic, manganese, sulfate and TDS. The concentration of the constituents, however, are lower than observed for the unoxidized diatomite;

8. The diatomite observed in MW-6 differs from the diatomite at the other locations and has been altered by heat and pressure to form opalized diatomite. In this location, the opalized diatomite contains euhedral pyrite that is not seen in any of the other drill locations. The presence of pyritic sulfur at concentrations slightly greater than 0.5 wt% in this location results in a slightly greater potential for acid generation based on the ABA and NAG results;

9. Only a few samples of the volcanic units (ash, tuff, andesite and basalt) demonstrate some neutralization potential, indicating there is a general absence of minerals capable of buffering acidity (i.e., carbonates) in the system. Based on the NAG results, the volcanic samples are non-acid generating. This prediction is confirmed by pH values observed in the MWMP tests. Based on these results, the volcanic rock types are considered relatively benign, and neither acid generation nor acid neutralization is anticipated. Furthermore, based on MWMP results, only a minor amount of metals and sulfate are expected to be leached from the volcanic units; and

10. The results for each material type are consistent from one mine area to another, demonstrating the geochemistry of the lithologic units are generally uniform for the different mine areas The majority of the waste rock associated with the existing and proposed operations will consist of either oxidized diatomite or unoxidized diatomite. The oxidized diatomite contains no sulfide material and is essentially inert. The unoxidized diatomite contains monosulfides and is considered acid generating, based on NAG and MWMP data. Any acid generated is not likely to be buffered under normal field conditions due to the limited acid neutralizing capacity of this material type and the very slow reaction kinetics of silica buffering. Under these conditions, water rock interactions will result in low pH conditions, thereby increasing the leachability of metals from the unoxidized diatomite.

Mineral Process Waste Samples

1. During processing of ore at the Vale Plant Site, the chemical composition of the ore is altered. Because of the addition of the soda ash, the neutralizing potential of the mineral process waste materials is increased, as demonstrated by ABA results;

2. The MWMP leachate from waste stream samples has very basic pH values (i.e., greater than 9 s.u.) and very high alkalinity in comparison to the corresponding source material. However, in addition to the increased neutralization capacity of the mineral process waste, the leachability is also increased for some metals and sulfate;

3. MWMP for the waste stream samples shows an increase in the potential release of oxyanion-forming elements (e.g., arsenic and selenium) after the blended ore is heated and oxidized during processing; and

4. This assessment is based on a relatively short time frame and, as a result, only provides a snap-shot of the characteristics of the waste stream materials that have been back-hauled to the mine in the past, rather than a comprehensive range.

Backfill Waste Samples

1. The backfilled waste samples consist of a mixture of mineral process waste as well as onsite waste material. The characterization results reflect this mixing, and show the potential for metals leaching is reduced in comparison to the waste stream material that comprises only a small percentage of the backfilled waste;

2. The MWMP results for the backfilled waste show a bimodal distribution with some samples showing a low potential for metals release and some samples showing a moderate potential for metals release that is slightly less than that observed for the unoxidized diatomite;

3. Constituents that have the potential to be leached from the backfill waste include aluminum, arsenic, beryllium, iron, manganese, sulfate, and TDS. However, concentrations observed for the backfill waste are generally lower than those observed for the waste stream samples, indicating dilution has taken place with the addition of onsite waste materials that consist of clay, ash, and diatomite;

4. For samples of backfill waste with high pH leachate chemistry, oxyanion-forming elements such as arsenic, antimony, and selenium increase in concentration due to a change in mineral surface chemistry which promotes the desorption of oxyanions. However, the magnitude of these element concentrations is lower in comparison to the mineral process waste samples; and

5. There is no distinguishable difference between the geochemistry of the backfilled waste in the Kelly Field Pit versus backfilled waste material in the Beede Desert Pit.

Sediment Pond Samples

1. The sediment pond samples have neutralization potential ratio (NPR) values greater than 3 and positive net neutralizing potential (NNP) values on the order of 10 eq. kg $CaCO_3$. This is in part due to sulfide sulfur concentrations near or below the detection limit and presence of measureable neutralization potential. However, according to the BLM criteria, the ABA results for the sediment pond samples are inconclusive. Because these samples were not submitted for NAG testing, the acid generation potential of this material cannot be verified with NAG pH and NAG values. However, based on the low to non-detect sulfide sulfur concentrations, the sediment pond samples are generally considered inert.

2. From the MWMP test, the sediment pond samples generated leachate with a pH around 4.5 to 5 s.u., and these samples showed a moderate potential to leach aluminum, manganese and sulfate at concentrations above the Oregon MCL. The overall concentration of these constituents is lower than those observed for the unoxidized diatomite. Therefore, it can be concluded that pumping water from the pits to the sediment ponds may increase the acid and metal loading within the pond areas; however, the concentrations are still below those observed for background conditions (i.e., unoxidized diatomite).

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