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Ballard Exploration Project Environmental Assessment

BLM

Prepared for:
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List of Acronyms

AMSL	above mean sea level
ARARs	applicable or relevant and appropriate requirements
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CMEWP	Cover Material Exploration Work Plan
DEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
KPLA	Known phosphate leasing area
NEPA	National Environmental Policy Act
P4	P4 Production LLC
RMP	Resource Management Plan

Chapter 1
Introduction

1.1 Introduction

P4 Production, LLC (P4) has submitted an exploration license application (P4, 2016) to the Bureau of Land Management (BLM) to conduct exploration drilling within the Grays Range-Wooley Range known phosphate leasing area (KPLA) (IDI-38120). Exploration drilling is proposed on private lands and on lands administered by the State of Idaho. Leasable minerals within the KPLA are administered by the U.S. Department of the Interior, BLM Pocatello Field Office. The proposal involves exploration of leasable phosphate minerals located within the KPLA, thus, the BLM is the lead agency for the exploration project. BLM has completed this Environmental Assessment to comply with the National Environmental Policy Act (NEPA) (40 Code of Federal Regulations [CFR] 1500-1508).

1.1.1 Background

The Ballard Mine site was an active mine from 1952 through 1969. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) otherwise known as Superfund, authorities are being used to address risks to human health and the environment posed by releases of contaminant at the site. P4 is the responsible party and has entered into an administrative settlement agreement and order on consent/consent order with the U.S. Environmental Protection Agency (EPA), which is the lead Agency for implementation of the administrative settlement agreement and order on consent/consent order at the site. The Idaho Department of Environmental Quality (DEQ), the U.S. Department of the Interior Fish and Wildlife Service, and Shoshone-Bannock Tribes are support entities (EPA, 2009). P4 is working with the entities to develop a remedial investigation and feasibility study to meet their obligations under CERCLA.

Additional investigation is needed to support development of the feasibility study and additional future deliverables, including remedial design. The remedial alternatives under consideration in the feasibility study include additional reclamation and placement of cover material and backfill to reduce exposure to contaminants in surface material and uptake of selenium by vegetation, and to prevent or reduce water from infiltrating the mined materials stored at the site. The EPA has approved the *Cover Material Exploration Work Plan* (CMEWP) (MWH Americas, Inc., 2016) which supports the feasibility study investigation by identifying and characterizing various earthen materials on-site that can be used as potential cover material and as backfill.

The CMEWP includes borings that will be drilled within the historic Ballard Mine area. Support equipment needed, access, borehole abandonment, sanitation, environmental protection measures, surface disturbance, and reclamation are explained and were approved as part of EPA's approval of the CMEWP. Additional details can be found in the CMEWP (MWH Americas, Inc., 2016).

1.1.2 Summary of Exploration License Application

In the course of developing the feasibility study, P4 has learned that there is the potential for intercepting abandoned ore bearing sections of the Phosphoria Formation. P4 proposes to

deepen 50 boreholes at 32 locations identified and approved in the CMEWP into the Meade Peak Formation to identify and characterize phosphate ore which was not recovered during mining of the Ballard property. Consequently, P4 has submitted the exploration license application to the BLM to authorize deepening of the boreholes.

The CMEWP and the exploration license application are connected actions, as the exploration license application is an interdependent part (40 CFR 1508.25(iii)) of the larger action (CMEWP). Because the CMEWP is not subject to National Environmental Policy Act (NEPA) review, and it will not be included as an aspect of the broader proposal in this environmental assessment which has been prepared for the exploration license application.

Given that the results of the proposed exploration are uncertain, future leasing or mining is not considered to be a connected action to the exploration license application under NEPA. Mining of the deposit or granting any new federal mineral lease with rights to mine are outside of the scope of this exploration proposal. Any future leasing is a separate discretionary decision by BLM and would need to be evaluated in a separate environmental analysis. Leasing of unleased phosphate resources has not been requested. Likewise, future ore extraction would only be considered if an application for a lease is later submitted.

1.2 Project Location

The proposed exploration drilling would be located approximately 13 miles north and east of Soda Springs, Idaho (**Figure 1**) in:

Township 7 South, Range 42 East,
- Section 12 S1/2NE1/4, N1/2SE1/4, and SE1/4SE1/4; and
- Section 13, E1/2NE1/4; and

Township 7 South, Range 43 East,
- Section 7, lots 1 through 4, SW1/4NE1/4, E1/2W1/2, and W1/2SE1/4; and
- Section 18, NW1/4NE1/4 and W1/2NW1/4.

The areas described aggregate 844.36 acres in Caribou County.

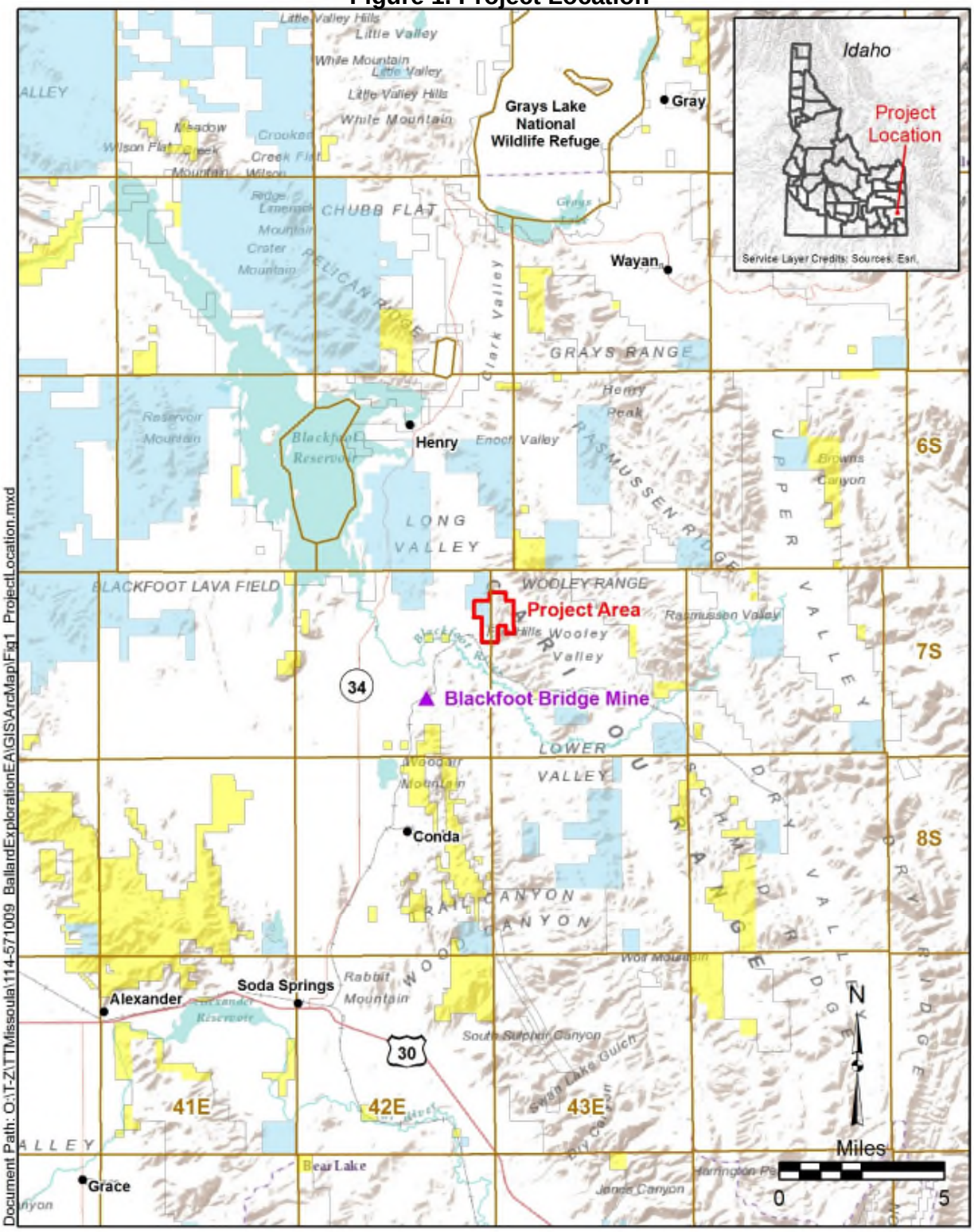
The mineral rights are owned by the federal government and managed by the BLM. The surface ownership consists of lands owned by the State of Idaho and privately–owned lands.

1.3 Purpose and Need for Action

The purpose of this action is to evaluate and respond to the 2016 Ballard exploration license application (P4, 2016) submitted by P4 in February 2016, according to the Mineral Leasing Act, 1920, as amended.

The exploration plan proposed by P4 is needed to define the nature and extent of the remaining phosphate resource within the Grays Range-Wooly Range KPLA. It would provide geologic data and chemical information necessary to determine the extent, geometry, and quality of the phosphate resource. The acquired information would be used to evaluate the economic feasibility of recovering the phosphate resource in the future.

Figure 1. Project Location



1.4 Land Use Plan Conformance Statement and Other Regulations

The project is in an area managed by the BLM under the 2012 Pocatello Approved Resource Management Plan (RMP) (BLM, 2012). In the RMP, the project area is designated as open for solid leasable mineral exploration. This land use plan and applicable regulations have been reviewed and a determination has been made that the proposed exploration drilling project is consistent with the current 2012 land use plan management actions; specifically, ME-1 "develop mineral resources (oil and gas, geothermal, solid minerals) consistent with other resource use and function", and ME-2 "develop mineral resources (oil and gas, geothermal, solid minerals) consistent with other resources and uses as part of an ecologically healthy ecosystem", as well as other management goals, objectives, and actions. The proposed exploration drilling project is consistent with other federal, state, and local laws and regulations.

This environmental assessment was prepared following the Council on Environmental Quality's regulations implementing NEPA (40 CFR 1500-1508) and the U.S. Department of the Interior's implementing NEPA regulations and guidance, and the BLM's NEPA Handbook, H-1790-1 (BLM, 2008).

1.5 Decisions to be Made

The BLM will make decisions related to the proposed drilling and mitigation measures regarding the additional drilling depth for ore characterization. The BLM will determine whether to issue an exploration license within the boundaries of the Grays Range-Wooly Range KPLA, and whether to approve or modify the exploration plan associated with the exploration license, along with any specific conditions of approval or mitigation measures. The BLM decisions will consider anticipated environmental consequences disclosed in the environmental assessment as well as applicable laws, regulations, and policies.

1.6 Scoping/Public Involvement

The BLM included the upcoming analysis on their NEPA register beginning in March 1, 2016. The BLM has coordinated with landowners adjacent to the KPLA, as well as with entities who have requested to be informed of phosphate development projects. No specific concerns have been identified through the outreach actions.

The BLM coordinates with the Shoshone-Bannock Tribal staff regarding phosphate development projects to ensure the tribal government, Native American community, and those individuals whose interests might be affected have sufficient opportunity for productive participation in BLM resource management decision making as set forth in BLM Manual Section 8160. The Shoshone-Bannock Tribes are support entities in the on-going CERCLA process, and have reviewed and commented on the CMEWP. Comments from tribal staff were addressed prior to EPA approval of the CMEWP. Additionally tribal staff have been briefed on the exploration project through regular participation associated with the CERCLA process. No specific concerns regarding issuing an exploration license have been identified by tribal staff.

Chapter 2
Alternatives

2.1 Introduction

As discussed in Chapter 1, the Proposed Action is the exploration license application while the CMEWP is a connected action (see Chapter 4). The activities conducted under the exploration license application are dependent on the activities in the CMEWP that occur before and after the exploration activities.

2.2 Proposed Action

The Proposed Action consists of deepening the boreholes approved by EPA in the CMEWP - currently 50 boreholes at 32 locations (**Figure 2**) into the ore bearing sections of the Phosphoria Formation to collect ore samples which would be used to define the nature and extent of the remaining phosphate resource. P4 would use this information together with historical drilling data to evaluate the economic feasibility of recovering these potential phosphate reserves. These deepened boreholes would penetrate through the Meade Peak Member of the Phosphoria Formation extending approximately 20 feet into the underlying Wells Formation. Drilling depths for these borings are generally expected to be between 250 and 500 feet below ground surface (**Table 1**).

Table 1.
Borehole Plan

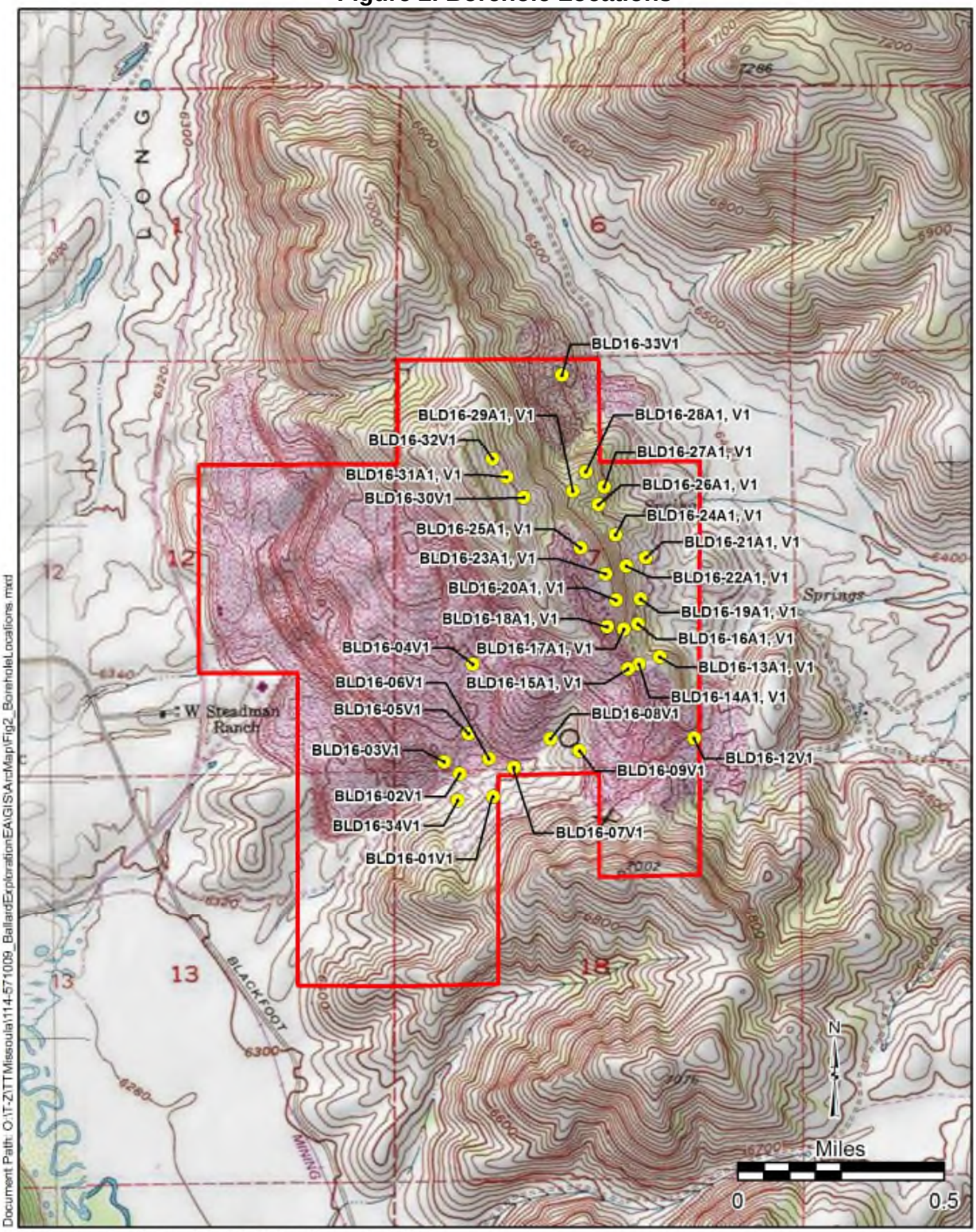
Borehole ID	Feet to Meade Peak Member (CMEWP)	Extra Drilling Feet (Proposed Action)	Approx. Total Feet
BLD16-01V1	60	200	260
BLD16-02V1	75	225	300
BLD16-03V1	80	235	315
BLD16-04V1	SURFACE	150	150
BLD16-05V1	SURFACE	180	180
BLD16-06V1	30	195	225
BLD16-07V1	100	225	325
BLD16-08V1	25-50	225-250	275
BLD16-09V1	25-50	225-250	275
BLD16-12V1	175	200	375
BLD16-13A1	225	220	445
BLD16-13V1	220	195	415
BLD16-14A1	180	210	390
BLD16-14V1	175	205	380
BLD16-15A1	55	210	265
BLD16-15V1	55	205	260
BLD16-16A1	205	205	410
BLD16-16V1	200	200	400
BLD16-17A1	165	200	365

Table 1.
Borehole Plan

Borehole ID	Feet to Meade Peak Member (CMEWP)	Extra Drilling Feet (Proposed Action)	Approx. Total Feet
BLD16-17V1	160	200	360
BLD16-18A1	55	210	265
BLD16-18V1	55	205	260
BLD16-19A1	220	205	425
BLD16-19V1	210	200	410
BLD16-20A1	165	200	365
BLD16-20V1	160	200	360
BLD16-21A1	295	205	500
BLD16-21V1	285	200	485
BLD16-22A1	220	205	425
BLD16-22V1	210	200	410
BLD16-23A1	165	200	365
BLD16-23V1	160	200	360
BLD16-24A1	275	205	480
BLD16-24V1	265	200	465
BLD16-25A1	85	215	300
BLD16-25V1	75	215	290
BLD16-26A1	220	205	425
BLD16-26V1	210	200	410
BLD16-27A1	275	205	480
BLD16-27V1	265	200	465
BLD16-28A1	220	205	425
BLD16-28V1	210	200	410
BLD16-29A1	165	200	365
BLD16-29V1	160	200	360
BLD16-30V1	55	205	260
BLD16-31A1	55	210	265
BLD16-31V1	55	205	260
BLD16-32V1	55	205	260
BLD16-33V1	80 (~60ft of dump)	200	280
BLD16-34V1	50	200	250

Source; Adapted from Appendix B (MWH Americas, Inc., 2016).

Figure 2. Borehole Locations



Reverse circulation drilling method would be used to deepen the boreholes. With this method, circulating fluid (water) flows from the surface down the borehole annulus outside the drill pipe, into the drill bit, and up the inside of the drill pipe to the ground surface. The fluid carries the cuttings to the surface and discharges them into a settling pit or tank. Drilling is accomplished typically with water without the use of additives.

Depending on the information obtained from the 50 boreholes, it is possible that P4 would request to deepen additional boreholes. In anticipation of additional requests, and to allow flexibility in phosphate ore characterization, the Proposed Action also includes the deepening of additional boreholes within the KPLA boundary, given the exploration borehole locations are approved by the EPA.

Drilling is anticipated to occur during the summer and fall 2016 and would depend on weather conditions or other restrictions (P4, 2016). Drilling may extend into 2017, if necessary.

2.3 No Action

Under the No Action Alternative, the BLM would not issue an exploration license. Consequently, P4 would be denied the opportunity to characterize potential phosphate resources, and BLM would not have the information to evaluate the potential for additional phosphate ore recovery. As the CMEWP is already approved, it would continue as planned.

2.4 Groundwater Protection Measures and Best Management Practices

The CMEWP indicates that boreholes would be abandoned according to State of Idaho Regulations “Well Construction Standards Rules” (Idaho Administrative Procedures Action (IDAPA) 37.03.09 to minimize risk to groundwater. These rules state that “a properly decommissioned well will not: produce or accept fluids; serve as a conduit for the movement of contaminants inside or outside the well casing; or allow the movement of surface or ground water into unsaturated zones, into another aquifer, or between aquifers.” Proper abandonment would prevent water migration from surface to groundwater.

2.5 Other Alternatives Considered

Issues identified did not warrant development of additional alternatives to consider.

Chapter 3
Affected Environment and Environmental Consequences

3.1 Introduction

The BLM is required to consider a wide range of resources and disclose the impacts on those that may be affected. **Table 2** identifies the elements that must be reviewed according to the BLM NEPA Handbook (BLM, 2008), and other resources based on public comment and internal scoping. For the resources listed in **Table 2** as either "not present" or "present not affected", rationale is provided as to why the resource would not be affected with implementation of the Proposed Action. For the resources that are "present affected" by the Proposed Action, an analysis in narrative form is provided in Sections 3.2 and 3.3.

Table 2.
Resource Considered

Resource	Resource Presence and Potential Effects	Rationale
Access	Present, not affected	The Proposed Action would not affect public access.
Air Quality	Present, not affected	The Proposed Action of increasing the drilling depth would not produce additional emission from vehicles or equipment, or particulate matter.
Areas of Critical Environmental Concern	Not present	No Areas of Critical Environmental Concern (BLM, 2012) are in or near the drilling locations
Cultural Resources	Present, not affected	Cultural resources may be present, but the extending the drilling depth will not affect cultural resources.
Economic and Social Values	Present, not affected	Extending the depth of drilling during the short-term (June to fall 2016) will not cause changes in economic or social values.
Environmental Justice	Not present	Less than five percent of the total population of Caribou County is considered minority (US Census Bureau, 2015a), while less than 8 percent of the population is below the poverty level (US Census Bureau, 2015b). No minority or low income populations reside in or adjacent to the project.
Land Use	Present, not affected	Extending the depth of drilling will have no effect on the current or likely future land use due to its short-term nature (June to fall 2016).
Fish	Not present	All drainages are ephemeral (P4, 2016) and none have fish (IDFG, 2015a). The nearest drill site is nearly a mile from the Blackfoot River.
Floodplains	Not present	No floodplains occur within the project area (FEMA, 2016).
Forests	Present, not affected	Extending the depth of drilling would not affect forests. The majority of the project area is disturbed and not forested.

Table 2.
Resource Considered

Resource	Resource Presence and Potential Effects	Rationale
Invasive, Non-native Species	Present, not affected	Extending the depth of drilling would not cause additional surface disturbance that can facilitate the establishment and spread of invasive, non-native species.
Geology and Minerals	Present, affected	Impacts are disclosed under Environmental Consequences (Section 0).
Migratory Birds	Present, not affected	Extending the depth of drilling will not create additional surface disturbance that may affect migratory birds.
Native American Religious Concerns	Not present	Native American Religious Concerns may be present, however there is no additional surface disturbance anticipated from the additional drilling depths associated with the Proposed Action. Consequently, there would be no impacts to Native American Religious Concerns.
Paleontological Resources	Present, not affected	Paleontological resources which may be present consists almost entirely of marine invertebrates that are generally abundant and widespread in their distribution. However, they are not unique and potential impacts from extending the depth of exploration boreholes are anticipated to be negligible.
Soil Resources	Present, not affected	Extending the depth of drilling would not cause additional surface disturbance. Consequently, soil resources would not be affected through implementation of the Proposed Action.
Special Designations	Not present	There are no special designation areas near the project area (BLM, 2012).
Threatened, Endangered or Sensitive Plants	Present, not affected	Extending the drilling depth would not cause additional surface disturbance which could affect threatened, endangered, or sensitive plants. Consequently, there would be no impacts to threatened, endangered, or sensitive plants.
Threatened, Endangered or Sensitive Animals	Not present	There are no known occurrences of threatened, endangered, or sensitive animal species in the project area and no designated critical habitat (IDFG, 2015b) in the project area. Because there is no additional surface disturbance anticipated from the additional drilling depths associated with the Proposed Action, there would be no impacts on threatened, endangered, or sensitive animals.
Threatened, Endangered or Sensitive Fish	Not present	No fish-bearing streams occur near the proposed drilling (see Fish above). The Blackfoot River contains Yellowstone cutthroat trout (IDFG, 2015a), a BLM sensitive fish species (BLM, 2015) and is nearly a mile southwest of the drilling.
Range	Present, not affected	Extending the depth of drilling will not affect grazing or range management as no additional surface disturbance would occur and no grazing allotments overlap the proposed drilling (BLM, 2013).

Table 2.
Resource Considered

Resource	Resource Presence and Potential Effects	Rationale
Recreational Use	Not present	There are no developed recreational facilities or campgrounds near the project area (Recreation.gov, 2016). Extending the depth of drilling would not affect public access to recreation opportunities.
Tribal Treaty Rights and Interests	Not present	Tribal Treaty Rights and Interest may be present, however because the site has already been disturbed and there is no additional surface disturbance anticipated from the additional drilling depths associated with the Proposed Action, there would be no additional impacts to Tribal Treaty Rights and Interests.
Vegetation	Present, not affected	Extending the depth of drilling will not cause additional surface disturbance and therefore would not affect vegetation.
Visual Resources	Present, not affected	Extending the depth of drilling will not affect surface activities and therefore will not affect visual quality.
Wastes, Hazardous and Solid	Not present	Extending the depth of drilling will not generate additional solid or hazardous waste. The materials needed, including diesel fuel, pipe dope [to lubricate pipe connections], drilling muds and foam, bentonite, concrete, motor and gear oil, and hydraulic oil are part of the Feasibility Study Investigation and have low potential for accidental spills.
Water Quality (Surface Water and Groundwater)	Present, affected	Extending the depth of exploration boreholes would not affect surface water resources. Impacts to groundwater resources are disclosed under Environmental Consequences (Section 3.3).
Wetlands and Riparian Zones	Present, not affected	Extending the depth of drilling will not affect any wetlands and riparian zones that may be present because no additional surface disturbance would occur.
Wild and Scenic Rivers	Not present	No designated Wild and Scenic Rivers are within or adjacent to the proposed drilling (National Wild and Scenic Rivers System, 2016).
Wilderness and Lands with Wilderness Characteristics	Not present	The closest Wilderness Study Area (Petticoat Peak Wilderness Study Area) is 23 miles southwest of the drilling (BLM, 2012).
Wildlife	Present, not affected	Extending the depth of drilling will not affect wildlife because no surface disturbance would occur as a result of implementation of the Proposed Action.

3.2 Geology and Minerals

3.2.1 Affected Environment

3.2.1.1 Regional Geologic Setting

The project area is in the Fox Hills in the Idaho – Wyoming Fold and Thrust Belt in the Northern Rocky Mountain province. The area is characterized by northwest trending mountain ranges and valleys. The northwest-trending structural fabric was produced by complex compressional tectonic events yielding a folded and faulted landscape. The main compressional events took place during the Sevier Orogeny in late-Jurassic to Cretaceous time. The compressional features were subsequently overprinted by high-angle, northwest-trending extensional faults associated with the formation of the Basin and Range Province which started at the end of the Tertiary Period and continues today.

3.2.1.2 Stratigraphy

Detailed descriptions of the sedimentary bedrock units are provided by numerous authors including (Mansfield, 1927), (McKelvey, et al, 1959), and most recently by (Hovland, 1981). The bedrock units are sedimentary and were formed in shallow seas. They are dominated by limestone and shale, and range in age from Pennsylvanian to recent. The brief descriptions below are listed from oldest to youngest.

Wells Formation

The Pennsylvanian and Permian Wells Formation (identified on Figure 3 as PPw) is divided into two members. The Lower Member is a gray massive limestone with some chert and sandy interbeds. It is about 300 meters thick. The Upper Member is a brownish-gray to reddish-gray sandstone mixed with light-gray dolomite beds. The Upper Member is typically 520 meters thick. The thick layers of limestone, dolomite, and sandstone of the Wells Formation form the regional aquifer.

Park City Formation

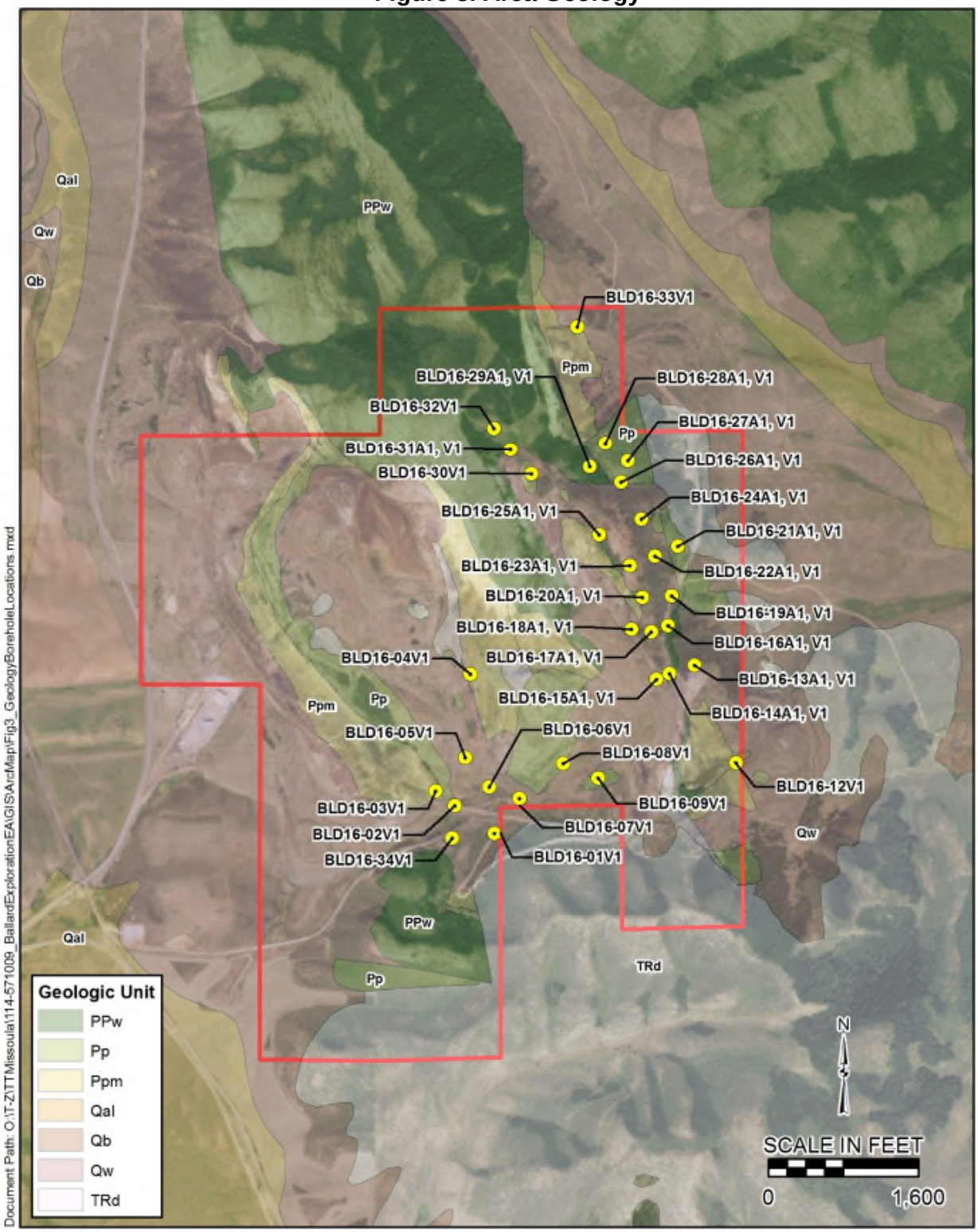
The lower-Permian Grandeur Tongue of the Park City Formation (included with Wells Formation on **Figure 3**) is a light-gray to brownish-gray dolomite with minor siltstone, and chert interbeds. The thickness typically is up to about 30 meters (Rioux, et al., 1975). Quite often the Grandeur Tongue is mapped together with the Wells Formation.

Phosphoria Formation

The Permian Phosphoria Formation contains beds of economic-grade phosphate which have been mined, by both underground and surface mining methods, in the region since about 1900. The Phosphoria Formation is divided into two members, the Meade Peak Member (Ppm on **Figure 3**) and the overlying Rex Chert Member (Ppr on **Figure 3**).

Rocks in the Meade Peak Member locally consist of about 45 meters of dark brown phosphorite, siltstone and mudstone, with minor beds of limestone and sandstone. The sequence of siltstone, mudstone, and limestone represent a transgression and regression of a shallow sea. Phosphate concentrations are highest – and generally reach economic grades – in two zones, one at the top (the upper ore) and the bottom (the lower ore) of the Meade Peak

Figure 3. Area Geology



Member. The overall package of fine-grained rocks generally has very low permeability and acts a hydrologic aquitard, except where highly faulted or fractured that separates regional groundwater flow in the underlying units from local- and intermediate-scale groundwater flow in the overlying units.

The Rex Chert Member consists of about 11 meters of gray to bluish-gray, massive, cliff-forming chert overlain by about 48 meters of chert-rich siltstone and mudstone. Where fractured, the Rex Chert Member may be water bearing and forms perched or localized groundwater systems.

Dinwoody Formation

The Triassic Dinwoody Formation (TRd on **Figure 3** may be divided into numerous members and distinct mapping units; however, the most recent mapping has not made these distinctions. The Dinwoody Formation is a mix of siltstone, limestone, and sandstone about 600 meters thick. Due to variable weathering, the formation ranges in color from gray to brown, but most commonly occurs as an olive-colored siltstone.

Alluvium

Alluvium (Qa on **Figure 3**) is present on slopes and in drainages in variable thickness and is composed of unconsolidated Holocene and Pleistocene poorly sorted gravel, sand, silt, and clay.

Disturbed Surface

Disturbed surface (Qw on **Figure 3**) is composed of facilities created by mining activity for the Ballard Mine. It includes road fill, waste rock dumps, and backfill which conceal bedrock features beneath.

3.2.1.3 Structure

The Fox Hills lie on the west limb of the Slug Creek Syncline. The axis of the Slug Creek Syncline is covered, and lies in the valley on the east side of the Fox Hills (Mansfield, 1927). The area is bisected by the Blackfoot Fault, an east-west trending, transverse fault with a significant, but undermined, amount of vertical and lateral displacement (Hovland, 1981). South of the Blackfoot Fault, outside of the project area, the Fox Hills are dominated by exposures of the Triassic Dinwoody Formation. North of the Blackfoot Fault, the dominant exposures are of younger Pennsylvanian and Permian carbonate rocks. Significant local thrust faults, folds and high-angle faults have created discontinuous outcrops of the Phosphoria Formation. Locally, the Phosphoria Formation does not form long, linear outcrops as seen in the neighboring Wooley Range and on Rasmussen Ridge.

3.2.2 Proposed Action Direct and Indirect Effects

Additional information regarding the nature and extent of the remaining phosphate resource would be gathered. This information may be valuable for evaluating future BLM management of phosphate minerals at the site. Effects on the phosphate reserves from the advancement of the drill holes into the Meade Peak are considered negligible.

3.2.3 No Action Direct and Indirect Effects

Because the exploration license would not be approved, additional information regarding the nature and extent of the remaining phosphate resource would not be gathered. No additional impacts to geology and minerals would occur.

3.3 Groundwater Quality

3.3.1 Affected Environment

The groundwater system can be divided into 1) local shallow groundwater flow systems generally hosted within alluvium and sometimes within shallow bedrock and that are recharged and discharge within a single adjacent ridge and valley area, 2) shallow to deep intermediate flow systems typically within sedimentary bedrock units of the Phosphoria and Dinwoody formations but occasionally within portions of the Wells Formation, which may be recharged on one side of a ridge and discharge to an adjacent valley on the opposite side of the ridge, and 3) a regional flow system within the Wells Formation and deeper sedimentary bedrock units, which transmit groundwater over large distances between multiple interconnecting valleys. The intermediate and deep flow systems are separated by the Meade Peak Member of the Phosphoria Formation.

Groundwater flow within the local systems is typically from topographically higher areas toward the adjacent valleys and then down-valley. Groundwater flow within the intermediate system typically similar, but in the project area it is not well documented. Groundwater flow within the regional system is generally toward the west, although local variations likely occur as a result of geologic structure. Groundwater elevations in the regional flow system are documented in five monitoring wells in the western part of the project area and range from approximately 6,224 feet above mean sea level (amsl) to approximately 6,330 feet amsl (MWH Americas, Inc., 2013).

Analyses of samples from the shallow groundwater system define three separate areas downgradient of mine waste material piles on the eastern side and three larger areas downgradient of mine waste material piles on the western side of the project area which exceed the DEQ groundwater standard for selenium (50 parts per billion). Samples from the intermediate flow system have also exceeded the selenium standard where it is immediately overlain by the shallow flow system where groundwater in the shallow system exceeds the selenium standard. Three of the five monitoring wells in the Wells Formation (the regional groundwater system) have exceeded the selenium standard. Additionally, groundwater samples have contained concentrations of total aluminum, arsenic, cadmium, iron and manganese and dissolved cadmium, manganese, sulfate and total dissolved solids that occasionally exceeded groundwater quality standards.

3.3.2 Proposed Action Direct and Indirect Effects

3.3.2.1 Groundwater

Drilling of the additional exploration depth in the boreholes would result in the boreholes penetrating approximately 20 feet into the Wells Formation, which is the regional aquifer. Based on the proposed borehole total depths and approximate depths to groundwater estimated from

groundwater levels measured in Wells Formation monitoring wells MMW06, MMW020, MMW021, MMW030 and MMW031 (MWH Americas, Inc., 2013), the majority of the proposed boreholes would encounter groundwater under confined (artesian) conditions in the Wells Formation. Under those circumstances and with the proposed reverse circulation drilling method, groundwater from the Wells Formation would likely mix into the drilling fluid and be brought to the land surface, where the drilling fluid would be contained within a settling pit or tank and recirculated back down the borehole until the total depth of the borehole is reached. Drilling fluids may mix into the groundwater through the borehole and may seep from settling pits and infiltrate into groundwater. Drill cuttings carried by the drilling fluids may contribute leachate to the drilling fluids.

Potential risks to groundwater from the proposed additional borehole drilling depths include:

- the direct impact of the drilling fluids on groundwater,
- drilling fluids or formation water stored on the surface infiltrating into groundwater,
- leachate from drill cuttings infiltrating into the groundwater via the additional borehole length, and
- leachate from existing mine waste materials infiltrating into the groundwater via the additional borehole length.

No direct impacts are anticipated from drilling fluids on groundwater or from drilling fluids or formation water stored on the surface infiltrating into groundwater because the drilling fluid would be water hauled from the Blackfoot Bridge Mine and used without additives; the volume of drilling fluids would be small compared to the volume of groundwater in the aquifers; and the chemical quality of the drilling fluid would not be substantially different from that of the groundwater.

Leachate from drill cuttings or existing mine waste materials will not infiltrate into the groundwater via the additional borehole length because boreholes which encounter groundwater would be abandoned in accordance with to State of Idaho Regulations “Well Construction Standards Rules” (IDAPA 37.03.09) to minimize impacts to groundwater. These regulations state that “a properly decommissioned well will not: produce or accept fluids; serve as a conduit for the movement of contaminants inside or outside the well casing; or allow the movement of surface or ground water into unsaturated zones, into another aquifer, or between aquifers.” Proper abandonment would prevent water migration from the surface to groundwater and between zones of underground water.

3.3.3 No Action Direct and Indirect Effects

The No Action Alternative would consist of not issuing an exploration license to allow the additional drill depth and exploration within the drill holes that will be used for the CMEWP, as it is already approved. Therefore, no additional impacts to groundwater would occur from the additional drill depths associated with the Proposed Action.

Chapter 4
Cumulative Effects

4.1 Cumulative Impacts

Cumulative effects are those impacts to the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

This section provides the incremental impacts that the Proposed Action or No Action alternative are likely to have when considered in the context of impacts associated with past, present, and reasonably foreseeable actions that have occurred or are likely to occur. The connected action (CMEWP) is a reasonably foreseeable action.

Cumulative impact analysis areas are defined for each resource, depending on the extent of potential indirect impacts and are defined in each resource section.

4.2 Past, Present, and Reasonably Foreseeable Actions

4.2.1 Past and Present Actions

Past and present actions have affected the cumulative impacts analysis areas. G.R. Mansfield and others performed geologic mapping in 1912, 1914, and 1916. Exploration work for mining purposes included air rotary and core drilling in the late1940's and throughout the 1950s and 1960s. Several monitoring wells and geotechnical boreholes were drilled in the 2000s. In the 1940s, 1950s and 1960s, ore trenching was completed periodically to help with exploration of the property. This trenching was necessary to investigate earlier mapping by Mansfield and others that indicated extensive localized faulting. Detailed geologic data on faults and bedding orientation ore chemistry were collected from these trenches and furnished to the BLM in the 1950s and 1960s.

Numerous environmental studies and reports have been done on the Ballard property between 1998 and 2014. A bibliography of these reports is included as Appendix A of the CMEWP. Mining the Ballard Mine began in 1955 and continued until 1969. Ballard Mine created several open mine pits. Piles of mine spoil were spread over the property. About 11 million tons of phosphate rock were mined and removed from about 191 acres at the Ballard Mine. Over 20 million cubic yards of waste rock were stripped; of this amount, 2 million cubic yards were used to backfill the pits with the remaining 18 million cubic yards placed in nearby external waste rock dumps. About 317 acres of land were covered by the external dumps and an additional 96 acres were used as service areas for the mine (Lee, 2000).

4.2.2 Reasonably Foreseeable Actions

Reasonably foreseeable actions include the CMEWP disturbance, access, drilling, environmental protection measures, and reclamation and abandonment. Although future CERCLA action is anticipated, a cleanup alternative has not been selected at this point and the specifics of the design are not yet known. The purpose of the action will be to reduce or remove

contamination in surface and groundwater, although the exact time frame or results cannot be analyzed in detail as a cumulative effect. Below is a description of the features of the reasonably foreseeable CMEWP approved by EPA that may contribute cumulative impacts on mineral resources and groundwater quality. More detail on the reasonably foreseeable action is below.

4.2.2.1 Access

Access for drilling equipment and sampling would use existing access roads wherever possible. Access to the proposed drilling would be coordinated with the surface owner and would use existing roads or roads constructed or reopened as part of the remedial investigation and Feasibility Study Investigation. Based on real-time information obtained from the drill program, the orientation and location of subsequent drill holes may require adjustment or modification to ensure the maximum information is acquired. All roads, created or reopened would be reclaimed and closed at the end of the drilling program as part of the EPA's feasibility study investigation (P4, 2016).

All roads accessing drill pads will be reclaimed by the end of the year 2016 after the hole or holes are completed. Earthen berms will be constructed following reclamation activities to prevent unauthorized road access. Roads left open over the winter, will utilize gates or other methods, as needed, to restrict access (P4, 2016).

The disturbance associated with the construction of drill roads (connected action for the Feasibility Study Investigation) is estimated to be 1.56 acres based on a road width of 20 feet and includes shoulder and berm (MWH Americas, Inc., 2016).

No public roads or facilities will be closed during the exploration of the Ballard Property.

4.2.2.2 Drill Pad Construction

Drill pads would need to be constructed to make a level and safe place for drillers to operate. The disturbance for the construction of drill pads is expected to be 1.87 acres, based on pad dimensions of 40 feet by 60 feet (2,400 square feet or 0.0551 acres per pad) (MWH Americas, Inc., 2016). The drill pad disturbance is considered part of the connected Feasibility Study Investigation. Drill pads for reverse circulation drilling will include a sump or tanks to catch drilling water and cuttings.

4.2.2.3 Reclamation and Borehole Abandonment

Roads, pads, and borehole sites will be reclaimed using the same or similar equipment used in their construction. Reclamation will include back tracking the slash generated in the construction of the drill site or road and the redistribution of spoiled topsoil generated in the construction of roads and pads. Drill roads and pads will be seeded with an approved seed mix. P4 will work closely with the BLM to ensure the described seed mix will meet ground cover requirements and not result in persistent establishment of exotic vegetation species.

Borehole abandonment will be completed as directed by the State of Idaho. Unless otherwise specified by the state, hydrated bentonite chips will be used in boreholes encountering groundwater. Where boreholes do not encounter groundwater, boreholes will be filled using a combination of drill cuttings, bentonite, and concrete. Concrete will be used to seal the upper five feet of the borehole.

4.3 Cumulative Impacts by Resource

The following section describes the cumulative impacts from the proposed Ballard Exploration drilling when combined with other past, current, and foreseeable future actions described in Section 4.2. Only resources that would be directly and/or indirectly impacted by the Proposed Action are addressed.

4.3.1 Geology and Minerals

The analysis area for cumulative impacts on geology and minerals is the project area (**Figure 1**). This area was chosen as the direct and indirect impacts to geology and minerals would not extend beyond this area.

4.3.1.1 Proposed Action

The geology and minerals have undergone substantial disturbance from prior mining activities and will experience negligible impacts through implementation of the CMEWP. The analysis in Section 3.2.2 indicated negligible direct or indirect effects on geology and minerals, therefore, the proposed action would have negligible cumulative impacts.

4.3.1.2 No Action

The analysis in Section 3.2.3 indicated there would be no direct or indirect impacts from the no action alternative. Therefore, the no action alternative would result in no cumulative impact on geology and minerals.

4.3.2 Groundwater Quality

The analysis area for cumulative impacts on groundwater quality is the regional aquifer (Wells Formation) within a mile of the project area. This area was chosen because the direct and indirect impacts on groundwater quality would not extend beyond this area, yet this area can be used to represent the historical impacts on the groundwater quality.

4.3.2.1 Proposed Action

Water quality has been adversely affected by historic mining activity. Groundwater concentrations of total aluminum, arsenic, cadmium, iron, and manganese, and dissolved cadmium, manganese, sulfate, and total dissolved solids have exceeded applicable standards.

The additional drilling depths of the proposed action would not affect groundwater quality and therefore would not cause or contribute to additional cumulative impacts to groundwater quality.

Because water hauled from the Blackfoot Bridge Mine would be used as the drilling fluid (without additives): the volume would be small compared to the volume of groundwater in the aquifers; and the chemical quality of the drilling fluid would not be substantially different from that of the groundwater; there would be no cumulative impacts from drilling fluids on groundwater or from drilling fluids or formation water stored on the surface infiltrating into groundwater due to the CMEWP.

Leachate from drill cuttings or existing mine waste materials will not infiltrate into the groundwater via the additional borehole length because boreholes which encounter groundwater would be abandoned in accordance with to State of Idaho Regulations “Well

Construction Standards Rules" (IDAPA 37.03.09) to minimize impacts to groundwater. These regulations state that "a properly decommissioned well will not: produce or accept fluids; serve as a conduit for the movement of contaminants inside or outside the well casing; or allow the movement of surface or ground water into unsaturated zones, into another aquifer, or between aquifers." Proper abandonment would prevent water migration from the surface to groundwater and between zones of underground water. Consequently, no cumulative impacts to groundwater quality are anticipated as a result of implementation of the CMEWP.

The reasonably foreseeable CERCLA action would eventually result in improved groundwater quality and a reduction in concentrations of contaminants listed above.

4.3.2.2 No Action

The no action alternative would result in no cumulative impact on water quality.

Consistent with the discussion provided above in Section 4.3.2.1, no cumulative impacts to groundwater quality are anticipated as a result of implementation of the CMEWP.

The reasonably foreseeable CERCLA action would eventually result in improved groundwater quality and a reduction in concentrations of contaminants listed above.

Chapter 5
Consultation and Coordination

5.1 Consultation and Coordination

5.2 People and Agencies Consulted

The following agencies and organizations were consulted regarding the Proposed Action:

- Environmental Protection Agency
- P4 Production, LLC
- Greater Yellowstone Coalition
- Idaho Conservation League

5.1 List of Reviewers and Preparers

- Barry Myers, Geologist, Pocatello Field Office, BLM
- Jeffrey Cundick, Minerals Branch Chief, Pocatello Field Office, BLM
- Blaine Newman, Assistant Field Manager, Pocatello Field Office, BLM
- Michael Kuyper, Supervisory Natural Resources Specialist, Pocatello Field Office, BLM
- Cameo Flood, NEPA Specialist, Tetra Tech
- Keith Thompson, Hydrogeologist, Tetra Tech
- Lisa Harloe, Biologist, Tetra Tech
- Lynn Peterson, GIS Specialist/Cultural Resource Specialist, Tetra Tech

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